MANONAMANIAM SUNDARANAR UNIVERSITY, Tirunelveli

PG- Courses - Affiliated Colleges

Course Structure for M.A. (Tamil)

(Choice Based Credit System)

(With effect from the academic year 2021-2022 onwards)

Sem	Sub. No.	Subject	Subject Title	Contact Hrs./Week	Credits
(1)	(2)	(3)	(4)	(5)	(6)
I	1	Core - 1	இக்கால இலக்கியம் கவிதை	6	4
	2	Core - 2	இலக்கணம் 1 தொல்காப்பியம் - எழுத்து	6	4
	3	Core - 3	புனைகதையும் உரைநடையும்	6	4
	4	Core - 4	அற இலக்கியம்	4	4
	5	சிறப்புத் தாள் 1	நாட்டார் வழக்காற்றியல் அடிப்படைகள்	4	3
	6	சிறப்புத் தாள் 2	இதழியல்	4	3
			Sub Total	**30**	**22**
II	7	Core - 5	மொழி வரலாறு	6	4
	8	Core - 6	இலக்கணம் II தொல்காப்பியம் - சொல்	6	4
	9	Core - 7	பக்தி இலக்கியம்	6	4
	10	Core - 8	சிற்றிலக்கியம்	4	4
	11	சிறப்புத் தாள் 3	தமிழ் அகராதியியல்	4	3
	12	சிறப்புத் தாள் 4	இணையத் தமிழ்	4	3
			Sub Total	**30**	**22**

Sem	Sub. No.	Subject	Subject Title	Contact Hrs./Week	Credits
III	13	Core - 9	காப்பிய இலக்கியம்	6	4
	14	Core - 10	இலக்கணம் - **III** தொல்காப்பியம் பொருள் (இயல் 1-5)	6	4
	15	Core - 11	உரையாசிரியர்களும் உரைமரபும்	6	4
	16	Core - 12	ஆராய்ச்சி நெறிமுறைகள்	4	4
	17	சிறப்புத் தாள் 5	தமிழிலக்கிய மானிடவியல்	4	3
	18	சிறப்புத் தாள் 6	ஒப்பிலக்கியமும் மொழிபெயர்ப்பும்	4	3
			Sub Total	**30**	**22**
IV	19	Core - 13	பண்டை இலக்கியம்	5	4
	20	Core - 14	இலக்கணம் **IV** தொல்காப்பியம் பொருள் (6-9)	5	4
	21	Core - 15	இலக்கியத் திறனாய்வியல்	4	4
	22	Core - 16	தமிழ் நாடகக் கலை	4	4
	23	Core - 17	**Project**	12+	8
			Sub Total	**30**	**24**

For the Project, Flexible Credits are b/W 5-8 & Hours per week are b/w 10-16.

Total Number of Credits $\geq$ 90   :   90

Total Number of Core Course   :   17 (16T+1Prj)

Total Number of Elective Course   :   6

Total Hours   :   120

Semester	Code	Title of the Paper	Hours	Credits
I		நாட்டார் வழக்காற்றியல் அடிப்படைகள்	4	3

MSU/2021-/PG COLLEGE/M.A.TAMIL/SEMESTER – I/சிறப்புத்தாள் - 1

நாட்டார் வழக்காற்றியல் அடிப்படைகள்

L T P C

2 2 0 3

நோக்கம்

1. நாட்டார் வழக்காற்றியல் புலத்தை அறிமுகம் செய்தல்
2. நமது மண்ணின் மரபுகளைப் புரிந்து கொள்ளுதல்
3. நாட்டார் மரபுகள் சமூகப் பண்பாட்டு வாழ்வோடு கொண்டுள்ள தொடர்புகளை உணர்த்துதல்
4. மரபுகளின் தொன்மையையும் அவற்றின் நிகழ்காலப் பரிமாணங்களையும் அறியச்செய்தல்.
5. பழங்கால மக்களின் வாழ்வியலை அறிதல்.

அலகு – 1

புல அறிமுகம் - கலைச்சொற்கள் விளக்கம் - அடிப்படை கலைச்சொற்கள் - கலைச் சொல் சிக்கல்கள் - நாட்டார் யார்? - வழக்காறு என்றால் என்ன? - 21 வரையறைகள். - எல்லையும் பரப்பும் : ஜான்ஹெறால்டு பிரண்வாண்டின் முப்பொருள் பகுப்பு - ரிச்சர்டு எம்.டார்சனின் பகுப்பு - நாட்டார் வழக்காற்றியல் புலத்தின் படிநிலைகள் - சேகரித்தல் - வகைப்படுத்துதல் ஆய்வு - வாய்மொழி வழக்காறுகளின் இயல்புகள்.

(9L)

அலகு – 2

அடிப்படைக் கருத்தாக்கங்கள், போலி வழக்காறுகள் (ப.11) - திரிபு வடிவங்கள் (ப.150) - கருவி வழக்காறுகள் (ப.154.155) - கதைக்கூறு (ப.161) - கதை வகை (க.163) - இழைவுக்கூறு (ப.213) - வாய்மொழி இலக்கியங்கள் - கதைகள் - பாடல்கள், தாலாட்டு, தெம்மாங்கு, திருமணப்பாடல்கள் ஒப்பாரிப் பாடல்கள், கதைப்பாடல்கள் - கதைகள் - பழமொழிகள் விடுகதைகள்.

(9L)

அலகு – 3

நாட்டார் நிகழ்த்துக் கலைகள் - தெருக் கூத்து - பாவைக் கூத்து - கணியான் கூத்து - வில்லுப்பாட்டு - ஒயிலாட்டம் - தேவராட்டம் - கரகாட்டம் - ஆகியவற்றின் வடிவம் - உள்ளடக்கம் - நிகழ்த்தப் பெறும் சூழல் - நிகழ்த்தும் மரபு - சடங்கியல் உறவுகள்.

(9L)

அலகு – 4

நாட்டார் வழிபாடு - நாட்டார் சமயத்தின் செயல்பாடுகள் - புராணக் கதைகள் - தெய்வங்களின் வகைகள். சிறு தெய்வம் - பெருந்தெய்வம் - கொலையில் உதித்த தெய்வங்கள் - தாய்த் தெய்வங்கள் - வழிபாட்டு இடங்கள் - சடங்கியல் நிகழ்த்துதல்கள் - பலிகளின் வகைகள் - வழிபடுவோர் - ஆவியியம் - கோட்பாடும், தாக்கமும் குறைபாடுகளும் - நம்பிக்கைகள் - பழக்கவழக்கங்கள் - நாட்டார் விளையாட்டுகள் - உயிரியம் - குலக்குறியியம்.

(9L)

அலகு – 5

களஆய்வு - ஆய்வுக்களம் தேர்வு - சிக்கலை அடையாளம் காணுதல் - நாட்டார் வழக்காற்றுப் படிமுறைகள் - களஆய்வு உத்திகள் - நேர்காணல் - உற்றுக்கவனித்தல்.

(9L)

(TOTAL 45L)

பாடநூல் :

1. லூர்து. தே., 2000, நாட்டார் வழக்காற்றியல் சில அடிப்படைகள், நாட்டார் வழக்காற்றியல் ஆய்வு மையம், பாளையம் கோட்டை

பார்வை நூல்கள் :

1. இராமநாதன், ஆறு., 2007, தமிழர் கலை இலக்கிய மரபுகள், நாட்டுப்புறவியல் ஆய்வுகள், மெய்யப்பன் பதிப்பகம், சிதம்பரம்.

2. லூர்து, தே., 1988, நாட்டார் வழக்காறுகள், மணிவாசகர் பதிப்பகம், சிதம்பரம்.

3. சிவசுப்பிரமணியன். ஆ., 1987, மந்திரம், நாட்டார் வழக்காற்றியல் தொகுதி.1

4. ஸ்டீபன். ஞா., 2009, தமிழ்ச்சமூகத்தில் வாய்மொழிக் கதைகள், பாவை பப்ளிகேஷன்ஸ், சென்னை.

5. சண்முக சுந்தரம், க., 1994. நாட்டுப்புற இயல், மணிவாசகம் பதிப்பகம், சென்னை.

6. தனஞ்செயன்.ஆ, 1996, குலக்குறியியலும் மீனவர் வழக்காறுகளும், அபிதா பப்ளிகேஷன்ஸ், பாளையங்கோட்டை.

7. பெருமாள், அ.கா, 1995, நாட்டாரியல் ஆய்வு வழிகாட்டி, ரோகினி பிரிண்டர்ஸ்(பி) லிமிடெட், நாகர்கோவில்.

8. வானமாமலை, நா., 1964, தமிழர் நாட்டுப் பாடல்கள், நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை.

9. ஹரிஹரன், வ., 2004, கொடை விழாவும் பரண்வெட்டும், தன்னானே வெளியீடு, காவ்யா பதிப்பகம், சென்னை.

Semester	Code	Title of the Paper	Hours	Credits
I		இதழியல்	4	3

MSU/2021-/PG COLLEGE/M.A.TAMIL/SEMESTER – I/சிறப்புத்தாள் - 2

இதழியல்

L T P C

2 2 0 3

நோக்கம்

1. இதழியல் குறித்து அறியச் செய்தல்
2. பத்திரிக்கைத் துறையில் மாணவர்களின் பங்கை அறியச் செய்தல்
3. பத்திரிக்கைகள் ஏற்படுத்தும் சமூக மாற்றத்தை உணரச் செய்தல்
4. இதழ்களில் பணியாற்றும் முறைகளைக் கற்றுக் கொடுத்தல்.
5. ஊடகங்களுள் இதழ்களின் பங்கினை எடுத்துரைத்தல்.

அலகு − 1

இதழியல் - விளக்கம் - மக்கள் தொடர்புச் சாதனங்கள் - மக்கள் தொடர்புக் கருவிகளில் பத்திரிக்கைகள் - பத்திரிக்கைகளின் பணிகள் - இதழியல் விதிகள் - பத்திரிக்கைகளின் பொறுப்புகளும் கடமைகளும் - மக்களாட்சியில் பத்திரிக்கைகளின் பங்கு

(9L)

அலகு − 2

செய்தித்தாளின் தோற்றம் - இந்திய இதழியல் - இந்திய விடுதலைப் போராட்டத்தில் இதழ்களின் பங்கு - தமிழக இதழ்கள் - தோற்றம் - தேசிய இதழ்கள், திராவிட இயக்க இதழ்கள், பிற இதழ்கள், விடுதலை இயக்க காலத்தில் தமிழ் இதழ்கள், தற்காலத் தமிழ் இதழ்கள், பழைய இதழ்கள், புகழ் பெற்ற இதழ்கள், புகழ் பெற்ற பத்திரிக்கையாளர்கள் - இதழியல் சட்டங்கள் - பத்திரிக்கை கவுன்சில் - இதழ்களின் சுதந்திரம் - இதழ்களின் நடத்தையறம் - இன்றைய இதழியல்

(9L)

அலகு − 3

செய்தி - வகைகள் - களங்கள் - செய்தியாளர்கள் - செய்தி சேகரிப்பு - செய்திகளை எழுதும் முறை - பேட்டி - தலைப்பு - முகப்பு - தலையங்கம் - பக்க அமைப்பு - செய்தி நிறுவனங்கள் - நிர்வாக அமைப்பு − ஆசிரியர் பிரிவு − வாணிபப் பிரிவு

- இயந்திரப் பிரிவு - இதழ்களின் பகுப்பும் அமைப்பும் - கால அடிப்படை – தன்மை அடிப்படை - உள்ளடக்க அடிப்படை.

(9L)

அலகு - 4

கருத்துப்படங்கள் - கேலிச்சித்திரங்கள் - பெட்டிச் செய்திகள் - காலநிலைக் குறிப்புகள் - அங்காடி நிலவரம் - இலச்சினை இடநிரப்பி - கையெழுத்துப் பத்திரிக்கைகள் - இராயல்டி ஆசிரியருக்குக் கடிதங்கள் - துணுக்குகள் - விளம்பரம் - விளக்கம் - நோக்கம் - வகைகள் - ஒழுக்கநெறிகள், நிறைகுறைகள்.

(9L)

அலகு - 5

புலனாய்வு இதழ்கள் - நச்சு இதழ்கள் - இன்றைய கால இதழ்களும் சமூகமும் - இதழியல் கலைச்சொற்கள். (9L)

(TOTAL 45L)

பாடநூல்

1. முனைவர் ச. ஈஸ்வரன், முனைவர் இரா. சபாபதி, இதழியல், பாவை பப்ளிகேஷன்ஸ் சென்னை.

பார்வை நூல்

1. மா. பா. குருசாமி, இதழியல் கலை, சக்தி ∴பைன் ஆர்ட்ஸ், சிவகாசி
2. கி.ராசா, இதழியல், தாமரை பப்ளிகேஷன்ஸ் சென்னை
3. வி. மோகன், இதழியல் பார்வை, மோனார்ச் கிராபிக்ஸ், சென்னை.
4. சு. சக்திவேல், இதழியல், மணிவாசகர் பதிப்பகம், சென்னை.
5. என்.கிருஷ்ணன், எஸ்.ஸ்ரீகுமார், மக்கள் தகவல் தொடர்பியல்.

கற்றல் விளைவுகள் (Course Outcomes)

1. இதழியலின் தோற்றம் வளர்ச்சியை அறிதல்.
2. இதழ்களின் வகைகளையும் படிநிலைகளையும் அறிதல்
3. செய்திகளின் தன்மைகளை ஆராய்தல்.
4. இதழ்களின் முக்கிய அம்சங்களைப் புலப்படுத்துதல்
5. இதழ்கள் மாணவர்களுக்கு ஏற்படுத்திக் கொடுக்கும் வாய்ப்புகள் குறித்து அறிதல்

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓		✓	✓	✓	

Semester	Code	Title of the Paper	Hours	Credits
II		தமிழ் அகராதியியல்	4	3

MSU/2021 – 2022/PG – Colleges/M.A. (Tamil)/Semester II/சிறப்புத்தாள் -3

தமிழ் அகராதியியல்

LTPC

2 2 0 3

நோக்கம் :

1. அகராதியியலை அறிமுகப்படுத்துதல்.
2. அகராதியியல் குறித்த அடிப்படைக் கல்வியை மாணவர்கள் கற்றல் மொழிப்பயிற்சிக்கான திறனை வளர்த்தல்.
3. பல்வேறு வகையான அகராதி நூல்களை அறிதல்.
4. மொழி வளர்ச்சியில் அகராதிகளின் தேவைகளை உணர்த்துதல்
5. பல்வேறு துறை சார்ந்த தூயத் தமிழ்ச் சொற்களை அறிதல்.

அலகு – 1

தமிழ் அகராதியியல் வரலாறு -அகராதியியல் விளக்கம் - அகராதிக்காலம் - அகராதிகளின் வகைகள் - அகராதிகளின் அமைப்பு முறை.   (9 L)

அலகு – 2

தொல்காப்பியக்காலம் - தொல்காப்பியமும் நிகண்டுகளும் - நிகண்டுகளின் காலம் - நிகண்டுகளின் தோற்றம் - விளக்கம் - வரலாறு - வகைகள் - நிகண்டுகளின் அமைப்புமுறை.

(9 L)

அலகு – 3

பதினேழாம் நூற்றாண்டு அகராதிகள் - பதினெட்டாம் நூற்றாண்டு அகராதிகள் - பத்தொன்பதாம் நூற்றாண்டு அகராதிகள் - இருபதாம் நூற்றாண்டு அகராதிகள் - கலைக்களஞ்சியங்கள் - தற்காலத் தமிழ் அகராதிகள்.

(9 L)

அலகு – 4

தமிழ் அகராதிகளில் வினைப்பதிவு - மரபும் வினைப்பதிவு வகைமையும் - இலக்கணக்குறிப்பு - வினைப்பதிவில் பொருட்சொற்கள் - வினைவேறுபடக்காட்டும் பதிவமைப்பு நெறி - வினைப்பதிவில் பொருள் தருமுறையும் சிக்கல்களும் - பொருள்விடுபாடு - உருவகவழக்கு.

(9 L)

அலகு – 5

தற்காலத் தமிழ் அகராதிகளின் வளர்ச்சிநிலைகள் - துறை சார்ந்த தமிழ் சொற்களை அறிதல். (சான்றாக : கல்வி, சமயம், கலைத்துறை சார்ந்த வழக்கிலுள்ள வழக்கிழந்த சொற்கள்) குறிப்பு: மாணவர்கள் தங்கள் வட்டாரம் சார்ந்த வழக்கு சொற்களைத் தொகுத்து புதிய கலைச் சொல்லகராதியை உருவாக்குதல். இவை திட்டக்கட்டுரையாக அமையலாம்

(9L)

TOTAL : 45 L

பாடநூல்கள்:

1. வ.ஜெயதேவன், தமிழ் அகராதியியல் வளர்ச்சி வரலாறு, ஐந்திணைப் பதிப்பகம், சென்னை – 5.

2. பெ.மாதையன், தமிழ் அகராதிகளில் வினைப்பதிவமைப்பு நெறிமுறைகள், நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை – 98.

பார்வை நூல்கள்:

1. சுந்தர சண்முகனார், தமிழ் அகராதிக்கலை, மெய்யப்பன் தமிழாய்வகம், சிதம்பரம்.

2. மாதையன்.பெ. 1997, அகராதியியல், முதற்பதிப்பு, தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்,

3. இராமசாமி நாயுடு, பேரகராதி சென்னை.

4. கிரியாவின் தற்காலத் தமிழ் அகராதி, கிரியா, சென்னை.

5. மண்டலபுருடர், சூடாமணி பன்னிரண்டு நிகண்டு மூலமும் உரையும், சென்னை.

கற்றல் விளைவுகள் (Course Outcomes)

1. அகராதிக் குறித்த அடிப்படை அறிவினை பெறுதல்.

2. தமிழ் அகராதிகளின் வகைகளை அறிதல்

3. புதிய தமிழ்ச் சொற்களை கண்டறிதல்

4. சொற்களின் வேறுபாட்டினையும் பொருளினையும் அறிதல்.

5. வட்டாரம் சார்ந்த தமிழ்ச் சொல்லகராதியை உருவாக்குதல்.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
CO2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
CO3	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
CO4	✔	✔	✔			✔	✔	✔	✔	

Semester	Code	Title of the Paper	Hours	Credits
II		இணையத்தமிழ்	4	3

இணையத்தமிழ்

LTPC

2 2 0 3

நோக்கம்

1. தமிழ் இணையங்கள் குறித்த புரிதலை உருவாக்குதல்.

2. இணையத்தளங்கள் தமிழ் கல்விக்கு உதவும் வகையை உணர்த்துதல்.

3. தமிழ் இலக்கியங்களின் வளர்ச்சியினை அறிதல்

4. இணையங்களினால் ஏற்படும் நன்மை தீமைகளை அறிந்து கொள்ளுதல்

5. இன்றையக் கல்வி முறையில் இணைய பயன்பாட்டை அறிதல்.

அலகு – 1

ஓலைச் சுவடி - அச்சு - தமிழின் நிலை - தமிழ எழுத்துக்கள் வடிவமைத்தல் - தமிழ்எழுத்துக்கள் பொருந்தும் முறை - சிக்கல்கள் - யூனிகோட் சிக்கலும் தீர்வும்

(9 L)

அலகு – 2

தமிழ் இணையங்கள் அமைத்தல் - முக்கியத் தமிழ் இணையங்கள் - தமிழ் இணைய நிறுவனங்களும், அமைப்புகளும் - வேலைவாய்ப்பு இணையங்கள் - தமிழ் மொழி இணையங்கள் - வலைப்பூ.

(9 L)

அலகு – 3:

இணையத்தில் தமிழ் - தரப்படுத்துதல் - இயக்க முறைமைகளில் தமிழ் - பிற மின்னணுச் சாதனங்களில் தமிழ் - தமிழ் இணையக் கல்விக் கழகம் - தமிழ் வள மையம் - மொழி பெயர்ப்புச் சேர்த்தியம்.

(9 L)

அலகு – 4:

மின்னூல் - கையாவண நூல் - மீயுரை நூல் - புரட்டும் நூல் - மென்னூல் - கிண் நூல் - மின்னூல்கிடங்கு - மின்அகராதி - மின் செய்தித்தாள் - மின் இதழ்கள்.

(9 L)

அலகு – 5

இணையத் தளங்கள் அமைப்பதற்கான வழிமுறைகள் - தமிழ்க் கல்விக்கு உதவும் இணைய தளங்கள் - சமூக இணையங்களும் தமிழ்க் கல்வியும் - இணைய மாநாடு - பின் விளைவுகள் - பரிந்துரைகள் - தமிழ் இணைய வளர்ச்சி.

(9 L)

TOTAL : 45L

பாட நூல்கள்

1. மா.ஆண்டோ பீட்டர் - தமிழும் கணிப்பொறியும் சா.்.ப்ட் வியூ பப்ளிகேஷன்ஸ், சென்னை, நான்காம்பதிப்பு, ஜூலை 2011.

2. இல.சுந்தரம், - கணினித் தமிழ், விகடன் பிரசுரம், சென்னை, ம.ப. - மே.2015.

பார்வை நூல்கள்:

1. பொன்னவைக்கோ, - இணையத் தமிழ் வரலாறு, பாரதிதாசன் பல்கலைக்கழகம திருச்சி, மு.ப- 2010

2. ம.செ.இரபிசிங், - தமிழ் இணையம், தமிழ் வலைத்தளங்கள், நர்மதா பதிப்பகம், சென்னை, மு.ப - 2009.

3. வாசன், கம்பியூட்டர் அமைப்பு முறை, நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை - 98.

கற்றல் விளைவுகள் (Course Outcomes)

1. தமிழ் இணைய வலைத்தளங்களை உருவாக்குதல்

2. கணினியில் தமிழ்த் தட்டச்சு செய்தல்

3. தமிழ் இணையத்தளங்களை இனங்கண்டு கொள்ளுதல்

4. இணையவழிப் படைப்புத்திறனை வெளிப்படுத்துதல்.

5. இணையவழி கோப்புகளைக் கையாளும் முறையைக் கற்றுக் கொள்ளுதல்

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO4	✓	✓	✓	✓	✓		✓	✓		✓

Semester	Code	Title of the Paper	Hours	Credits
III		தமிழிலக்கிய மானிடவியல்	4	3

MSU/2021-2022/PG- Colleges/ M.A.Tamil / Semester-III/ Ppr.no.17/சிறப்புத்தாள்- 5

தமிழிலக்கிய மானிடவியல்

L T P C

2 2 0 3

நோக்கம்:

1. மானிடவியலை அறியச் செய்தல்.

2. மானிடவியலின் பரிணாமங்களை உணர்த்துதல்.

3. மானிடவியல் அடிப்படையில் திணைக்கோட்பாட்டைப் புலப்படுத்துதல்

4. தமிழிலக்கிய இனவரைவியலை அறியச் செய்தல்.

5. இலக்கியங்களில் பண்பாட்டுச் சூழலியல் பற்றி விளக்குதல்

அலகு.1:

மானிடவியல் விளக்கம் - மானிடவியலின் தந்தை- இந்தியாவில் மானிடவியலின் வளர்ச்சி -முழுதளாவிய அணுகுமுறை - மானிடவியலின் நான்கு பரிணாமங்கள் - பண்பாட்டு மானிடவியல் - அமெரிக்க மானிடவியல், சமுதாய மானிடவியல்- ஆங்கிலேய மானிடவியல் இனவரைவியல், இனஒப்பாய்வியல்.

(6 L 6 T)

அலகு.2:

பண்பாடு விளக்கம் - வரையறைகள் - உண்மையியல் வகை - கருத்தியல் வகை பண்பாட்டுச் சார்புடைமைக் கொள்கை - பண்பாட்டின் உட்கூறுகள் - பண்பாட்டுக் கூறு - பண்பாட்டுக் கலவை - பண்பாட்டு நிறுவனம் - உட்கூறுகளின் தன்மைகள்.

(6 L 6 T)

அலகு.3:

இலக்கிய மானிடவியல், இலக்கிய இனவரைவியல், படிமலர்ச்சிக் கோட்பாடு - இலக்கியப் படிமலர்ச்சி.

(6 L 6 T)

அலகு.4:

தொல்காப்பியமும் இனவரைவியல் கவிதையியலும், சங்க இலக்கியத்தில் நாட்டார் உணவு, தாழியும் தமிழர் மரபுகளும், இனவரைவியலும் தமிழ் நாவலும்

(6 L 6 T)

அலகு.5:

சங்க இலக்கியம் - உணவு உற்பத்தியும் பரிமாற்ற உறவுகளும்
சங்க இலக்கியத்தில் இரும்புப் பண்பாடு, பதுக்கைகளும் பெருங்கற்படைச் சின்னங்களும், தாலியும் குலக்குறிச் சின்னமும், இலக்கியங்களில் பண்பாட்டுச் சூழலியல்.

(6 L 6 T)

(30L +30T=60 Hours)

பாட நூல்கள்:

1. பக்தவத்சல பாரதி.சீ, 1990 - பண்பாட்டு மானிடவியல், மெய்யப்பன் பதிப்பகம், சிதம்பரம்.

2. முனைவர் ஞா.ஸ்டீபன்,2017 - இலக்கிய இனவரைவியல், நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை.

3. முனைவர் ஞா.ஸ்டீபன், தொல்காப்பியமும் இனவரைவியல் கவிதையியலும், நியூ செஞ்சுரி புக் ஹவுஸ்,சென்னை.

4. சிவசுப்பிரமணியன்.ஆ, 2014, இனவரைவியலும் தமிழ்நாவலும், நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை.

பார்வை நூல்கள்:

1. கார்த்தி கேசு சிவத்தம்பி – பண்டைத் தமிழ்ச் சமூகம் வரலாற்றுப் புரிதலை நோக்கி, நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை .

2. சண்முகலிங்கன். என், பக்தவத்சல பாரதி.சீ, 2004 - இலங்கை - இந்திய மானிடவியல் மெய்யப்பன் பதிப்பகம், சிதம்பரம்.

3. செல்லப் பெருமாள்.ஆ, (ப.ஆ), 1991 – நாட்டார் வழக்காற்றியல் தொகுதி -3 (மானிடவியல் சிறப்பிதழ், பாளையங்கோட்டை).

4. ஜான் மோன்கன் , பீட்டர்ஜஸ்ட், 2005 – சமூக பண்பாட்டு மானிடவியல் மிகச் சுருக்கமான அறிமுகம், அடையாளம் பதிப்பகம்

5. பக்தவத்சல பாரதி.சீ, 2005, மானிடவியல் கோட்பாடுகள், வல்லினம் பதிப்பகம், சென்னை.

6. இராசமாணிக்கனார்.மா, 1955, தமிழர் திருமணத்தில் தாலி, செல்வி பதிப்பகம், காரைக்குடி.

7. இராசேந்திரன்.அ, 2006, நாட்டுப்புறப் பண்பாட்டுப் பழம்பெரும் மரபுகள், வனிதா பதிப்பகம்

Semester	Code	Title of the Paper	Hours	Credits
III		ஒப்பிலக்கியமும் மொழிபெயர்ப்பும்	4	3

MSU/2021-2022/PG- Colleges/ M.A.Tamil / Semester-III/ Ppr.no.18/- சிறப்புத்தாள் -6

ஒப்பிலக்கியமும் மொழிபெயர்ப்பும்

L T P C
2 2 0 3

நோக்கம்:

1. தமிழில் ஒப்பியலக்கிய வளர்ச்சி நிலையை விளக்குதல்.
2. ஒப்பிலக்கியமும்,மொழிபெயர்ப்பும் பற்றி அறியச் செய்தல்.
3. ஒப்பாய்வு, மொழிபெயர்ப்பு வாயிலாக பன்மொழி அறிவைப் பெறச் செய்தல்
4. ஒப்பியல் இலக்கிய ஆய்வின் வாயிலாக உலக ஒருமைப்பாட்டை வளரச் செய்தல்.
5. மொழிபெயர்ப்பின் கோட்பாடுகளையும், உத்திகளையும் புலப்படுத்துதல்

அலகு:1

ஒப்பிலக்கியம் - சொற்பொருள் விளக்கம் - மூவகை இலக்கியம் (தேசிய இலக்கியம், உலக இலக்கியம், பொது இலக்கியம்)- தமிழில் ஒப்பிலக்கிய வளர்ச்சி நிலை, ஒப்பீட்டில் அறிவியல் முறைகள்.

(6 L 6 T)

அலகு:2

பிரஞ்சுக் கோட்பாடு- அமெரிக்கக் கோட்பாடு- ஒப்பிலக்கியமும், மொழிப் பெயர்ப்புத் துறையும்.

(6 L 6 T)

அலகு:3

ஒப்பிலக்கியத்தில் புதிய பரிமாணம் சூசன் பாசுனெட் வரவு, இந்தியக் கவிதையில்மேலை இலக்கியத்தாக்கம், சீக்கிய கருத்தியலும் தமிழ்ச்சிந்தனை மரபும், பாரதிதாசன்- கிருஷ்ண சாஸ்திரியின் கவிதைகளில் இயற்கை, நாமக்கல்லார்- வள்ளத்தோள் கவிதைகளில் காந்தியம்

(6 L 6 T)

அலகு:4

மொழிபெயர்ப்பு இயல்பும் மரபும், மொழிபெயர்ப்பு – விளக்கம் - மொழி பெயர்ப்பு கலை மற்றும் அறிவியல் - மொழிபெயர்ப்பின் பயன்கள் - நோக்கங்கள் - இயல்புகள் - மொழிபெயர்ப்பாளரின் தகுதிகள் , கடமைகள், வகைகள்.

அலகு:5

மொழிபெயர்ப்பின் தோற்றமும் வளர்ச்சியும் - மொழிபெயர்ப்புக் கோட்பாடுகள் - மொழிபெயர்ப்பு உத்திகள் - மொழிபெயர்ப்பின் வகைகள் - மொழிபெயர்ப்புச் சிக்கல்கள்.

ஒப்படைப்பு (Assignment) – ஐந்து பக்கங்களுக்குக் குறையாமல் இருத்தல் வேண்டும்.

தமிழிலிருந்து ஆங்கிலத்தில் மொழிபெயர்த்தல்.

ஆங்கிலத்திலிருந்து தமிழில் மொழிபெயர்த்தல்.

பாடநூல்கள்

1. டாக்டர் தமிழண்ணல், 2014 – ஒப்பிலக்கிய அறிமுகம், பாரி நிலையம், சென்னை.

2. கிருஷ்ணன் .என், 2012 - மொழிபெயர்ப்பியல், செம்மூதாய் பதிப்பகம், சென்னை.

3. பா.ஆனந்தகுமார்,2003 - இந்திய ஒப்பிலக்கியம் சூசன் பாசுனெட்டை முன்வைத்து, மீனாட்சி புத்தக நிலையம், மதுரை.

பார்வை நூல்கள்:

1. கைலாசபதி, 2018 - ஒப்பியல் இலக்கியம், காலச்சுவடு பப்ளிகேஷன்ஸ், நாகர்கோவில்.

2. தமிழண்ணல், 2005 – சங்க இலக்கிய ஒப்பீடு, பாரி நிலையம், சென்னை.

3. டாக்டர் சண்முக கணபதி,2014 – ஒப்பிலக்கிய வரம்பும் செயற்பாடும், இராஜா பப்ளிகேஷன் சென்னை,

4. டாக்டர் க.த.திருநாவுக்கரசு, 1977 – திருக்குறள் நீதி இலக்கியம், சென்னைப் பல்கலைக்கழகம், சென்னை.

5. கு.இராம்மூர்த்தி, 2007 – வால்மீகியும் கம்பனும், பழனியப்பா பிரதர்ஸ், சென்னை.

6. ஈஸ்வரன், ச., 2005 - மொழிபெயர்ப்பியல், பாவை பப்ளிகேஷன்ஸ், சென்னை.

7. சண்முகவேலாயுதம், சு., 1985 - மொழிபெயர்ப்பியல், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை.

8. சந்திரன்.வீ., 2000 - மொழிபெயர்ப்புச் சிக்கல்களும் தீர்வுகளும், ராஜகுமாரி பப்ளிகேஷன்ஸ், சென்னை.

9. சேதுமணியன், 1993 - மொழிபெயர்ப்பியல் கோட்பாடுகளும் உத்திகளும், செண்பகம் வெளியீடு, மதுரை.

10. வளர்மதி,மு., 2008 - மொழிபெயர்ப்புக் கலை, திருமகள் நிலையம், சென்னை.

Manonmaniam Sundaranar University, Tirunelveli

UG Courses - Affiliated Colleges

B.A. English

(Choice Based Credit System)

(with effect from the academic year 2020 – 2021 onwards)

Sem.	Part I/II/III/IV	Sub. No.	Subject Status	Subject Title	Hrs.	Credits
III	I	1	Language	Tamil / Other Language	6	4
	II	2	Language	English	6	4
	III	3	Core – 5	History of English Literature - I	5	4
	III	4	Core – 6	British Poetry	4	4
	III	5	Allied – 3	English Grammar and Usage	3	3
	III	6	Skilled-Based Core – 1	Phonetics and Spoken English	4	4
	IV	7	Non-Major Elective – 1	English for Employability	2	2
	IV	8	Common	Yoga	2	2
Sub. Total					**30***	**25***

*Excluding Yoga

Sem.	Part I/II/III/IV	Sub. No.	Subject Status	Subject Title	Hrs.	Credits
IV	I	1	Language	Tamil / Other Language	6	4
	II	2	Language	English	6	4
	III	3	Core – 7	History of English Literature - II	5	4
	III	4	Core – 8	British Drama	4	4

Sem.	Part I/II/III/IV	Sub. No.	Subject Status	Subject Title	Hrs.	Credits
	III	5	Allied – 4	Chicano and Caribbean Literature	3	3
	III	6	Skilled-Based Core – 2	Eco English	4	4
	IV	7	Non-Major Elective – 2	Business English	2	2
	IV	8	Common	Computer for Digital Era	2	2
	V	9	Extension Activity	NCC, NSS, YRC, YWF	-	1
	Sub. Total				**30***	**25***

*Excluding Computer for Digital Era

Sem.	Part I/II/III/IV	Sub. No.	Subject Status	Subject Title	Hrs.	Credits
V	III	1	Core – 9	Non-Fiction	5	4
	III	2	Core – 10	Literary Critics and Approaches	5	4
	III	3	Core – 11	World Literature in Translation	5	4
	III	4	Core – 12	Canadian Literature	5	4
	III	5	Major Electives (select 2 courses out of 3)	Women"s Writing	4 + 4	4 + 4
		6		Journalism and Mass Communication		
				Creative Writing in English		

Sem.	Part I/II/III/IV	Sub. No.	Subject Status	Subject Title	Hrs.	Credits
	IV	7	Skill Based Subject (Common)	Personality Development / Effective Communication / Youth Leadership	2	2
			Sub. Total		**30***	**26**
VI	III	1	Core – 13	Shakespeare	6	4
	III	2	Core – 14	Australasian Literature	6	4
	III	3	Core – 15	Short-stories and One-act Plays	5	4
	III	4	Core – 16	Regional Literature in Translation	5	4
	III	5	Major Electives (select 2 courses out of 3)	African Literature	4 + 4	4 + 4
		6		Writing for the Media		
				Comparative Literature		
			Sub. Total		**30***	**24**

*140 credits (excluding Part IV and Part V)

Major Electives – 1 (Select 2 out of 3 Papers)
Women's Writing

Objectives:

1. To sensitize the students about the problems faced by women in the patriarchal cultural milieu.
2. To employ literature to analyze issues and questions relating to women"s experienceand empowerment.

Unit I: Prose

Jean Rhys	: The Day they burned the Books
Virginia Woolf	: Shakespeare"s Sister

Unit II: Poetry

Maya Angelou	: Phenomenal Woman
Judith Wright	: Woman to Man
Kishwar Naheed	: I am not that Woman
Carol Ann Duffy	: Originally

Unit III: Short Stories

Nadine Gardiner	: A Correspondence Course
Katherine Mansfield	: An Ideal Family
Alice Munroe	: The Photographer

Unit IV: Drama

Suzan-Lori Parks	: Topdog/Underdog

Unit V: Fiction

Meena Alexander	: Nampally Road

Prescribed Text:

Women's Writing: Anthology. Mainspring Publishers. Chennai - 6000042.
Nampally Road. Meena Alexander. Orient Blackswan.

Reference:

The Arnold Anthology of Post-colonial Literatures. Ed. John Thieme. Arnold Pub. New York.

Major Electives – 2 (Select 2 out of 3 Papers)
Journalism and Mass Communication

Objectives:

1. To introduce the students to the challenges of the constantly evolving world of journalism and mass communication.
2. To develop multi-tasking skills required in the dynamic multi-media and convergent environment.

Unit I:

Journalism and Mass Communication

Journalism and Print Media

Unit II:

News Agencies

News Gathering and Reporting

Unit III:

History of Indian Journalism

Communication and Mass Communication

Unit IV:

Radio Broadcasting in India

Television Broadcasting in India

Unit V:

Information Technology

Web Journalism

Prescribed Text:

Hena Naqvi. *Journalism and Mass Communication*. Upkar Prakashan. Agra - 2

Reference:

Keval J. Kumar. *Mass Communication in India*. 4th Edition. Jaico Publishing House. Mumbai - 1.

Major Electives – 3 (Select 2 out of 3 Papers)
Creative Writing in English

Objectives:

1. To introduce the students the basic knowledge and skills in creative writing.

2. To develop the creative writing skills latent in the students.

Unit I: What is Creative Writing?

Dear Creativity, Measuring Creativity, Inspiration and Agency, Creativity and Resistance, Art and Propaganda, Creativity and Madness, What is Creative Writing?, Imagination and Writing, Restriction on an Open Field, Can Creative Writing be Taught?, The Importance of Reading

Unit II: The Art and Craft of Writing: Troupes and Figures

i. Based on Similarity: Simile, Metaphor and Homonym

ii. Based on Association: Metonymy, Synecdoche, Allusion and Symbol

iii. Based on Difference: Antithesis, Paradox and Oxymoron

iv. Based on Extension of Ideas: Personification and Hyperbole

v. Based on Obliqueness: Irony, Euphemism, Ambiguity and Pun

vi. Based on Utterance: Alliteration, Assonance, Consonance, Onomatopoeia and Homophones

vii. Based on Work Building: Chiasmus, Acronyms and Palindrome

Unit III:

Style and Register, Formal and Informal Usage, Varieties of English, Language and Gender, Disordered Language, Playing in Words, Grammar and Word Order, Tense and Time, Grammatical Differences.

Unit IV: Modes of Creative Writing

Writing to Communicate: The Writer and the Reader, Section-I: Poetry, Writing Poetry, Definition of Poetry: What is Poetry?, The Four Functions of Language, What to Write and How to Start, Poetry and Prose, Shape, Form and Technique Television Broadcasting in India

Unit V: Section II: Fiction

Fiction, Non-Fiction, Fiction and the 20th Century, The Importance of History, Types of Novels, Literary and Popular Fiction, The Short-Story and the Novel, Character, Plot, Point of View (Modes of Narration), Setting (Milieu)

Prescribed Text:

Anjana Neira Dev, Anuradha Marwah and Swati Pal. *Creative Writing: A Beginners Manual*. Pearson: Longman. Delhi/Chennai/Chandigarh

References:

David Morley. *The Cambridge Introduction to Creative Writing*. Cambridge University Press.

Paul Mills. *The Routledge Creative Writing Course Book*. Routledge. London and New York.

Major Electives – 4 (Select 2 out of 3 Papers)
African Literature

Objectives:

1. To enable the students to understand the cross-cultural and historical approaches to the works by major writers of Africa.
2. To understand the role of African literature in developing a national identity in the former colonies of Africa.

Unit I: Poetry

Mazisi Kunene	: A Note to all Surviving Africans
Jean-Joseph Rabearivelo	: Cactus
Tsegaye Gabre-Medhin	: Home Coming Son

Unit II: Poetry

Walter Odame	: Dear Child
Wole Soyinka	: Telephone Conversation
John Pepper Clarke	: The Casualties (to Chinua Achebe)

Unit III: Short Stories

Oral Tradition	: Nwashisisana, The Hare
Assia Djebar	: My Father writes to My Mother
Henry Lopes	: The Advance

Unit IV: Drama

Wole Soyinka	: The Lion and the Jewel

Unit V: Fiction

Chinua Achebe	: The Arrow of God

Prescribed Text:

African Literature: Expanding Horizons. Mahaam Publishers. Chennai – 78.

Major Electives – 5 (Select 2 out of 3 Papers)
Writing for the Media

Objectives:

1. To teach the fundamentals of good writing.

2. To help the students to be aware of the basic conventions of fiction writing.

3. To provide the students with the tools for self-expression in this medium.

Unit I:

The Making of a Writer

Writing for Print Media

News and News Writing

Unit II:

Freelance Writer

The Art of Interviewing

Editorial Writing

Unit III:

Script Writer

Play Writing

Script Writing

Unit IV:

Copy Writer

Writing for Advertisement

Copy Writing

Unit V:

Writing Novels

Writing a Bestseller

Writing Effectively

Prescribed Text:

Writing for the Media. Sunny Thomas, Vision Books Pvt. Ltd., New Delhi.

Major Electives – 6 (Select 2 out of 3 Papers)
Comparative Literature

Objectives:

1. To gain insight into the affinities among various literatures.

2. To enable the students to gain insights into the different cultures and milieu.

Unit I:

Introduction

Definition and Scope of Comparative Literature

National, Comparative, General and World Literature

French, American and Russian Schools of Comparative Literature

Indian School of Comparative Study

Unit II:

The Study of Influence

Analogy/Parallel Studies

Reception Study

Periodisation

The Matology

Unit III:

The Study of Genres

Introduction

Theory of Genres

Problems of Genre Studies

Unit IV:

Literature and Other Disciplines

Literature and Sociology

Literature and Philosophy

Literature and Other Arts

Unit V:

Literature and the History of Ideas

Comparative Literature and Translation

Short Notes on Comparative Literature

Prescribed Text:

Comparative Literature. Prof. S. Yusuf. Manimekala Publishing House, 39, North Chithirai Street, Madurai – 625001.

References:

Susan Basnett. *Comparative Literature: A Critical Introduction*. Blackwell Pub. Inc.
Steven Totosy de Zepetnak. *Comparative Literature: Theory, Method, Application*. Rodophi Publication.

MANONMANIAM SUNDARANAR UNIVERSITY
AFFILIATED COLLEGES - M.A. ENGLISH (CBCS)
SCHEME OF EXAMINATIONS & VALUATION
For those who joined the course from the academic year 2021 onwards

Semester I

Paper	Subject Code	Subject	Core/ Elective	Credit	Hours Per Week	Internal Marks	External Marks	Total Marks	Exam Duration in Hours
I		British Poetry	Core	4	5	25	75	100	3
II		British Drama	Core	4	5	25	75	100	3
III		Indian English Literature – I	Core	4	5	25	75	100	3
IV		American Literature – I	Core	4	5	25	75	100	3
V		African Literature	Core	4	5	25	75	100	3
V1		World Literature in Translation **(or)**	Elective	3	5	25	75	100	3
		Literature and Pandemics	Elective						

Semester II

Paper	Subject Code	Subject	Core/ Elective	Credit	Hours Per Week	Internal Marks	External Marks	Total Marks	Exam Duration in Hours
VII		British Non – Fiction	Core	4	5	25	75	100	3
VIII		Indian English Literature – II	Core	4	5	25	75	100	3
IX		American Literature – II	Core	4	5	25	75	100	3
X		Canadian Literature	Core	4	5	25	75	100	3
XI		Shakespeare	Core	4	5	25	75	100	3
XII		Literary Theory – I	Core	4	5	25	75	100	3

Semester III

Paper	Subject Code	Subject	Core/ Elective	Credit	Hours Per Week	Internal Marks	External Marks	Total Marks	Exam Duration in Hours
XIII		British Fiction	Core	4	5	25	75	100	3
XIV		Australian Literature	Core	4	5	25	75	100	3
XV		Research Methodology	Core	4	5	25	75	100	3
XVI		Aspects of English Language – I	Core	4	5	25	75	100	3
XVII		Literary Theory – II	Core	4	5	25	75	100	3
XVIII		Green Literature **(or)**	Elective						
		National Literature in Translation	Elective	3	5	25	75	100	3

Semester IV

Paper	Subject Code	Subject	Core/ Elective	Credit	Hours Per Week	Internal Marks	External Marks	Total Marks	Exam Duration in Hours
XIX		Gender Studies	Core	4	5	25	75	100	3
XX		Asia Pacific Literature	Core	4	5	25	75	100	3
XXI		Aspects of English Language – II	Core	4	5	25	75	100	3
XXII		Content Writing **(or)**	Elective						
		Translation Studies: Theory and Practice	Elective	3	5	25	75	100	3
XXIII		Project	Core	5	10	25	75	100	--

Papers – 23   Credits – 90
Core – 19 --Elective –3 (To be chosen from 6 papers) – Project – 1

L	T	P	C
5	0	0	3

SEMESTER-I

Elective	**WORLD LITERATURE IN TRANSLATION**

Code:	Hrs / Week: 5	Hrs / Semester: 75	Credits: 3

Scope: To introduce the students to seminal literary texts across the world translated into English.

Objectives:
- ➢ To familiarize the students with different socio-cultural context that produce a narrative.
- ➢ To make the students understand the significance and nuances of translation.

Course Outcomes:

C.O. No.	Upon the completion of this course, students will be able to	PSOs Addressed	Cognitive Level
CO 1	get acquainted to the spectrum of world literature.	A, B, C	K1
CO 2	understand that translation facilitates cultural communication.	B, C, E, G	K2, K4
CO 3	analyse various socio-cultural texts.	F	K3, K4
CO 4	undertake an independent research activity.	F, G	K3, K4, K6
CO 5	validate some of the main theoretical and methodological issues involved in reading World Literature.	E, F, G	K5
CO 6	demonstrate mastery in expressing oneself through translation or mutli-lingual writing in a clear, coherent and persuasive manner, and to construct an interpretive argument.	D, G, H	K1, K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 - Create

Mapping with POs

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	S	S	S	S	S	S
CO 2	S	S	S	S	S	S	S	S
CO 3	S	S	S	S	M	S	S	S
CO 4	S	S	S	S	M	S	S	S
CO 5	S	S	S	S	S	S	S	S
CO 6	M	S	S	S	S	S	S	S

S – Strong – 93.75% , M – Medium – 6.25% , L – Low – 0%

UNIT – I - POETRY

Khalil Gibran	:	On Joy and Sorrow
Pablo Neruda	:	Ritual of My Legs
Mahmoud Darwish	:	The Passport

Suggested Reading:

Theo D'haen, David Damrosch, Djelal Kadir, *The Routledge Companion to World Literature*, 2011.

UNIT – II – EPIC

Ilango Adigal	:	The Cilappatikaram: The Tale of an Anklet
		- **The Book of Pukar (87 Pages) only**

Suggested Reading:

David Konstan,*Epic and History*, Kurt A. Raaflaub · 2009

UNIT – III – SHORT STORIES

Tayeb Salih	:	A Handful of Dates
Marcel Ayme	:	The Man who could walk through walls
Fyodor Dostoevsky	:	An Honest Thief

Suggested Reading:

Ferenc Molnár , *Great Short Stories of the World: A Collection of Complete Short Stories*, Chosen from the Literatures of All Periods and Countries. Deutsche Nationalbibliothek · 2017

UNIT – IV – DRAMA

Dario Fo	:	Accidental Death of an Anarchist
Betrolt Brecht	:	Life Of Galileo

Suggested Reading:

David Wiles &Christine Dymkowski, *The Cambridge Companion to Theatre History,* Cambridge University Press, 2012.

UNIT – V – FICTION

Gabriel Garcia Marquez	:	Love in the Time of Cholera
Elie Wiesel	:	Night

Suggested Reading:

John N. Duvall ed., *Modern Fiction Studies*, John Hopkins University Press, Vol.66, 2020.

References:

Khalil Gibran, *The Prophet*, Fingerprint Publishing, 2017.
Pablo Neruda, *Residence on Earth*, Souvenir Press, 2003.
Mahmoud Darwish, *Unfortunately, It was Paradise – Selected Poem*s, University of California Press, 2003.
Marcel Ayme, *The Man who could walk through walls*, Pushkin collection, 2012.
Fyodor Dostoevsky*, An Honest Thief*, Read Books, 2018.
Dario Fo, *Accidental Death of an Anarchist*, Bloomsbury, 1987. Alfred A. Knopf , 1988.
Elie Wiesel, *Night*, Penguin U.K., 2008.
Ilango Adigal, *The Cilappatikaram: The Tale of an Anklet*, translated by R.Parthasarathy, Penguin India, 2004.

L	T	P	C
5	0	0	3

SEMESTER-I	
Elective	**LITERATURE AND PANDEMICS**
Code:	**Hrs / Week: 5** **Hrs / Semester: 75** **Credits: 3**

Scope: To introduce the students to the literature written on the Pandemics.

Objectives:
- ➢ To expose the students to understand the plight of humanity during pandemics as portrayed in literary texts.
- ➢ To initiate the students to various kinds of writing techniques adopted by writers during the Pandemic Period

Course Outcomes:

C.O. No.	Upon the completion of this course, students will be able to	PSOs Addressed	Cognitive Level
CO 1	identify and demonstrate the knowledge about contagions.	A, C, D	K1, K2
CO 2	classify the varied socio-cultural conditions related to pandemics.	B, C	K2, K4
CO 3	elucidate the significant impact of the pandemics on society.	E, F	K2, K3
CO 4	examine the major biological crises like the COVID-19 pandemic.	B, D	K3, K4
CO 5	assess pandemic as a unique narrative device and its role in stimulating a new reading.	E, F, H	K4, K5
CO 6	envision themselves in the societies more equitably in the aftermath of pandemics with the knowledge gained from how the writer adopted the rhetoric of pandemic in different contexts	F, G, H	K3, K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 - Create

Mapping with POs

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	S	S	L	S	S	S
CO 2	S	S	S	S	L	S	S	S
CO 3	S	S	S	S	L	S	S	S
CO 4	S	S	S	S	L	S	S	S
CO 5	S	S	S	S	S	S	S	S
CO 6	S	S	S	S	S	S	S	S

S – Strong – 91.66%, M – Medium – 0%, L – Low – 8.33%

Unit I – POETRY

Thomas Nashe	:	The Litany in the time of Plague
Christina Rossetti	:	The Plague
Thom Gunn	:	The Lament
Vikram Seth	:	Soon: A Poem on AIDS

Recommended Reading:

Samuel K. Cohn, Jr, *The Black Death Transformed: Disease and Culture in Early Renaissance*. O.U.P., 2002

Unit II – PROSE

Giovanni Boccaccio	:	"An Introduction" Extract from *The Decameron*,
Molly Caldwell Crosby	:	"City of Corpses": An Extract from *The American Plague: The Untold Story of Yellow Fever, The Epidemic That Shaped Our History*
Steven Johnson	:	The Night Soil Men: An Extract from *The Ghost Map: The Story of London's Most Terrifying Epidemic – and How it Changed Science, Cities and the Modern World*

Recommended Reading:

Daniel Defoe, *The Journal of the Plague Year*, Penguin, 2003.

Unit III – SHORT STORIES

Edgar Allen Poe	:	The Masque of the Red Death
Greg Egan	:	The Moral Virologist
UNICEF	:	"My Hero is You": A fictional book developed by and for children aims to help families understand and cope with COVID-19.

Recommended Reading:

Taylor, Steven. The Psychology of Pandemics: Preparing for the Next Global Outbreak
of Infectious Disease. Cambridge Scholars Publishing, 2019.

Unit IV – FICTION

Albert Camus	:	The Plague
Jose Saramago	:	Blindness

Recommended Reading:

Katie M. Flynn, *The Companion*, Simon & Schuster, 2020.

Unit V – SCREENPLAY

Steven Soderbergh	:	Contagion
Francis Lawrence	:	I am Legend

Recommended Reading:

Steffen Schäffler, The Periwig-maker /2001 Oscars Nominee

References:

Thom Gunn, *Collected Poems*, Fsg Adult Publishers, 1995.

Sonia Faleiro, *AIDS Sutra: Untold stories from India*, Anchror Publishers, 2008.

Molly Caldwell Crosby, *The American Plague: The Untold Story of Yellow Fever, The Epidemic That Shaped Our History,* Berkley Publishers, 2006.

Steven Johnson, *The Ghost Map: The Story of London's Most Terrifying Epidemic – and How it Changed Science, Cities and the Modern World*, Riverhead Books, 2007.

E. A. Poe, *The Masque of the Red Death*, Graham's Magazine, 1842.

Greg Egan, *The Moral Virologist*, The Best of Pulphouse: the hardback magazine, St. Martin's Press, 1991.

Albert Camus, *The Plague*, Vintage International, 1991.

Darnelle Berry, *I Am Legend: Complete Screenplay Paperback*, independently published, 2020.

Scott.Z.Burns, *Contagion*, https://8flix.com/assets/screenplays/c/tt1598778/Contagion-2011-screenplay-by-Scott-Z-Burns.pdf, 2011.

Giovanni Boccaccio, *The Decameron*, Penguin Classics, 2003

L	T	P	C
5	0	0	3

SEMESTER-III

Elective	**GREEN LITERATURE**

Code:	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 3**

Scope: To create an awareness among the students about Ecocriticism and the role of literature in addressing contemporary issues of environmental concerns.

Objectives:

➢ To introduce the students to specific literary texts based on the ecological concerns and focus on the need to address the rising global threats.

➢ To express care and concern for the environment and advocate a more thoughtful and ecologically sensitive relationship between man and nature.

Course Outcomes:

C.O. No.	Upon the completion of this course, students will be able to	PSOs Addressed	Cognitive Level
CO 1	tabulate the indomitable part of nature in life.	A, D	K1
CO 2	exemplify the most relevant critical theories through literary texts.	B, C, F	K2, K3
CO 3	elucidate the role of literature in addressing contemporary issues such as environmental concerns.	E, F	K3, K4
CO 4	examine the social issues from the eco-critical perspective.	D, E, F	K4, K5
CO 5	prioritise ethical, cross-cultural and historical context of the environmental issues.	C, D, E	K5
CO 6	study literature and environment from an interdisciplinary point of view to analyse and brainstorm possible solutions for promoting or hampering sustainable practices crucial for environmental conservation	F, G	K5, K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 - Create

Mapping with POs

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	S	M	L	M	S	S
CO 2	S	S	S	S	S	S	S	S
CO 3	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	S	S
CO 5	S	S	S	M	S	S	S	S
CO 6	S	S	S	L	M	S	S	S

S – Strong – 87.5%, M – Medium – 8.33%, L – Low – 4.16%

UNIT I -INTRODUCTION TO ECOCRITICISM- DEFINITION, SCOPE AND IMPORTANCE OF ECOCRITICISM

John Ruskin	:	Landscape, Mimesis, Morality
Todd Andrew Borlik	:	Introduction: An Extract from *EcoCriticism: An Early Modern English Literature*
Cheryll Glotfelty & Harold Fromm	:	"Literary Studies in an age of Environmental Crisis". An Extract from *The Ecocriticism Reader: Landmarks in Literary Ecology*.

Suggested Readings:

Timothy Clark, *The Cambridge Introduction to Literature and the Environment*. C.U.P. Illustrated Edition.

Laurence Coupe, *The Green Studies Reader: From Romanticism to EcoCriticism*, Routledge.

Linda Hutcheon, *The Eruption of Postmodernity: The Post-Colonial and the Ecological*

UNIT II –POETRY

William Cullen Bryant	:	The Gladness of Nature
Mamang Dai	:	The Voice of the Mountain
Dan Beachy Quick	:	Endangered Species
Gieve Patel	:	On Killing a Tree

Suggested Reading:

Louise Hutchings Westling. Ed. Cambridge Companion to Literature and Environment. C.U.P. 2013.

UNIT III- SHORT STORY

Mahasweta Devi	:	Pterodactyl
Liam O'Flaherty	:	The Waves
Ruskin Bond	:	The Tree Lover

Suggested Reading:

Pramod K. Nayar. Ecoprecarity: Vulnerable Lives in Literature and Culture, Routledge, 2019.

UNIT IV– FICTION

Indra Sinha	:	Animal's People
Margaret Atwood	:	Oryx and Crake

Suggested Reading:

Garrard Greg. Ed *The Oxford Handbook of Ecocriticism*, O.U.P., 2014

UNIT V – DRAMA

| Henrik Ibsen | : | An enemy of the people |
| John Heywood | : | The Play of the Weather |

Suggested Reading:

Scott Slovic, & et.al. Global Perspectives on Eco-Aesthetics and Eco-Ethics A Green Critique, Lexington Books, 2019.

References:

Todd A. Borlik, *Ecocriticism and Early Modern English Literature: Green Pastures: 16 (Routledge Studies in Renaissance Literature and Culture)*, Routledge, 2010.
Cheryll Glotfelty (Ed), Harold Fromm (Ed), The Ecocriticism Reader: Landmarks in Literary Ecology, University of Georgia Press, 1996.
Mamang Dai, "The Voice of the Mountain",
https://www.asu.edu/pipercwcenter/how2journal/archive/online_archive/v2_4_2006/current/indian/dai.html
William Cullen Bryant, The Gladness of Nature, https://poets.org/poem/gladness-nature
Dan Beachy Quick, Endangered Species, https://poets.org/poem/endangered-species#:~:text=About%20This%20Poem,species%2C%20most%20notably%20the%20monarch.
Gieve Patel, On Killing a Tree, https://www.poemhunter.com/poem/on-killing-a-tree/
Mahasweta Devi (Au), Gayatri Chakravorty Spivak (Tr), *Imaginary Maps*, Thema, 2001.
Henrik Ibsen, *An Enemy of the People*, Sovereign, 2018.
Liam O'Flaherty, Angeline A. Kelly (Ed), *The Wave*, Prentice Hall Press, 1980.
Ruskin Bond, *The Tree Lover*, Penguin Random House India, 2017.
Indra Sinha, AnimalsPeople, Simon & Schuster, 2008.
John Heywood,   *The Play of the Weather*, Andesite Press, 2017.
Margaret Atwood, *Oryx and Crake*, Virago, 2013.

L	T	P	C
5	0	0	3

	SEMESTER-III
Elective	**NATIONAL LITERATURE IN TRANSLATION**

Code:	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 3**

Scope: To enable the students to learn and appreciate the literatures written in different native languages and varied cultures.

Objectives:
- ➢ To help the students learn the texts written in different languages in India and understand their distinct socio-history and cultural identities.
- ➢ To familiarise the students with the different regional literary movements of India.

Course Outcomes:

C.O. No.	Upon the completion of this course, students will be able to	PSOs Addressed	Cognitive Level
CO 1	relate the thematic concerns in the regional literatures of India.	A, B, C	K1, K2
CO 2	illustrate regional consciousness in their reading of literary texts.	B, C	K2
CO 3	distinguish the socio-cultural movements that formulated the regional literature.	B, C, D	K3, K4
CO 4	categorise the regional literatures translated in English.	E, F, H	K3, K4
CO5	validate the historical, the social, and the cultural crises specific to the region.	B, C, D	K5
CO 6	Perform comparative study of the original and the translated texts to see the process of negotiation that constructs, and is constructed in, the English language translation	F, G, H	K6

Mapping with POs

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	S	S	S	S	S	S
CO 2	S	S	S	S	S	S	S	S
CO 3	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	S	S
CO 5	S	S	S	S	S	S	S	S
CO 6	S	S	S	S	S	S	S	S

S – Strong – 100%, M – Medium – 0%, L – Low – 0%

UNIT – I - POETRY

Subramania Bharati	:	The Victory Drum.
Sundara Ramaswamy	:	The Artist at Sea.
O. N. V. Kurup	:	A Requiem to Mother Earth
Kedarnath Singh	:	Where Would I Go?
Nilmani Phookan	:	Three Poems

Suggested reading:

K Satchidanandan, *One Hundred Indian Poets*, National Book Trust,India, 2000.

UNIT - II – PROSE

Muthu Mohan	:	"Foreword"from Ponneelan's New Dharshans
K. Srilata & Swarnalatha Rangarajan:		Interview with 1) Bama, 2) Sivakami
Bal Gangadhar Tilak	:	Freedom is my Birthright.

Suggested reading:

V. V. B. Rama Rao, *Regional Language Fiction: Transformative Essays on Literary*

Translation, Authorspress, New Delhi.

Nissim Ezekiel,Meenakshi Mukherjee (ed), *Another India, New Delhi*, Penguin, 1990

UNIT – III - SHORT STORIES

Jayakanthan	:	The Heroine
U. R. Anantha Murthy	:	Ghatasraddha
Gopinath Mohanty	:	Tadpa

Suggested reading:

Bhabani Bhattacharya, *Contemporary Indian Short stories Vol.2 &3*, Delhi, Sahitya

akademi, 1959&1964

UNIT – IV - DRAMA

Badal Sircar	:	Bhoma
Vijay Tendulkar	:	The Vultures

Suggested reading:

V K.Gokak (ed), *Literature in Modern Indian Languages*, The Publication Division,

Delhi, 1957

UNIT – V - FICTION

Imayam	:	Arumugam
M. T. Vasudevan Nair	:	The House around the Courtyard

Suggested reading:

Adil Jussawalla (ed), *New Writing in India*, Harmondsworth, Penguin,1974.

References:

Sundara Ramaswamy, *The Ways of Dogs*, Kalachuvadu Trust, Nagercoil.

Velcheru Narayana Rao, *Twentieth Century Telugu Poetry -An Anthology*, Oxford India Paperbacks.

O. N. V. Kurup, 'A Requiem to Mother Earth', *In the Shade of the Sahyadri*, Oxford University Press.

https://www.worldliteraturetoday.org/blog/poetry/three-poems-india-kedarnath-singh

https://www.parabaas.com/translation/database/translations/poems/sankhaghosh_just.html

https://www.youthaffairz.in/historyjuly2012.html

K. Srilata&Swarnalatha Rangarajan*, Lifescapes*, Women Unlimited Publication, New Delhi.

D. Jayakanthan (Author), Deepalakshmi J. (Translator*), The Heroine and Other Stories*, Niyogi Books, 2017.

U. R. Anantha Murthy, *Ghatasraddha*, Indian Horizon, Vol No: 46 Published by Indian Council for Cultural Relations, New Delhi.

Gopinath Mohanty, *Tadpa*, Indian Horizon, Vol No: 46 Published by Indian Council for Cultural Relations, New Delhi.

Badal Sircar, *Three Plays: Procession*, Bhoma, Stale News, Seagull Books, Kolkata, 2009.

Vijay Tendulkar, *The Vultures*, Prakash Book Depot, Chennai.

Imayam, *Arumugam*, Katha Publications, Mumbai.

M. T. Vasudevan Nair, *Naalukettu: The House with a Courtyard and Four Pillars*, Oxford University Press, 2010.

L	T	P	C
5	0	0	3

SEMESTER-IV

Elective	**CONTENT WRITING**		
Code: CENE4A	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 3**

Scope: To have a proficient and practical knowledge about content writing.

Objectives:
- ➢ To inculcate the knowledge of documenting sources.
- ➢ To develop internet skills for writing in the social media.

Course Outcomes:

C.O. No.	Upon the completion of this course, students will be able to	PSOs Addressed	Cognitive Level
CO 1	record the knowledge of digital skills essential for the media.	E, G, H	K1
CO 2	outline an idea on content marketing.	G, H	K2
CO 2	compute practical skills on earning through content writing.	E, G, H	K2, K6
CO 4	analyse and present a topic of study in a field-specific language.	F, G, H	K4, K5
CO 5	standardise teamwork skills.	G, H	K3
CO 6	demonstrate knowledge of editing and revision techniques, the world of publishing, and other career-related aspects of writing.	F, H	K5, K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 - Create

Mapping with POs

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M	M	L	L	L	M	M	L
CO 2	L	L	L	L	L	S	M	S
CO 3	L	L	L	L	L	S	S	S
CO 4	M	S	L	M	L	S	S	M
CO 5	L	L	L	L	L	S	S	S
CO 6	L	L	S	M	L	S	S	S

S – Strong – 31.25%, M – Medium – 18.75%, L – Low – 50%

UNIT – I - LANGUAGE SKILLS

Introduction - Writing Rules - Writing GPS - Cross Out the Wrong Words - Keep It Simple – Readability - Grammar Rules - Confusing Words.
Suggested Reading:

S. C. Sood, *Developing Language Skills*, Manohar Publishers.

UNIT – II - PUBLISHING

Publishing Rules - Brand Journalism - Interview Tips – Copyright - Blog Posts, Podcast, Facebook Posts, Tweets, and Other Marketing Content - Writing for Twitter - Hashtags - LinkedIn Profile.
Suggested Reading:

Arielle Eckstut, David Henry Sterry, *The Essential Guide To Getting Your Book*

Published: How To Write It, Sell It, And Market It - Successfully, Workman Publishing.

UNIT – III - CONTENT TYPES

Business Writing Skills - Technical Writing - Academic Writing - Email Writing - News Letter - Brochure Writing - Research Paper - Academic Book Writing - Rubrics - Fiction Writing - SEO Writing - Medical Writing - Statement of Purpose - Writing a Critique.
Suggested Reading:

C. C. Chapman & Ann Handley, *Content Rules*, Wiley Publishers.

UNIT – IV - CONTENT STRATEGY

Strategic Vs Non- Strategic Content - Creating Effective Content - Overcoming Challenges - Idea Generation Tools - Creating Strategic Content to promote Brands - Market Segmentation - Creating Target Persona - Ninja Writing.
Suggested Reading:
Robert Ashton & Jessica Juby, *Writing for the Web*, Teach Yourself Publications.

UNIT – V - EARN ONLINE

Websites for Content Writing Projects - Tips to Earn as a Content Writer - Successful Content Writing Career - How to Become a Published Author - Guest Posting - Collecting Payments.
Suggested Reading:

Lirish Chinnappa, *Content Writing as a Career Option*, Amazon Digital Service.

References:

(Unit I & II) - Ann Handley, *Everybody Writes*, Wiley Publishers.

(Unit III, IV & V) - Kounal Gupta, *The Only Content Writing Handbook*, Henry

Harvin, India.

L	T	P	C
5	0	0	3

	SEMESTER-IV
Elective	**TRANSLATION: THEORY AND PRACTICE**

Code:	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 3**

Scope: To introduce the students to the theories and theorists of translation through the different ages, of traditions, and of emerging fields in translation.

Objectives:

➢ To encourage the students to recognise various problems and challenges faced by the translators concerning literary texts.
➢ To equip the students with various procedures and techniques of translation.

Course Outcomes:

C.O. No.	Upon the completion of this course, students will be able to	PSOs Addressed	Cognitive Level
CO 1	recall the various theories of translation and their importance in the contemporary world.	F, H	K1
CO 2	extend the skill to translate and engage in advanced study in the field of translation.	B, H	K2, K3
CO 3	apply various methods of interpretation related to Translation Studies.	C, F, H	K3
CO 4	assess the multi-cultural approaches and navigate the linguistic problems in translation.	C, D, F, H	K4, K5
CO 5	perceive the difficulties in translation at a practical level and evaluate alternative strategies for dealing with them.	F, G, H	K4, K5
CO 6	choose between different models of translation on the basis of their relative merits and demerits.	F, H	K5, K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 - Create

Mapping with POs

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	S	S	S	S	M	S
CO 2	M	S	S	S	M	S	S	S
CO 3	S	S	S	S	S	S	M	S
CO 4	S	S	S	S	S	S	M	S
CO 5	L	S	M	M	L	S	S	S
CO 6	S	S	S	S	S	S	S	S

S – Strong – 81.25%, M – Medium – 14.58%, L – Low – 4.16%

UNIT - I – TRANSLATION AND ITS PERSPECTIVES

Language as a Medium - Referential Meaning - Connotative Meaning - Definitions of Translation - Linguistic and Cultural Distances between the Source and Target

Languages - Lexical Untranslatability

Suggested Reading:

Susan Bassnett-McGuire, Andre Lefevere, Susan Bassnett, *Translation, History and Culture*, Continuum International Publishing Group Ltd, 1998.

UNIT - II – TRANSLATION THEORIES AND THEORISTS
Major Theories
Philological Theory - Linguistic Theory - Sociolinguistic Theory - Integrated Theory
Major Theorists
J.C. Catford, Eugene A. Nida , Peter Newmark, Sujit Mukherjee, Juliane House

Suggested Reading:

Theo Hermans, *The Manipulation of Literature (Routledge Revivals): Studies in Literary Translation*, Routledge, 2015.

UNIT - III – LEXICAL PROBLEMS AND COMPENSATORY MECHANISMS
Borrowing – Transliteration - Literal Translation – Definition – Addition – Omission - Lexical Creation – Transcreation – Substitution - Generic and Specific Names - By Using Multi-Lexical Units - Hybrid Formation or Loan Blending

Suggested Reading:

Piotr Kuhiwczak Karin Littau, *A Companion to Translation Studies*, Orient BlackSwan, 2011.

UNIT - IV – SYNTACTIC AND STYLISTIC PROBLEMS AND PROCEDURES

Double Words - Repetitive Words – Ideophones - Pleonasms and Reduplications - Active and Passive Constructions - Gender and Number.
Imagery – Idioms – Proverbs - Non-verbal Communication - Honorific Affixes - Proper Name – Vocatives - Play on Words - Transformation of Sentences

Suggested Reading:

Peter Newmark, *About Translation*, Multilingual Matters, 1991.

UNIT - V – TRANSLATION PRACTICE
Perumal Murugan   :   Poonachi: Or the Story of a Black Goat
                                    (OR)
Vaikom Muhammad Basheer :   Pattumma's Goat.

Discussions and Questions from the translated texts, based on the concepts discussed in Unit 2,3 and 4.

Suggested Reading:

Clifford.E.Landers, *Literary Translation: A Practical Guide,* Multilingual Matters, 2001.

References:

Nair, Shreedevi K. *Aspects of Translation*. New Delhi: Creative Books, 1996.

Nida, Eugene A. *Towards a Science of Translating*. London: Brill, 1964.

Nihamathullah A. *Procedures of Translation*. Tirunelveli: Shameem Publication, 2009. Unit I - Pages 1 to 15 & Unit II Pages 16 to 36.

Hema K. *Theory and Practice of Translation*. Madurai: Shanlax Publications, 2019

Susan Bassnett, *Translation Studies III Edition*. Routledge, London & New York, 2002. - Pages 47 to 80.

Peter Newmark, *A Textbook of Translation*. Prentice Hall, 1987.

Perumal Murugan (Au), N Kalyan Raman (Tr), *Poonachi: Or the Story of a Black Goat*, Context, 2018.

Perumal Murugan, *Poonachi Allathu Oru Vellatin Kathai*, Kalachuvadu Publications, 2016.

Vaikom Muhammad Basheer, *Pattumma's Goat*, Mathrubhumi Books, 2018.

Vaikom Muhammad Basheer, *Pathummayude Aadu*, DC Books, 2019.

MANONMANIAM SUNDARANAR UNIVERSITY

TIRUNELVELI – 12

MPhil English (For affiliated colleges)

(For those who joined the course from the academic year 2018-2019 onwards -Fulltime)

Sl. No.	Sem	Course Title	Credits	LHrs/Wk
1.	I	Core –I- Research and Teaching Methodology	4	4
2.	I	Core—II – Critical Theory	4	4
3.	I	Elective –Contemporary Literature (or) Women's Studies	4	4
4.	II	Project and Viva Voce	12	-
		Total	**24**	

<p style="text-align:center">Paper III – Elective I   L P T C</p>
<p style="text-align:center">Contemporary Literature   4 0 0 4</p>

Objectives:
- To familiarize the students with the literary works of different countries and cultures.
- To enable the learners to compare the different works and get a better understanding of them.

Unit I   British Literature(12 Hours)

Poetry	Benjamin Zephaniah –	*1) We Refugees 2) The Race Industry*
Drama	Tom Stoppard	- *Arcadia*
Fiction	Zadie Smith	- *Swing Time*

Unit II   American Literature(12 Hours)

Poetry -	Charles Bright-	
	North American Bear (*The Norton Anthology of American Literature*)	
Drama	Tracy Letts	- *August:Osage County*
Fiction	Rachel Gold	- *Being Emily*

Unit III   African Literature(12 Hours)

Poetry	Francis Duggan	-- Racism is Around me Everywhere
	Herbert Logerie	-- *The Colour of Racism*
Drama	Athul Fugord	-- *A Lesson From Aleos*
Fiction	Ben Okri	-- *The Famished Road*

Unit   Canadian Literature(12 Hours)

Poetry	Dorothy Livesay	--1) *Green Rain* 2) *Nocturne*
Drama	Joan Mac Leod	-- *The Valley*
Fiction	Michael Ondaatje	-- *Divisadero*

Unit V   South Asian Literature(12 Hours)

Poetry	Basil Fernando	*Yet Another Incident in July 1983*
Drama	Girish Karnad	*Wedding Album*
Fiction	Khalid Hosseine	*And the Mountains Echoed*

<p style="text-align:right">(Total 60 Hours)</p>

References:

1. David Lane - *Contemporary British Drama,* 2010.
2. *Tracy J. Prince, **Culture Wars in British Literature: Multiculturalism and National Identity, 2012.***
3. Florence Stratton *Contemporary African Literature and the Politics of Gender, 1994*
4. Karen Meyers, Erik V. R. Rangno, Jerry R. Phillips, Michael Anesko Contemporary American Literature, 1945 – Present, 2010
5. W. J. Keith ,Canadian Literature in English, Volume 2, 2006
6. Alex Tickell, South-Asian Fiction in English: Contemporary Transformation

<div align="center">

Elective – II   **L P T C**

Women's Studies   **4 0 0 4**

</div>

Objectives:

- To sensitize the learners on the issues of women
- To analyze and interpret the various voices raised in support of women and to contribute towards women empowerment.

Unit I : Prose (12 Hours)
Virginia Woolf – *Modern Fiction*
Arundhati Roy -- *Walking with the Comrades*

Unit II : Poetry (12 Hours)
Carol Ann Duffy -- "Anna Hathaway" , " Onion"
Sylvia Plath -- "Daddy" , "The Colossus"
Kamala Wijeyaretna -- " On Seeing a White Flag Across a Road"
Imtiaz Dharkar – "Purdah I"

Unit III : Drama (12 Hours)
Susan Glaspel -- *Trifles*
Vinodini -- *Thirst*
Lorrainne Hansberry -- *What Use are Flowers?*

Unit IV : Fiction (12 Hours)
Jeannette Winterson -- *Oranges are not the Only Fruit*
Mahasweta Devi – *Draupadi*

Unit V : Fiction (12 Hours)
Bama – *Karukku*
Chimamanda Ngozi Adichie – *Half of a Yellow Sun*

(Total 60 Hours)

References:
- Winterson, Jeanette. *Oranges Are Not the Only Fruit*. , 1987
- Nick Bentley, *Contemporary British Fiction*, 2008
- Angela Y. Davis, *Women, Race, & Class,* 2011.
- Kathy Davis, Mary Evans, Judith Lorber, *Handbook of Gender and Women's Studies,* 2006.

4.PROGRAMME STRUCTURE

MANONMANIAMSUNDARANARUNIVERSITY, TIRUNELVELI–627012.
UGCOURSES– AFFILIATEDCOLLEGES
B.Sc. Mathematics
(ChoiceBased Credit System)
(Witheffectfromtheacademicyear2021- 2022 onwards)

Part	Sub. No.		Subject Status	SubjectTitle	Hrs/ Week	Credits	Maximum			Passing Minimum	
							Int.	Ext.	Tot.	Ext.	Tot.
I	I	1	Language	Tamil/OtherLanguages	6	4	25	75	100	30	40
	II	2	Language	CommunicativeEnglish-I	6	4	25	75	100	30	40
	III	3	Core-IPaper-I	Calculus and ClassicalAlgebra	6	4	25	75	100	30	40
		4	Addonmajor(Mandatory) Paper-II	ProfessionalEnglishforP hysicalSciences–I	4	4	25	75	100	30	40
		5	Allied-I(ForMaths students)	Statistics-I OR Physicswith Practical /Chemistry withPractical/ ComputerScience**	6 / 6	3 / 5	25 / 25	75 / 75	100 / 100	30 / 30	40 / 40
			Allied-I (ForScience students)	AlgebraandDifferentialE quations	6	4	25	75	100	30	40
	IV	6	Common	EnvironmentalStudies	2	2	25	75	100	30	40
			Total		**30**	**21/23**					
II	I	7	Language	Tamil/OtherLanguages	6	4	25	75	100	30	40
	II	8	Language	Communicative English-II	6	4	25	75	100	30	40
	III	9	Core-IIPaper-III	Differential Equationsand Analytical GeometryofThree Dimensions	6	4	25	75	100	30	40
		10	Addon major(Mandat ory)Paper-IV	ProfessionalEnglishforP hysicalsciences-II	4	4	25	75	100	30	40
		11	Allied-II(ForMath sStudents)	Statistics-II OR Physics with Practical /Chemistry with Practical /ComputerScience**	6 / 6	3 / 5	25 / 25	75 / 75	100 / 100	30 / 30	40 / 40
			Allied–II(For ScienceSt udents)	Vector Calculus &FourierSeries	6	4	25	75	100	30	40
	IV	12	Common	Valuebasededucation	2	2	25	75	100	30	40.
			Total		**30**	**21/23**					

** The Allied Computer Science shall be taken by the Department of Mathematics

Sem	Part	Sub. No.	Subject Status	Subject Title	Hrs/week	credits	Mark				
							Maximum			Passing minimum	
							Int.	Ext.	Tot.	Ext.	Tot.
III	I	13	Language	Tamil/Other Languages	6	4	25	75	100	30	40
	II	14	Language	English	6	4	25	75	100	30	40
	III	15	CoreIII Paper-V	SequencesandSeries	6	4	25	75	100	30	40
		16	Allied-II	Statistics-I OR Physics with Practical / Chemistrywith Practical / Computer Science	6 / 6	3 / 5	25 / 25	75 / 75	100 / 100	30 / 30	40 / 40
		17	Skill Based Core	Vector Calculus	4	4	25	75	100	30	40
	IV	18	Non-Major Elective	Anyoneofthefollowing 1.1) Mathematics forCompetitiveExaminations-I 1.2) Fundamentals of Statistics-I	2	2	25	75	100	30	40
		19	Common	Yoga*	2	2	25	75	100	30	40
			Total		30	25/27					
IV	I	20	Language	Tamil/Other Languages	6	4	25	75	100	30	40
	II	21	Language	English	6	4	25	75	100	30	40
	III	22	Core-IV Paper-VI	Abstract Algebra	6	4	25	75	100	30	40
		23	Allied-II	Statistics-II OR Physics with Practical / Chemistry with Practical/ Computer Science	6 / 6	3 / 5	25 / 25	75 / 75	100 / 100	30 / 30	40 / 40
		24	Skill Based Core	Trigonometry, Laplace Transforms and Fourier Series	4	4	25	75	100	30	40
	IV	25	Non-Major Elective	Anyone of the Following: 2.1) Mathematics for Competitive Examinations-II 2.2) Fundamentals of Statistics-II	2	2	25	75	100	30	40
		26	Common	Computers for Digital Era*	2	2	25	75	100	30	40
	V		Extension activities	NCC/NSS/YRC/YWF/ PE	-	1	-	-	-	-	-
			Total		30	26/28					
V	III	27	Core-V Paper-VII	LinearAlgebra	5	4	25	75	100	30	40
		28	Core-VI	RealAnalysis	5	4	25	75	100	30	40

			Paper-VIII								
		29	Core-VII Paper-IX	Statics	5	4	25	75	100	30	40
		30	Core-VIII Paper-X	Integral Transforms and Z Transforms	5	4	25	75	100	30	40
		31	Major Elective-I Paper-XI	Anyone of the Following: 1.1) Programming in C 1.2) Discrete Mathematics 1.3) Combinatorial Mathematics	4	4	25	75	100	30	40
		32	Major Elective –II Paper-XII	Anyone of the Following: 2.1) Operations Research-I 2.2) Stochastic Process 2.3) Math Typing using LaTeX	4	4	25	75	100	30	40
	IV	33	Skill Based Common	Personality Development	2	2	25	75	100	30	40
			Total		**30**	**26**					
VI	III	34	Core-IX Paper-XIII	ComplexAnalysis	5	4	25	75	100	30	40
		35	Core-X Paper-XIV	GraphTheory	5	4	25	75	100	30	40
		36	Core-XI Paper-XV	NumberTheory	4	4	25	75	100	30	40
		37	Core-XII Paper-XVI	Dynamics	4	4	25	75	100	30	40
		38	Core-XIII Paper-XVII	NumericalMethods	4	4	25	75	100	30	40
		39	Major Elective-III Paper-XVIII	Any one of the following 3.1) Astronomy 3.2) Fuzzy Mathematics 3.3) Mathematical Modeling	4	4	25	75	100	30	40
		40	Major Elective-IV Paper-XIX	Any one of the following 4.1) Operations Research-II 4.2) Coding Theory 4.3) Programming in C++	4	4	25	75	100	30	40
			Total		**30**	**28**					

Semester-V

Major Elective-I
PROGRAMMING IN C

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical	Credits (C)
Part-III	Non Major - I		Programming in C	60	-	-	4

Contact hours per semester:60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	V	25	75	100

Objective: To study the basic concepts and structure of C program and to train the students to write simple C programs.

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Summarize about character set. Classify the keywords and identifiers.Identify the constants, variables and data types.	K3,K4
CO2	Apply different types of operators and to make use of input and output operators.	K1,K6
CO3	Compile programs by utilizing decision making and branching statements.Also to apply Decision making and looping statements while develop a program.	K2,K5
CO4	Make use of one dimensional and two dimensional arrays.Also to utilize Character arrays and strings and its functions while compiling the program	K3,K6
CO5	Illustrate user defined functions and illustrate the definitions of functions and return values and their types.Also to categorize function call, function declaration.	K2,K5

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	3

CO2	2	3	3	3	2
CO3	2	3	2	2	3
CO4	2	2	3	3	3
CO5	2	2	2	3	3
Total contribution of COs to PSOs	11	12	12	13	14
Weighted Percentage of COs contribution to PSOs	73.33	80	80	86.67	93.33

Course Content

UNIT-1:

Introduction – Character set, C tokens ,keywords and identifiers, Constants ,Variables andDatatypes.

UNIT–2:

Operators – Arithmetic, relational, logical assignment, increment and decrement, Conditional,Bitwise special operators, Precedence of operators,Managing input and output operators – getchar(),putchar(),scanf()andprintf().

UNIT–3:

Decision making and branching-Simple if, if else, nested if and the else if ladder statements, The switch statement,The ?: operator, The goto statement. Decision making and looping-while,Dowhile andforstatement,jumpsinloops.

UNIT–4:

Onedimensionalandtwodimensionalarrays–declaration,initializationofarrays, Multidimensionalarrays,Characterarraysandstrings:Declaringandinitializingstringvariables,Readingandwritingofstrings,stringhandlingfunctions.

UNIT–5:

Userdefinedfunctions– Definitionoffunction,returnvaluesandtheirtypes,functioncalls,functiondeclaration,Categoryoffunctions,Nestingoffunctions,recursion.

TextBook:

❖ E. Balaguruswamy - Programming in ANSI C –Tata McGraw Hill Publishing company limited – III Edition(2017).

Booksforreferences:

➢ C. ReemaThareja,ProgramminginC- OxfordUniversityPress(2018).
➢ Ramasamyet.al.-Programmingin C-ScetechPublication(INDIA)Pvt.Ltd.IIEdition(2015).
➢ AshokN.Kamathane- ProgrammingwithAnsiandTurboC– DorlingKindersley(India)Pvt.Ltd,(2009).

Major Elective-I
DISCRETE MATHEMATICS

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical	Credits (C)
Part-III	Non Major - I		Discrete Mathematics	60	-	-	4

Contact hours per semester:60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	V	25	75	100

Objective: To study concepts of mathematical logics and to understand the basics of Lattices and Boolean Algebra.

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Illustrate and use the statements,notations and connectives .Construct truth table and utilize conditional and biconditional statements.	K2,K3
CO2	Analyze and explain Predicate calculus	K1,K4
CO3	Elaborate Groups and monoids. Also to develop Group codes	K6
CO4	Construct Lattices and special lattices.Analyze and explain Boolean algebra	K5
CO5	Convert From one form to another form (Decimal,Binary,Octal,Hexadecimal). Evaluate Binary addition,subtraction multiplication and division.	K2,K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	1	3
CO2	3	3	3	3	2
CO3	3	3	2	1	3
CO4	2	3	3	3	3

CO5	1	3	2	3	2
Total contribution of COs to PSOs	12	14	13	11	13
Weighted Percentage of COs contribution to PSOs	80	93.33	86.67	73.33	86.67

Course Content

UNIT–1: Mathematical logic – Statements and notation, Connectives, Negation, Conjunction, Disjunction, Statement formula and truth table ,Conditional and biconditionalstatements.Well defined formulae,tautologies.
UNIT–2: Normal forms - The theory of interference for the statement calculus,ThePredicate,Theory of inference for the Predicate Calculus.

UNIT–3: Algebraic structures - Groups and monoids, Simple properties, Group codes.

UNIT–4: Lattices and Booleanalgebra -Lattices asposets, Properties of lattices, special lattices, Boolean algebra, Gating networks, Minimalsumsofproducts.

UNIT–5: Numbersystemand codes - Decimal,Binary,Octal,Hexadecimal–Conversionfromonetoanother–Binaryaddition,subtraction,multiplicationand division, BCD, Weightedexcess time, Graycode.

TextBook:
 ❖ J.P.Tremblayand Manohar-Discretemathematicalstructureswithapplication to Computer Science(Tata McGrawHill)NewDelhi, 43rd edition 2013.

BooksforReference:
 ➢ M. K. Venkataramanandothers –Discretemathematics- TheNationalPublishingPvt.Ltd.(2000).
 ➢ G. Balaji– Discretemathematics– BalajiPublishersChennai(2013).

 ➢ T. Veerarajan–Discrete mathematics Tata McGraw Hill –2009.

 ➢ GarettBirkhoff-Lattice Theory,American Mathematical Soceity(1948).

 ➢ M.K.Sen,B.C.Chakraborty,Introduction to Discrete Mathematics, Books and Allied (P) Ltd (2009).

Semester-V

<table>
<tr><td colspan="9" align="center">**Major Elective-I**
COMBINATIONAL MATHEMATICS</td></tr>
<tr><td>**Category**</td><td>**Course Type**</td><td>**Course Code**</td><td>**Course Title**</td><td>**Lecture (L)**</td><td>**Tutorial (T)**</td><td>**Practical**</td><td>**Credits (C)**</td></tr>
<tr><td>**Part-III**</td><td>**Non Major - I**</td><td></td><td>**Combinational Mathematics**</td><td>**60**</td><td>**-**</td><td>**-**</td><td>**4**</td></tr>
</table>

Contact hours per semester:60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	**V**	**25**	**75**	**100**

Objective: To know the basic concepts of pairings and to understand relations

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain Selections and to find binomial coefficients.Classify ordered selections and unordered selections.	K1,K3
CO2	Solve pairing problems	K3
CO3	Explain recurrence and classify the types of relations using generating functions.	K2,K5
CO4	Illustrate The inclusion and exclusion principles.	K4,K6
CO5	Construct and solve block designsand square block designs.	K5

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	1	3
CO2	2	1	2	3	1
CO3	2	2	2	1	2
CO4	2	1	1	3	1
CO5	1	3	2	3	1

Total contribution of COs to PSOs	10	9	10	11	8
Weighted Percentage of COs contribution to PSOs	66.67	60	66.67	73.33	53.33

Course Content

UNIT–1:

Selections and Binomial coefficients–Permutations–Ordered selections–unordered selections–Miscellaneous Problems.

UNIT–2:

Parings Problems–Pairings within a set–Pairing between sets.

UNIT–3:

Recurrence–Fibonacci–type relations using generating functions–Miscellaneous methods.

UNIT–4:

The Inclusion–Exclusion Principles.

UNIT–5:

Block designs–square block designs.

TextBook:

❖ IanC.Andersen–A first course in combinatorial mathematics –Clarendon Press,Oxford(1989).

Books for Reference:
➢ RalphP.Grimaldi,B.V.Ramona –Discreteandcombinatorialmathematics–anappliedintroduction(IVedition).

Semester-V

<table>
<tr><td colspan="8" align="center">**Major Elective-I**
OPERATIONS RESEARCH -I</td></tr>
<tr>
<td>**Category**</td>
<td>**Course Type**</td>
<td>**Course Code**</td>
<td>**Course Title**</td>
<td>**Lecture (L)**</td>
<td>**Tutorial (T)**</td>
<td>**Practical**</td>
<td>**Credits (C)**</td>
</tr>
<tr>
<td>**Part-III**</td>
<td>**Major elective**</td>
<td></td>
<td>**Operations Research-I**</td>
<td>**60**</td>
<td>**-**</td>
<td>**-**</td>
<td>**4**</td>
</tr>
</table>

Contact hours per semester:60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	**V**	**25**	**75**	**100**

Objective: To introduce the various techniques of operations research

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Solve Linear Programming Problem by making use of Graphical method,Simplex method.	K4
CO2	Interpret the concept of duality.Classify primal and dual problems.Utilizing the concept of duality ,solve problems on dual simplex method.	K3
CO3	Solve Transportation problems by making use of North – west corner rule,Matrix-Minima method,Vogel's Approximation rule. Evaluate Degeneracy and unbalanced transportation problems.	K2,K5
CO4	Determine the solution for Assignment problems.	K1,K6
CO5	Solve sequencing problems.	K5

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs	PSO1	PSO2	PSO3	PSO4	PSO5

Cos					
CO1	3	3	3	1	3
CO2	2	1	2	3	3
CO3	2	1	2	3	2
CO4	2	3	1	3	3
CO5	3	3	2	3	3
Total contribution of COs to PSOs	12	11	10	13	14
Weighted Percentage of COs contribution to PSOs	80	73.33	66.67	86.67	93.33

Course Content

UNIT-1:

Linear Programming Problem:Mathematical formulation of LPP–Graphical method,Simplex method–Artificial variable technique.

UNIT-2:

Concept of Duality–Primal and Dual problems–Duality–Dual Simplex method.

UNIT-3:

Transportation Problem:North-west Corner rule–Matrix-Minima method–Vogel's approximation method–MODI method–Degeneracy and unbalanced Transportation problem.

UNIT-4:
Assignment Problem:Hungarian method –Unbalanced assignment problems.

UNIT-5:
Sequencing Problem: n jobs and two machines – n jobs and three machines – 2 jobs and m machines.

TextBook:
- ❖ KantiSwarup, P. K. Gupta and Manmohan – Operations Research – Sultan Chand and sons,(New Delhi)12[th]edition(2006)

BooksforReference:
- ➢ GuptaP.KandD.S.Hira–OperationsResearch– S.Chand&Sons Reprint (2012).
- ➢ B. J.RanganathandA. S.Srikantappa–OperationsResearch–YesDeePublishingHouse,Chennai(2017).
- ➢ HamdyA.Taha –Operationsresearch,Anintroduction- 8[th]EditionPrentice–HallIndia(2006).
- ➢ A.C.S.Kumar, Operation Research,Yes Dee Publications,Chennai,3rd Reprint 2019.

Major Elective-I
STOCHASTIC PROCESS

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical	Credits (C)
Part-III	Major Elective		Stochastic Process	60	-	-	4

Contact hours per semester:60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	V	25	75	100

Objective: To understand the concepts of stochastic process and understand the generalizationof Poisson process

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Determine the generating functions .Also to analyze and explain Stochastic Process and specification of stochastic process	K1,K3
CO2	Interpret Markov Chains .Also to analyze theclassfication of states and chains.Illustrate the stability of Markov chain.	K2,K4
CO3	Classify Markov chain with denumberable states and Markov chain with continuous state space.	K2,K5
CO4	Illustrate Markov Process with discrete state space by using Poisson Process.	K1,K6
CO5	Elaborate Erlang Process.	K5

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs \ Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	1	3
CO2	2	1	2	3	3

CO3	1	1	2	3	2
CO4	2	3	1	3	3
CO5	3	3	2	3	2
Total contribution of COs to PSOs	11	11	10	13	13
Weighted Percentage of COs contribution to PSOs	73.33	73.33	66.67	86.67	86.67

Course Content:

UNIT-1:

Generating functions–Laplace transform of probability distribution, Classification of distribution, Stochastic process, specification of stochastic process.

UNIT-2:

Markov chains – Definition and examples , Higher transition probabilities ,Generalisation of independent Bernoulli Trails, classification of states and chains ,Determination of Higher Transition Probabilities–stability of Markov systems.

UNIT-3:

Markov chain with Denumerable number states – Reducible chains ,Statistical inference for Markov chains, Markov chain with continuous state space, Non homogeneous chains.

UNIT-4:

Markov process with discrete state space–Poisson process, Poisson process and related distributions, Generalisation of Poisson process,Birth and Death process.

UNIT-5:
Markov process with Discrete state space–Derived Markov chains, Erlang Process.
TextBook:
  ❖ J.Medhi–Stochastic Process–New Age International Publishers Pvt.Ltd.Third Edition.
    2009.
Books for Reference:
  ➢ SuddhenduBiswas – Applied Stochastic Process – New Central Agency Pvt.
    Ltd.,Kolkatta(2012).
  ➢ PaulG.Hoel,SidneyPort&CharlesJ.Stone–IntroductiontoStochasticprocess–WavelandPress–
    Boston(1987).
  ➢ V.Thangaraj, Stochastic Process and their applications,New Age International
    Publishers,NewDelhi,First Edition (1995).

Major Elective- IV
MATH TYPE USING LATEX

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical	Credits (C)
Part-IV	Major Elective		Math Type using Latex	60	-	-	4

Contact hours per semester:60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	VI	25	75	100

Objective: To introduce coding and decoding concepts.Also to develop the students in the field of coding theory

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Type words, sentences and symbols not in the keyboard usingTex	K1,K3
CO2	Analyze Text environments	K2,K4,K5
CO3	Type math by making use of spacing rules,equations	K5
CO4	Type spacing of symbols building new symbols,math alphabets and symbols	K2,K6
CO5	Write latex documents by making use of abstract,sectioning,cross referencing and Bibliographies.	K4

➢ K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	3	3	3
CO2	2	1	3	2	1

CO3	2	1	2	3	2
CO4	3	2	3	3	1
CO5	3	3	3	3	3
Total contribution of COs to PSOs	11	10	14	14	10
Weighted Percentage of COs contribution to PSOs	73.33	66.67	93.33	93.33	66.67

Course Content:

Unit-I

Typing text:Words,sentences and paragraphs-symbols not on the keyboard-comments and footnotes-Changing font Characteristics-Lines,paragraphs and pages-spaces- Boxes.

(Chapter 5, section 5.1 to 5.9, pages 61 to 115)

Unit-II

Text environments: some general rules for displayed text environments-List of environments-style and size environments-proclamations(theorem-like structures)-Proof environments-Tabular environments-Tabbing environments-Miscellaneous displayed text environments.

(Chapter 6, section 6.1 to 6.8, pages 117 to 149)

Unit-III

Typing math:Mathenviroments-spacing rules-equations--spacing rules-equations-Basic constructs-Arithmetic operations-Delimiters-Operators-Math accents-Stretchable horizontal lines-formula gallery.

(Chapter 7, section 7.1 to 7.9, pages 151 to 186)

Unit-IV

More math: Spacing of symbols building new symbols-math alphabets and symbols-vertical spacing-Tagging and grouping-Generalized fractions-Boxed formulas.

(Chapter 8, section 8.1 to 8.6, pages 187 to 206)

Unit-V

Latex documents:The structure of a document-The preamble-Abstract-Sectioning-Cross referencing-Bibliographies.

(Chapter 10, section 10.1 to 10.6, pages 245 to 270)

Text Book:

❖ George Gratzer,More Math into LaTeX,4th edition,Springer,2007.

Books for Reference:

➢ Helmut KopkaandPatricW.Daly,A guide to LaTeX,Fourthedition,Addison-Wesley.
➢ David R.Wilkins,Getting started with LaTeX,SecondEdition.

Practical:

Typing texts and Tables: Chapter 4.1- Inserting Figures Chapter 5.1-Mathematical Equations:Chapter 6.3-Inserting references:Chapter 7.6-Preparing an article for mathematical journal.

Semester-VI

<table>
<tr><td colspan="8" align="center">**Major Elective- III**
ASTRONOMY</td></tr>
<tr><td>Category</td><td>Course Type</td><td>Course Code</td><td>Course Title</td><td>Lecture (L)</td><td>Tutorial (T)</td><td>Practical</td><td>Credits (C)</td></tr>
<tr><td>Part-III</td><td>Major Elective-III</td><td></td><td>Astronomy</td><td>60</td><td>-</td><td>-</td><td>4</td></tr>
</table>

Contact hours per semester: 60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	VI	25	75	100

Objective: To introduce the exciting world of Astronomy to students and to understand the movements of the celestial sphere.

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain Spherical Trigonometry .Also to elaborate the fundamental of spherical trigonometry,thesine,the cosine, four parts and Napier's formula.	K3,K5
CO2	Imagine the celestial sphere,Illustrate about the rising and setting of a star. Identify and Classify circumpolar stars and morning,evening stars.	K1,K4
CO3	Imagine Earth and to explain refraction. Deduce Tangent formula and Cassini's formula.	K2,K6
CO4	Illustrate Geocentric parallax and Heliocentric parallax	K3,K5
CO5	Elaborate Kepler's laws. Also to classify True anomaly,mean anomaly and eccentric anomaly and to obtain the relationship between them.	K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PO mapping (Course Articulation Method)

PSOs \ Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	3	3
CO2	2	2	3	3	1
CO3	2	3	2	3	2
CO4	2	2	2	3	2
CO5	2	1	2	2	3
Total contribution of COs to PSOs	10	11	12	14	11
Weighted Percentage of COs contribution to PSOs	66.67	73.33	80	93.33	73.33

Course Content

UNIT–1:

SphericalTrigonometry:Sphericaltriangle–ThefundamentalformulaofSphericaltrigonometry, the sine, cosine, four parts and Napier formula (without proof) and simpleproblems.

UNIT–2:

TheCelestialSphere: Celestial co-ordinates–Diurnalmotion–Risingandsettingofastar siderealtime –circumpolarstars–Morningandeveningstars-Twilight.

UNIT–3:

Earth – length of a day – Refraction – Tangent formula – Cassini's formula – Effects ofrefraction.

UNIT–4:

Geocentricparallax–Effects–Heliocentricparallax–Effects.

UNIT–5:

Kepler's laws –verification of Kepler's laws – True anomaly,mean anomaly, Eccentricanomaly-Relationbetween them.

TextBook:

❖ Kumaravelu.SandSusheelaKumaravelu –Astronomy for degree classes, RainbowPrinters,Nagercoil(2005).

BookforReference:

➢ Ramachandran.G.V–Astronomy,MissionPress,Palayamkottai,1965.

Semester-VI

<table>
<tr><td colspan="8" align="center">**Major Elective- III**
FUZZY MATHEMATICS</td></tr>
<tr><td>**Category**</td><td>**Course Type**</td><td>**Course Code**</td><td>**Course Title**</td><td>**Lecture (L)**</td><td>**Tutorial (T)**</td><td>**Practical**</td><td>**Credits (C)**</td></tr>
<tr><td>**Part-III**</td><td>**Major Elective -III**</td><td></td><td>**Fuzzy Mathematics**</td><td>60</td><td>-</td><td>-</td><td>4</td></tr>
</table>

Contact hours per semester:60
Contact hours per week :4

Year	Semester	Internal Marks	External Marks	Total marks
III	VI	25	75	100

Objective: Tointroduce fuzzyconceptstostudents and tofacilitatethestudentstostudyfuzzyoperationsandfuzzynumbers

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Explain Crisp sets and fuzzy sets and illustrate the characteristics and significance of Paradigm Shift.	K1,K2
CO2	Elaborate the Additional properties of α cuts and the extension principle for fuzzy sets.	K1,K4
CO3	Perform fuzzy set operations.Also to determine fuzzy complements , fuzzy intersections and fuzzy unions.	K5,K6
CO4	Determine fuzzy numbers and Linguistic variables.Apply arithmetic operations on intervals and on fuzzy numbers.Construct lattice of fuzzy numbers.	K2,K3,K4
CO5	Analyze and classify fuzzy decision making ,individual decision making, Multi person decision making problems.	K5,K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PO mapping (Course Articulation Method)

PSOs \ Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	3	3
CO2	2	1	3	3	1
CO3	2	1	2	3	2
CO4	1	2	2	3	2
CO5	2	2	1	2	3
Total contribution of COs to PSOs	9	9	11	14	11
Weighted Percentage of COs contribution to PSOs	60	60	73.33	93.33	73.33

Course Content

UNIT–1:

CrispSets–FuzzySets–BasicTypes–BasicConcepts–Characteristics and SignificanceofParadigmShift.

UNIT–2:

Additional propertiesof α-cuts– representationsof fuzzy sets– Extension principleforfuzzysets**.**

UNIT–3:

Fuzzysetoperations–Fuzzycomplements–Fuzzyintersections:t-norms–FuzzyUnions:t-conforms –Combinations ofoperations.

UNIT-4:

Fuzzy numbers – linguistic variables-arithmetic operations on intervals-arithmetic operations on fuzzy numbers-Lattice of fuzzy numbers-Fuzzy Equations.

UNIT-5:

Fuzzy decision making – Individual Decision Making-Multi-person decision making-fuzzy linear programming.

TextBook:

- ❖ GeorgeJ.KlirandBoBoYuan– FuzzysetsandFuzzyLogicTheoryApplications,PrenticeHallofIndia,2002,NewDelhi.

Book forReference:

- ➢ GeorgeJ.KlirandTina.A.Folger–Fuzzy sets, uncertainty and Information – Prentice Hall ofIndia,2003,NewDelhi.

Major Elective- III

MATHEMATICAL MODELLING

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical	Credits (C)
Part-III	Major Elective -III		Mathematical Modelling	60	-	-	4

Contact hours per semester:60

Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	VI	25	75	100

Objective: To study the mathematical models through ODE and difference equations.

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Illustrate mathematical modelling through ODE. Classify and elaborate linear growth , non-linear and growth decay problems,Compartmentmodels,Dynamic problems and geometrical problems.	K1,k2
CO2	Explain population dynamics, Epidemics.Anlayze the compartment models in economics,medicines,arms race bullets and international trade.	K2,K3,K5
CO3	Explain mathematical modelling problem through second order ODE.	K5,K6
CO4	Illustrate mathematical modelling through difference equation.	K2,K6
CO5	Explain mathematical modelling through graphs.	K3,K6

K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	3	3
CO2	2	1	3	3	1
CO3	2	1	2	3	2
CO4	2	2	2	3	1
CO5	2	2	1	1	3
Total contribution of COs to PSOs	10	9	11	13	10
Weighted Percentage of COs contribution to PSOs	66.67	60	73.33	86.67	66.67

Course Content

UNIT–1:

(Mathematical modeling through O.D.E(First order)):   Linear growth and Decay models –Non –linear growth and Decay models – Compartment Models –Dynamics Problems–GeometricalProblems.

UNIT–2:

Population dynamics – Epidemics – Compartment Models – Economics, Medicine, Arms race,BattlesandInternationalTrade.

UNIT–3:

(MathematicalModellingthroughO.D.E.(Secondorder)): Planetarymotion–circularmotion– Motionofsatellites– Modelling throughlineardifferenceequationsofsecond order.

UNIT–4:

(MathematicalModellingthroughdifference equations):Basictheoryofdifferenceequation with constant coefficients – Economics and Finance –Populationdynamicsandgenetics–Probabilitytheory.

UNIT–5:(Modellingthroughgraphs):Solutionsthatcanbemodeledthroughgraphs-modelsintermsofdirectedgraphs,signed graphs, weighted digraphs and unoriented graphs**.**

TextBook:

- ❖ Kapur.J.N – Treatment as in "Mathematical Modelling" New Age InternationalPublishers,2004.

BooksforReference:

- ➢ Kapur.J.N–MathematicalModellinginBiologyandMedicine–EastWestPress–1985.
- ➢ Singh– MathematicalModelling,InternationalBookhouse–2003.
- ➢ Frank R.Giordano,MauriceD.WeirandWilliamP.Fox,-AfirstcourseinmathematicalmodellingThomsonLearning,LondonandNewYork,2003.
- ➢ Kapur.J.N, Mathematic modeling, New Age International Pvt., Ltd., Reprint (2007).

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical	Credits (C)
Part-III	Major Elective -III		Operations Research	60	-	-	4

Contact hours per semester:60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	VI	25	75	100

Objective: To introduce games and strategies.Also to understand networking problems.
Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Interpret the games and strategies. Solve two persons zero sum games.Make use of mixed strategies and dominance property.	K2,K3
CO2	Analyze the replacement of items that deteriorate with time. Illustrate replace montage of a machine taking money value into consideration and elaborate the replacement of items that completely fail suddenly and Staffing problems.	K1,K5
CO3	Explain the queueing models and to classify into (M/M/1:FCFS),(M/M/1:∞/FCFS),(M/M/S:/FCFS)	K4,K6
CO4	Compose network scheduling using PERT/CPM. Explain the rules of network construction.Make use of PERT calculation.	K2,K3
CO5	Analyse and solve inventory control problems.	K5,K6

> K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	2	3
CO2	2	1	3	2	1
CO3	2	1	2	2	2
CO4	2	2	2	2	1
CO5	1	2	1	1	3
Total contribution of COs to PSOs	9	9	11	9	10
Weighted Percentage of COs contribution to PSOs	60	60	73.33	60	66.67

Course Content:

UNIT–1:

Games and Strategies: Two Person Zero sum Games – The Maximin – Minimax Principle –Games without Saddle Points – Mixed Strategies – Graphical Solution of 2xn and mx2 games–DominanceProperty.

UNIT–2:

Replacement of items that deteriorate with time – replace montage of a machine taking moneyvalue into consideration – replacement of items that completely fail suddenly and StaffingProblems.

UNIT–3:

Queueingmodels:Generalconceptanddefinitions–characteristics–propertiesof PoissonprocessModels(M/M/1:/FCFS),(M/M/1:∞/FCFS),(M/M/S:/FCFS).

UNIT–4:

Networks SchedulingbyPERT/CPM:Networkandbasiccomponents– RulesofNetworkConstruction– TimeCalculation in network–CriticalPathMethod– PERTCalculation.

UNIT–V:

Inventory Control :Introduction–Typesof Inventories–Inventory decisions– DeterministicinventoryProblem–EOQproblems withoutshortages**.**

TextBook:

❖ KantiSwarup,P.K.GuptaandManmohan–OperationsResearch–SultanChand&Sons– 2006, 12thEdition.

Books for Reference:

➢ Gupta.P.KandD.S.Hira–OperationsResearch–S.Chand&sons–VIIEdition..
➢ B.J.RanganathandA.S.Srikantappa–OperationsResearch,YesDeePublishingHouse,Chennai(2017).
➢ Hillier,F.S.andG.J.Lieberman– Introduction to Operations Research, 9th Ed., TataMcGrawHill,Singapore,2009.
➢ HamdyA.Taha,-OperationsResearch,AnIntroduction,8thEd.,Prentice–HallIndia,2006.
➢ Hadley.G.-LinearProgramming,NarosaPublishingHouse,NewDelhi,2002.

Major Elective- IV
CODING THEORY

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical	Credits (C)
Part-III	Major Elective –IV		Coding Theory	60	-	-	4

Contact hours per semester:60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	VI	25	75	100

Objective: To introduce coding and decoding concepts.Also to develop the students in the field of coding theory

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Analyze and illustrate basic assumptions and correcting ,detecting error patterns.Also to interpret effects of error correction and detection.	K3,K4
CO2	Elaborate linear codes and illustrate the bases for C and C^+ generating matrices on coding	K1,K2
CO3	Illustrate parity check matrices and determine the equivalent codes	K3,K5
CO4	Explain some bounds for codes and classify perfect codes,hamming codes, extended codes, the extended Golay code and decode them.	K4,K6
CO5	Summarize about polynomials and words,cycliccodes.Make use of polynomial encoding and decoding	K6

➢ K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs / Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	3	2	3
CO2	2	1	3	2	1
CO3	2	1	2	2	2
CO4	2	2	3	2	1
CO5	3	2	3	2	3
Total contribution of COs to PSOs	10	9	14	10	10
Weighted Percentage of COs contribution to PSOs	66.67	60	93.33	66.67	66.67

Course Content:

UNIT -1:
Introduction to coding theory, Basicassumptions, Correctinganddetectingerrorpatterns–informationrate–effectsoferrorcorrectionanddetection –findingthemostlikelycode word transmitted.

UNIT-2:
Linear codes–subspacesindependence–basis,dimension–matrices–BasesforCand C$^+$generating matrices on coding.

UNIT-3:
Parity check matrices– equivalent codes–distance of a linear code–Linear codes – cosets – MLDforlinear codes–ReliabilityofIMLDforlinearcodes.

UNIT-4:
Someboundsforcodes–perfectcodes–hammingcodes–extendedcodes–TheextendedGolaycode– decoding the extendedGolaycode–Golaycode.

UNIT-5:
Polynomialandwords–introductiontocycliccodes– Polynomialencodinganddecoding–findingcyclic codes–Dualcycliccodes.

Text Book:
❖ Codingtheory,Theessentials–MarcelDekker,Inc.MadtrisonAvenue,NewYork.

Books for Reference:
➢ ElwynBerlekamp– AlgebraicCodingTheory–Springer-1970
➢ San Ling and Chaoping Xing, coding theory A first course, Cambridge University Press, New York (2004)

Major Elective- IV
PROGRAMMING IN C++

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical	Credits (C)
Part-III	Major Elective -IV		Programming in C++	60	-	-	4

Contact hours per semester:60
Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total marks
III	VI	25	75	100

Objective: To introduce coding and decoding concepts.Also to develop the students in the field of coding theory

Course Outcomes: On successful completion of the course,the students should be able to

CO No.	Course Outcome	Knowledge Level
CO1	Illustrate and make use of the concepts of tokens, expressions and control structures	K3,K4
CO2	Utilize the functions in C++ and to apply it while writing programs	K1,K2
CO3	Interpret constructors and destructors	K3,K5
CO4	Explain and apply operator overloading while writing programs	K4,K6
CO5	Make use of inheritance and classes to compile a program	K6

➢ K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

CO-PSO mapping (Course Articulation Method)

PSOs \ COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	3	2	3
CO2	2	1	3	2	1
CO3	2	2	2	2	2
CO4	2	3	3	2	3
CO5	2	3	3	2	3
Total contribution of COs to PSOs	9	12	14	10	12
Weighted Percentage of COs contribution to PSOs	60	80	93.33	66.67	80

Course Content:
Unit-I:Tokens, Expressions and control structures
Introduction, Tokens, Keywords, Identifiers and constants, Basicdata types,Userdefined data types, storageclasses, Derived data types, Symbolic constants.

UNIT-II: Functions in C++

Introduction ,Themain function, functionprototyping, Call by reference, Return by references, Inlinefunctions, Defaultarguments, constant Arguments, Recursion, Functionoverloading, Friend and virtual functions, Math library functions, C structures Revisited, Specifying a class, Defining member functions, A C++ program with class, Making an outside functions inline, Nesting member functions, Private member functions, Arrays within a class, Memory allocation for objects, Staticmember functions, Array of objects, objects as function arguments, Friend functions, Returning objects.

UNIT-III: Constructors and Destructors

Introduction, Constructors, Parameterizedconstructors, Multipleconstructors in a class, Constructors with default arguments, Dynamic initialization of objects, Copy constructor, , Constructing Two-dimensional arrays, constant objects, Destructors.

UNIT-IV: Operator Overloading and Type Conversations

Introduction, Defining operator overloading, Overloading unary operator, Overloading Binary operator, Overloading Binary operators using Friends, Manipulation of strings using operators, Some other operator overloading examples, Rules for Overloading Operators

UNIT-V:Inheritance: Extending Classes

Introduction, Defining Derived classes, Single inheritance, Making a private member inheritable, Multilevelinheritance, Multipleinheritance, Hierarchicalinheritance, Hybridinheritance.

Text Book:
- ❖ E.BalaguruSamy,Object Oriented Programming with C++,TataMcGraw Hill Education Private Limited, New Delhi(Fifth Print 2012).

Book for References :
- ➢ ReemaThareja,Object Oriented Programming with C++, Oxford University Press(January 2018)

PROGRAMME STRUCTURE

Semester	Class	Paper	Allotted Hours	Credits
I	I M.Sc. Mathematics	Core – 1, Algebra - I	6	4
		Core – 2, Analysis – I	6	4
		Core – 3, Analytic Number Theory	6	4
		Core – 4, Operations Research	6	4
		Core – 5, Ordinary Differential Equations	6	4
II	I M.Sc. Mathematics	Core – 6, Algebra - II	5	4
		Core – 7, Analysis – II	5	4
		Core – 8, Advanced Calculus	5	4
		Core – 9, Differential Geometry	5	4
		Core – 10,Research Methodology and Statistics	5	4
		Elective – 1 (Choose any one) : 1.1. Classical Mechanics 1.2. Partial Differential Equations 1.3. Python Programming-Theory	5	4
III	II M.Sc. Mathematics	Core – 11, Advanced Algebra – I	6	4
		Core – 12, Graph Theory	6	4
		Core – 13, Measure and Integration	6	4
		Core – 14, Topology - I	6	4
		Elective – 2 (Choose any one): 2.1. Algebraic Number Theory 2 .2. Calculus of Variation and Integral Equations 2.3. Python Programming-Practicals	6	4
IV	II M.Sc. Mathematics	Core – 15, Advanced Algebra -II	5	4
		Core – 16, Complex Analysis	5	4
		Core – 17, Functional Analysis	5	4
		Core – 18, Topology - II	5	4
		Core – 19, Project	10	10
		Total	120 hrs.	90

- In Elective- 1, if 1.3. Python Programming-Theory is chosen then in Elective-2, 2.3. Python Programming-Practicals is Compulsory.

- Project credit is increased to create awareness on Research among students.

MSU/2021-2022 /PG-College /M.Sc. (Mathematics) /SEMESTER - II /Course No. 11/Elective-1.1

Title of the Course   **: CLASSICAL MECHANICS** (75 Hours)

Course Objective   : To illustrate Mechanics of a system of particle, Hamilton principle and Kepler problem

Course Outcomes(COs)

On successful completion of the course, the students will be able to

	Course outcome	Cognitive Level
CO 1	Distinguish between the external force acting on the particles due to sources outside the system and internal forces on all other particles in the system.	K-2, K-3
CO 2	Work with many vector forces and accelerations and deal with two scalar functions.	K-3
CO 3	Emphasize that configuration space has no necessary connection with the physical three-dimensional space. extend Hamilton's principle to cover certain types of nonholonomic systems.	K-4
CO 4	Discuss the problems of two bodies moving under the influence of a mutual central force as an application of the Lagrangian formulation.	K-3
CO 5	Solve the orbital equation for motion in a central inverse-square force law in a fairly straightforward manner with results that can be stated in simple closed expressions.	K-4, K-5

K-1: Remembering; K-2: Understanding; K-3: Applying; K-4: Analyzing; K-5: Evaluating; K-6:Creating.

L	T	C	P
5	0	4	0

Course Description

Unit I: Mechanics of particles– Mechanics of a system of particle constraints.
Chapter 1: Section 1 - 3, Problems: 2, 4 and 5.   (15 hours)

Unit II: D'Alembert's Principle and Lagrange's Equation – Velocity dependent potentials and dissipation functions – Simple applications of Lagrangian formulation.
Chapter 1: Section 4, 5 and 6, Problems: 11, 13 and 17.   (15 hours)

Unit III: Hamilton's Principle – Some techniques of Calculus of Variation –Derivation of Lagrange's equations from Hamilton's principle –   Extension of Hamilton principle to non-holonomic systems.

Chapter 2: Section 1 – 4, Problems: 1 – 3.   (15 hours)

Unit IV: Reduction to the equivalent one-body problem – The equations   of   motion and first Integrals – The equivalent one-dimensional problem and classification of orbits – The virial theorem.
Chapter 3: Section 1 – 4, Problems: 2 – 4.   (15 hours)

Unit V: The differential equation for the orbit and integrable power law potentials – The Kepler problem: Inverse square law of force – The motion in time in the Kepler problem – The Laplace – Runge – Lenz vector.
Chapter 3: Section 5, 7 – 9.   (15 hours)

Text Book: Classical Mechanics, H. Goldstein, Second Edition, Addison Wesley India Edition.

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	3	3	2	3	3	3	3	3	2	3
CO 2	3	3	3	3	3	3	3	2	2	3
CO 3	2	3	2	3	2	3	3	3	3	3
CO 4	2	3	3	3	2	3	3	3	2	3
CO 5	2	3	3	3	2	3	3	2	2	3

Strongly Correlated-3; Moderately Correlated-2; Weakly Correlated-1; No Correlation-0

MSU / 202120-22 / PG-College / M.Sc. (Mathematics) /SEMESTER -II/Course No. 11 /Elective-1.2

| Title of the Course | **: PARTIAL DIFFERENTIAL EQUATIONS** (75 Hours) |

Course Objective   : To analyse various methods of solutions of Partial differential equation, Cauchy's Method and Separation of variables

Course Outcomes(COs)

On successful completion of the course, the students will be able to

		Course outcome	Cognitive Level
CO 1		Find the fundamental difference between Pfaffian differential equations in two variables and those in a higher number of variables.	K-3, K-4
CO 2		Find the general solution of a linear partial differential equation and indicate how such a general solution may be used to determine the integral surface which passesthrough a given curve.	K-4, K-5
CO 3		Able to solve the nonlinear partial differential equation.	K-5
CO 4		Able to solve linear partial differential equations of the second order.	K-5
CO 5		Able to extend the characteristic curves of a second - order linear differential equation in two independent variables to the case where there are n independent variables.	K-3, K-4

K-1: Remembering; K-2: Understanding; K-3: Applying; K-4: Analyzing; K-5: Evaluating; K-6:Creating.

L	T	C	P
5	0	4	0

Course Description

Unit I: Methods of Solution of$\frac{dx}{P} + \frac{dy}{Q} + \frac{dz}{R}$– Pfaffian Differential Forms and Equations- Solution of Pfaffian Differential Equations in three variables.
Chapter 1: Section: 3, 5 and 6 (all problems)   (15 hours)

Unit II: Partial Differential equations – Origins of first order Partial Differential equations –Linear equations of the first order –Integral surfaces passing through a given curve.
Chapter 2: Section: 1, 2, 4 and 5 (all problems)   (15 hours)

Unit III: Cauchy's Method of Characteristics – Compatible systems of First order Equations –Charpit's Method.
Chapter 2: Section: 8 – 10 (all problems)   (15 hours)

Unit IV: Second order equations in Physics – Linear Partial Differential equations with Constant Coefficients.
Chapter 3: Section: 2 and 4 (all problems) (15 hours)

Unit V: Characteristics of Equations in three variables – Separation of variables.
Chapter 3: Section: 7 and 9 (all problems) (15 hours)

Text Book: Elements of Partial Differential Equations, IAN N. SNEDDON,McGraw Hill,New Delhi,1983

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	3	2	3	3	2	2	3	2	2	3
CO 2	3	3	2	2	3	3	3	2	2	3
CO 3	3	3	2	3	2	2	3	3	2	2
CO 4	2	2	3	3	3	2	2	2	3	2
CO 5	3	3	2	2	3	2	2	3	2	3

Strongly Correlated-3; Moderately Correlated-2; Weakly Correlated-1; No Correlation-0

MSU/2020-2021/PG-Colleges/M. Sc. (Mathematics)/SEMESTER - II/ Course No. 11/Elective 1.3

Title of the Course　　**: PYTHON PROGRAMMING** (75 Hours)

Course Objective　　: To demonstrate Problem Solving Techniques, Algorithmic　Problem Solving , Python introduction and Python functions.

Course Outcomes(COs)

On successful completion of the course, the students will be able to

	Course outcome	Cognitive Level
CO 1	Give mathematical model for real world problems	K-1, K-2
CO 2	Design algorithms for mathematical models, analyse the efficiency and correctness of algorithms.	K-4
CO 3	Design implementable programs in Python.	K-5
CO 4	Define and demonstrate the use of functions and looping using Python.	K-3
CO 5	Design and implement a program to solve a real-world problem.	K-5

K-1: Remembering; K-2: Understanding; K-3: Applying; K-4: Analyzing; K-5: Evaluating; K-6:Creating.

L	T	C	P
5	0	4	0

Course Description

Unit I:　　PROBLEM SOLVING TECHNIQUES

Problem solving Techniques – Algorithm, flowchart, pseudocode, programming; Algorithms: properties, quality (time, space); building blocks of algorithms - statements, state, control flow, functions, notation (pseudo code, flow chart, programming language)　　　　　　　　(15 hours)

Unit II:　　ALGORITHMIC PROBLEM SOLVING

Algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion), pseudocode for some Mathematical Problems – greatest of two numbers, print n natural numbers, greatest common divisor, fibonacci sequence upto n terms. Practical applications of algorithms.

(15 hours)

Unit III:　　INTRODUCTION TO PYTHON

Introduction to Python, Python interpreter, Modes of Python Interpreter, Values and Data Types, Variables, Keywords, Identifiers, Statements and Expressions, Input and Output, Comments, Docstring, Lines and Indentation, Quotation, Tuple Assignment, Operators and Types of Operators, Operator Precedence.　　　　　　　　(15 hours)

Unit IV: PYTHON FUNCTIONS

Functions, Types of function, Function definition (Sub program), Flow of Execution, Function Prototypes, Parameters and Arguments; Modules; Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion. (15 hours)

Unit V: STRING, LISTS, TUPLES IN PYTHON

Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value. (15 hours)

Text Book:

Allen B. Dowley, "Think Python: How to Think Like a Computer Scientist", 2nd Edition.

Reference Books:

1. Wes McKinney, **"**Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython", O'Reilly, 2nd Edition, 2018.
2. Jake VanderPlas, "Python Data Science Hand Book: Essential Tools for working with Data", O'Reilly, 2017.
3. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2006.
4. Mark Lutz, "Learning Python", O'Reilly, 4th Edition, 2009.

E-Books:

http://www.programmer-books.com/introducing-data-science-pdf/
http://www.CS.uky.edu/~keen/115/haltermanpythonbook.pdf
http://math.ecnu.edu.cn/~lfzhou/seminar/IJoel Geusl Datascience from Scratch First Princ.pdf

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	3	2	3	3	2	3	3	3	3	3
CO 2	3	2	3	3	2	3	3	3	3	3
CO 3	3	2	3	3	3	3	3	3	3	3
CO 4	3	2	3	3	3	3	3	3	3	3
CO 5	2	2	2	3	3	3	3	3	3	3

Strongly Correlated-3; Moderately Correlated-2; Weakly Correlated-1; No Correlation-0

MSU/2021-2022/PG-College/M.Sc.(Mathematics)/SEMESTER-III/Course No. 16/Elective-2.1

Title of the Course	: **ALGEBRAIC NUMBER THEORY** (90 Hours)

Course Objective : To appreciate the significance of approximating irrational numbers, acquired the knowledge of Unique factorizations

Course Outcomes(COs)

On successful completion of the course, the students will be able to

	Course outcome	Cognitive Level
CO 1	Demonstrate competence with the basic ideas of Diophantine and other linear equations.	K-2
CO 2	Solve some special equations of the type $x^4+y^4=z^2$	K-3
CO 3	Able to demonstrate about infinite continued functions	K-3
CO 4	Appreciate the significance of approximating irrational numbers	K-3
CO 5	Acquired the knowledge of Unique factorizations	K-3

K-1: Remembering; K-2: Understanding; K-3: Applying; K-4: Analyzing; K-5: Evaluating; K-6:Creating.

L	T	C	P
6	0	4	0

Course Description

Unit I: Diophantine equations: Diophantine equations – The equation ax+by=c – Positive solutions – Other linear equations. (18 hours)

Unit II: Some special equations: The equation $x^2 + y^2 = z^2$ - The equation $x^4 + y^4 = z^2$ –The equation $4x^2 + y^2 = n$ (18 hours)

Unit III: Infinite continued functions: The equations $ax^2 + by^2 + cz^2 = 0$ -Infinite continued functions – Irrational numbers. (18 hours)

Unit IV: Quadratic Fields: Approximation to irrational numbers – Algebraic integers. (18 hours)

Unit V: Unique Factorization – Units in quadratic fields. (18 hours)

Text book: An introduction to the Theory of Numbers – Ivan Nivan and Herbert S.

Zukerman – II edition, Wiley Eastern Ltd.

Chapter 5,6 and 9 (except 5.13, 5.14, 7.7,7.8 and 7.9)

Book for reference:

Elements of Number Theory – Kumaravelu and Suseela Kumaravelu
(2002), Raja Shankar Printers, Sivakasi (V edition)

Mapping:

Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	3	3	2	3	3	3	3	3	2	3
CO 2	3	3	3	3	3	3	3	2	2	3
CO 3	2	3	2	3	2	3	3	3	3	3
CO 4	2	3	3	3	2	3	3	3	2	3
CO 5	2	3	3	3	2	3	3	2	2	3

Strongly Correlated-3; Moderately Correlated-2; Weakly Correlated-1; No Correlation-0

Title of the Course **: CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS** (90 Hours)

Course Objective   : To identify Constraints, Linear Equations and various theorems.

Course Outcomes(COs)

On successful completion of the course, the students will be able to

	Course outcome	Cognitive Level
CO 1	Demonstrate competence with the basic ideas Maxima and Minima	K-2
CO 2	Explain about Constraints and Lagrange's Multipliers Hamilton's principles-Lagrange equations	K-3
CO 3	Demonstrate Relation between differential and integral equations	K-3
CO 4	Appreciate the significance of Fredholm equations with separable kernels	K-3
CO 5	Acquired the knowledge of Iterative methods for solving equations of second kind	K-3

K-1: Remembering; K-2: Understanding; K-3: Applying; K-4: Analyzing; K-5: Evaluating; K-6:Creating.

L	T	C	P
6	0	4	0

Course Description

Unit I: Calculus of Variations and Applications Maxima and Minima – The simplest case – Illustrative examples-The variational notation-the more general case.
(18 hours)

Unit II: Constraints and Lagrange's Multipliers – Variable endpoints - Sturm Liouville problems-Hamilton's principles - Lagrange equations   (18 hours)

Unit III: Integral Equations – Introduction –Relation between differential and integral equations – The Green's function - Alternative definition of Green's function.
(18 hours)

Unit IV: Linear Equations in cause and effect - The influence function – Fredholm equations with separable kernels – Illustrative Examples.   (18 hours)

Unit V: Hilbert Schmidt theory – Iterative methods for solving equations of second kind-Fredholm theory. (18 hours)

Text Book: Methods of Applied Mathematics, Francis B. Hildebrand, sections 2.1to 2.11, 3.1 to 3.9 and 3.11.

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	3	3	2	3	3	3	3	3	2	3
CO 2	3	3	3	3	3	3	3	2	2	3
CO 3	2	3	2	3	2	3	3	3	3	3
CO 4	2	3	3	3	2	3	3	3	2	3
CO 5	2	3	3	3	2	3	3	2	2	3

Strongly Correlated-3; Moderately Correlated-2; Weakly Correlated-1; No Correlation-0

MSU/2021-2022/PG-Colleges/M. Sc (Mathematics)/Semester-III/ Course No. 16/Elective-2.3

Title of the Course	: **PYTHON PROGRAMMING – PRACTICALS** (90 Hours)

Course Objective   : To evaluate GCD of numbers, various sorts, search and to generate an adjacency martix.

Course Outcomes(COs)

On successful completion of the course, the students will be able to

		Course outcome	Cognitive Level
CO 1		Write programs using advanced concepts of Python.	K-3
CO 2		Write, Test and Debug Python Programs.	K-4
CO 3		Implement Conditionals and Loops for Python Programs.	K-5
CO 4		Use functions and represent Compound data using Lists, Tuples and Dictionaries.	K-4
CO 5		Read, write and manipulate data from & to files in Python.	K-5

K-1: Remembering; K-2: Understanding; K-3: Applying; K-4: Analyzing; K-5: Evaluating; K-6: Creating

L	T	C	P
0	0	4	6

Course Description

LIST OF PRACTICALS IN PYTHON PROGRAMMING:

1. Find minimum/maximum in a list / guess an integer in given range
2. Distance between two points
3. Find GCD
4. Sum an array of numbers
5. Linear search
6. Binary search.
7. Find the numbers which are divisible by n in a given range
8. Print first n Fibonacci numbers
9. Selection sort
10. Insertion sort
11. Merge sort
12. Count word frequencies
13. Generate adjacency matrix of any graph on n vertices
14. Find degree of vertices from given adjacency matrix of the graph
15. Find odd number in given array/ Replace odd numbers with given integer in the given array

16. Compute multiplication of two 3x3 matrices
17. Compute mean and standard deviation of given array
18. Create a Barplot/Piechart for comparing three features.

Text Book:

1. Allen B. Dowley, "Think Python: How to Think Like a ComputerScientist", 2nd Edition.
2. Wes McKinney, "Python for Data Analysis: DataWrangling with Pandas, NumPy, and Ipython", O'Reilly, 2nd Edition, 2018.
3. Jake VanderPlas, "Python Data Science Hand Book: Essential Tools   for working with Data", O'Reilly, 2017.

Reference Books:

1. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2006.
2. Mark Lutz, "Learning Python", O'Reilly, 4th Edition, 2009.

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	3	2	3	3	2	3	3	3	3	3
CO 2	3	2	3	3	2	3	3	3	3	3
CO 3	3	2	3	3	3	3	3	3	3	3
CO 4	3	2	3	3	3	3	3	3	3	3
CO 5	2	2	2	3	3	3	3	3	3	3

Strongly Correlated-3; Moderately Correlated-2; Weakly Correlated-1; No Correlation-0

MANONMANIAM SUNDARANAR UNIVERSITY TIRUNELVELI
PG - COURSES – AFFILIATED COLLEGES
M.Sc. PHYSICS
(Choice Based Credit System)
(For those who joined from 2021- 2022 onwards)

Semester	Sub. No.	Sub. Status	Sub. Title	Contact Hrs./Week	Credits
I	1	Core– 1	Classical Mechanics	6	4
	2	Core– 2	Mathematical Physics - I	6	4
	3	Core– 3	Integrated Electronics	5	4
	4	Core– 4	Nonlinear Dynamics	5	4
	5	Core– 5 Practical1	General Physics Experiments –I	4	2
	6	Core– 6 Practical2	Electronics Experiments -I	4	2
			Subtotal	30	20
II	7	Core– 7	Mathematical Physics - II	5	4
	8	Core– 8	Electromagnetic Theory	5	4
	9	Core– 9	Microprocessor 8085 & Microcontroller 8051	5	4
	10	Core– 10	Statistical Mechanics	4	4
	11	FW/ST	Field Work/ Study Tour	3+2**	3
	12	Core–11 Practical3	General Physics Experiments–II	4	2
	13	Core–12 Practical4	Electronics Experiments -II	4	2
			Subtotal	30	23
III	14	Core– 13	Quantum Mechanics- I	6	4
	15	Core– 14	Atomic and Molecular Spectroscopy	6	4
	16	Core– 15	Condensed Matter Physics	5	4
	17	Core– 16	Numerical Methods & Programming C++	5	4
	18	Core– 17 Practical5	Advanced Physics Experiments -I	4	2
	19	Core– 18 Practical6	Microprocessor Experiments	4	2
			Subtotal	30	20
IV	20	Core– 19	Quantum Mechanics- II	5	4
	21	Core– 20	Nuclear and Particle Physics	5	4
	22	Core– 21	Research Methodology	4*	4
	23	Core– 22 Practical7	Advanced Physics Experiments-II	4	2
	24	Core– 23 Practical8	C++Programming	4	2
	25	Elective-I	Elective IA Optoelectronics(OR) Elective IB Material Science(OR) Elective IC Nano Physics(OR) Elective ID Renewable Energy Sources.	3	3
	26	Core– 24	Project	5+5**	8
			Subtotal	30	27

	Subject Part	Subject Title	Contact Hr / Week	Credit	Exam Hrs	Marks		
						Int	Ext	Total
Semester – III	Part I	Tamil / Other Languages	6	4	3	25	75	100
	Part II	English	6	4	3	25	75	100
	Part III	Core subject 3. Electricity & Electromagnetism	4	4	3	25	75	100
		Practical-III	2	2	3	50	50	100
		Allied Subject-I (for allied subjects With theory and practical) 1.Theory-Paper-I	4	3	3	25	75	100
		2.Practical-1	2	2	3	50	50	100
		Skill based subject (Any one) a. Maintenance of Electrical appliances b. Instrumentation Physics – I	4	4	3	25	75	100
	Part IV	Non – Major Elective (Any one) a. Basic Physics – I b. Applied Physics	2	2	3	25	75	100
		Common-Yoga*	2	2				
		Total	32	27				

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	Recall the definition of speed, velocity and acceleration	1	Re
CO–2	Apply the principle of work, power and energy in any one daily activity.	3	Ap
CO–3	List out the applications of Bernouille's theorem	3	Ap
CO–4	Analyse the functioning of aventurimeter and Pitot's tube	7	An
CO–5	Summarize the effect of reverberation in buildings	1	Un
CO–6	Create a method to produce and detect plane polarized light	7	Cr
CO–7	Enumerate the different types of resistances	1	Un
CO–8	Construct Wheatstone's bridge using Kirchoff's law	7	Cr

Preamble: Objective of the paper is to provide a basic knowledge in Physics for students who do not study physics as major/allied subject

UNIT I: MECHANICS

Motion-speed, velocity, acceleration- force –equations of motion- Newton's laws - momentum - work, power and energy -conservation of energy and momentum.

UNIT II: PROPERTIES OF MATTER

Three states of matter - binding forces - fluid pressure and thrust - applications - Pascal law - Archimedes principle – surface tension-capillary action - Bernoulli's principle – Viscosity – venturi meter - pitot's tube.

UNIT III: HEAT AND SOUND

Measurement of heat and temperature - clinical thermometer - heat transfer - thermos flask - change of state - effect of pressure on boiling point and melting point - heat engines - steam engine and diesel engine-sound and music - reverberation - acoustics of building - recording and reproduction of sound in film.

UNIT IV: OPTICS

Reflection and refraction-concave and convex mirrors and lenses-dispersion- spectra-rainbow- interference-diffraction-polarization-concepts with examples- uses-double refraction-optical activity-quartz crystal

UNIT V: ELECTRICITY

Electric field - potential - Ohm's law - electrical energy and power - resistance - types of resistance - fixed resistance - variable resistance.- resistance in series and parallel -Kirchoff's laws

Books for study and Reference
1. Properties of matter by Murugeshan R, S Chand & Co. Pvt. Ltd., New Delhi
2. Text book of sound by Brij Lal & Subramaniam, Vikas Publishing House, New Delhi,1982
3. Electricity and Magnetism - R. Murugesan. (S. Chand & Co.)
4. Heat and thermodynamics - Brijlal and Subramaniyam, S Chand & Co.
5. Optics by Subramaniam N & Brij Lal, S Chand & Co. Pvt. Ltd., New Delhi,1990

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	Explain about the conventional energy Sources	1,7	Re,Un
CO–2	Illustrate about the world's reserve of conventional energy. To classify various forms of energy.	1	Un,An
CO–3	Summarize about fossil fuels such as coal, oil and natural gas and their availability, statistical details.	1	Re,Ev
CO–4	Explain about fossil fuel's application and to list out the merits and demerits.	1,6	An
CO–5	Illustrate about Bio mass energy and Biomass classification and to elaborate the Bio Mass Conversion process	1,5	Re,An
CO–6	Summarize about Dheena Bandhu Model gas plant. They can explain the importance of wood gasification, Also to list out the merits and demerits of Bio Mass	1,5	Un,Ev
CO–7	Demonstrate about the renewable energy resources Such as solar energy and their applications	1,6	Re
CO–8	Elaborate about solar pond, solar water heater, solar cookers, solar green house and solar cell	1,3	Un,An
CO–9	Illustrate about Geothermal energy and Geo thermal power plant. Summarize about the wind energy, wind farms and wind mill.	1,3	Re,Un
CO–10	Explain the process of producing energy from tides and energy from waves	1,3	Re

PAPER 1.b.
APPLIED PHYSICS

Preamble: This paper enables the students to understand variable energy sources and the need for finding alternate energy source.

UNIT-I: Conventional energy sources

Conventional energy sources –world's reserve of conventional energy sources–various forms of energy-renewable and conventional energy systems- comparison

UNIT-II: Fossil fuels

Fossil fuels – coal, oil and natural gas-availability-statistical details- applications-merits and demerits

UNIT-III: Biomass energy: Biomass energy-biomass classification-biomass conversion process-biogas plants-Deena bandhu model gas plant-wood gasification-advantages and disadvantages of biomass

UNIT-I V: Renewable energy sources

Renewable energy sources-solar energy - importance - storage of solar energy - applications of solar energy -solar pond - solar water heater-solar crop dryers-solar cookers- solar green house - solar cell

UNIT-V: Geothermal energy

Geothermal energy-Geothermal power plant-wind energy and wind farms- wind mills - types – ocean thermal energy conversion - energy from tides-energy from waves

Books for study and Reference

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand & Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd., New Delhi.

NON MAJOR ELECTIVE
PAPER 2.a / BASIC PHYSICS-II

Course Outcome:

CO.No.	Upon completion ofthiscourse,studentswillbeableto	PSO addressed	CL
CO–1	Recall the structure of nuclei	1	Re
CO–2	Explain the properties of alpha, beta and gamma rays	1	Un
CO–3	Enumerate the applications of para, dia and diamagnetic materials	7	Ap
CO–4	Analyse the role of superconductors in the present technology	3	An
CO–5	Weigh the use of Laser technology in medicinal field	7	Ev
CO–6	Explain the postulates of special theory of relativity	7	Cr
CO–7	Differentiate between analog and digital circuits	3	An
CO–8	Design a logic circuit for the addition of two binary numbers	7	Cr

	Subject Part	Subject Title	Contact Hr / Week	Credit	Exam Hrs	Marks		
						Int	Ext	Total
Semester – IV	Part I	Tamil / Other Languages	6	4	3	25	75	100
	Part II	English	6	4	3	25	75	100
	Part III	Core subject 4. Heat & Thermodynamics	4	4	3	25	75	100
		Practical-IV	2	2	3	50	50	100
		Allied Subject-II (for allied subjects with theory and practical) 1.Theory-Paper-II	4	3	3	25	75	100
		2.Practical-II	2	2	3	50	50	100
		Skill based subject (Anyone) a. Maintenance of Electronic appliances b. Instrumentation Physics – II	4	4	3	25	75	100
	Part IV	Non – Major Elective - Paper - II (Any One) a. Basic Physics – II b. Space Physics	2	2	3	25	75	100
		Common - Computer For Digital Era*	2	2	-	-	-	-
	Part V	Extension activity	-	1	-	-	-	-
		Total	32	28				

Preamble: Objective of the paper is to gain knowledge on Basic principles of Physics

UNIT I: NUCLEAR PHYSICS

     Introduction - nuclear structure - properties of nucleus - packing fraction - binding energy - nuclear forces - Radio activity - properties of alpha, beta and gamma rays - radio carbon dating - nuclear fission - nuclear fusion

UNIT II: MAGNETIC MATERIALS

     Classification of magnetic materials - para-dia and ferromagnetic materials - properties – applications - crystalline and amorphous materials – conductors – insulators – superconductors - properties – applications

UNIT III: LASERS

Introduction – absorption – spontaneous emission – stimulated emission - population inversion - general laser system – He - Ne laser - CO_2 laser - applications.

UNIT IV: RELATIVITY

     Introduction - reference frames - postulates of the special theory of relativity - length contraction - time dilation (no derivation) - Quantum mechanics - dual nature of wave and radiation – de - Broglie waves

UNIT V: NUMBER SYSTEMS

     Number systems in digital electronics-binary, decimal and hexadecimal numbers – inter conversions - binary addition and subtraction — binary coded decimal - logic gates

Books for study and Reference

1. Modern Physics - R.Murugesan, S. Chand & Co
2. Electricity and Magnetism - R. Murugesan (S. Chand & Co.)
3. Digital principles and applications - Albert Paul Malvino & Donald P.Leach
4. Mechanics and mathematical physics- R.Murugeshan - S Chand & Co. Pvt. Ltd., New Delhi

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	Explain about universe planets. Also to imagine and classify interior and exterior planets	1	Re,Un,Ev
CO–2	Illustrate about Van Allen Belts and to summarize about auroro	1	Re,Un,Ev
CO–3	Classify and illustrate about comets, Meteors, Asteroids	1,5	Re,An
CO–4	Elaborate the salient features of asteroids, meteors and its uses.	1,5	Re,An
CO–5	Describe about sun. To list out the structure of photosphere, chromosphere, Corona.	1	Un
CO–6	Elaborate the satellites of planets their structure. Interpret the phases and features of moon	1	Un,Ev
CO–7	Explain about star constellation. Also to discuss about binary stars and their origin.	1	Un
CO–8	Classify the types of clusters, types of variable, types of galaxies.	1	Un,An
CO–9	Summarize the origin of universe.	1	Un,An
CO–10	Illustrate about the Big Bang Theory, Pulsating Theory, Steady state theory.	1	Re,Un

NON MAJOR ELECTIVE

PAPER 2.b

SPACE PHYSICS

Preamble: This course provides an understanding of celestial objects.

UNIT I : Universe

Planets - interior planets - exterior planets - crust, mantle and core of the earth - different region of earth's atmosphere - rotation of the earth - magnetosphere - Van Allen belts - Aurora.

UNIT II: Comets, Meteors, Asteroids

Composition and structure of comets - periodic comets - salient features of asteroids, meteors and its use.

UNIT III: Sun

Structure of photosphere, chromosphere, corona - sunspots - solar flares - solar prominence - solar plages - satellites of planets - structure, phases and their features of moon.

UNIT IV: Stars

Constellations - binary stars - their origin and types star clusters – Globular clusters - types of variable stars - types of galaxies.

UNIT V: Origin of Universe

Big bang theory - pulsating theory - steady state theory - composition of universe expansion

Books for study and Reference

1. K.D. Abyankar, Astrophysics of the solar system, University press, India.
2. Baidyanath Basu, An introduction to Astrophysics, Prentice Hall of India, New Delhi.
3. Prof. P. Devadas, The fascinating Astronomy, Published by Devadas Telescopies, 2, Charkrapani Road, Guindy, Chennai.
4. Elements of Space Physics – R.P. Singhal, PHI.

MAJOR ELECTIVE

(any one)

a. PROGRAMMING IN C++

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	Understand the basics of C++ programming.	1	U
CO - 2	Understand the applications of C++ modules.	1, 2	U, Ap
CO - 3	Understand the basic techniques of numerical analysis.	1, 2, 7	U, C
CO - 4	Understand and apply computational techniques to physical problems.	1, 7	U, Ap
CO - 5	Understand the procedural and object-oriented paradigms with concepts like streams, classes, functions, and arrays.	1, 2, 8	U
CO - 6	Understand dynamic memory management techniques using member functions, classes, constructors, etc.	1, 8	U, C
CO - 7	Understand the concept of function overloading and operator overloading.	1	U, C
CO - 8	Understand inheritance and its types of inheritance.	1, 8	U, C
CO - 9	Managing the C++ streams with operations and classes	1, 2	U, Ap
CO - 10	Understand the fundamental C++ file operations for single and multiple files.	1, 2	U, Ap

	Subject Part	Subject Title	Contact Hr / Week	Credit	Exam Hrs	Marks		
						Int	Ext	Total
Semester V		Core subject 5.Basic Electronics	6	4	3	25	75	100
		6. Spectroscopy	5	4	3	25	75	100
		7.Atomic and Nuclear Physics	6	4	3	25	75	100
	Part III	Major Elective (any one) a.Programming in C++ b.Communication Electronics	5	4	3	25	75	100
		Practical – V - General Practical	3	3	3	50	50	100
		Practical-VI Electronics	3	3	3	50	50	100
	Part IV	Skill based subject (Common) Personality development / Effective Communication / Youth Leadership	2	2	3	25	75	100
		Total	30	24				
Semester VI		Core Subject 9. Quantum Mechanics	5	4	3	25	75	100
		10. Digital Electronics	5	4	3	25	75	100
		11. Solid State Physics	5	4	3	25	75	100
	Subject Part	Major Elective (any one) a.Energy Physics b.Medical Physics	5	4	3	25	75	100
		Project	4	4	3	50	50	100
		Practical-VII General Practical	3	3	3	50	50	100
		Practical-VIII Electronics	3	3	3	50	50	100
		Total	30	26				

MAJOR ELECTIVE

(any one)

b. PROGRAMMING IN C++

Preamble: Objective of the course is to provide knowledge about the basics of Computer programming in C++ by writing programs. The paper does not need any special prerequisite and the learners are expected to come out with the ability to apply the computer language C++ to solve problems.

UNIT-I: WHAT IS C++

Introduction –comments –output operator-input operator-io stream file –tokens - keywords -identifiers and constants - declaration of variables - basic data types - operators in C++ -expressions and their type-hierarchy of arithmetic - control structures- a simple C ++ program (arithmetic operations using do while loop)

UNIT-II: ARRAYS AND FUNCTIONS IN C++

Introduction - one dimensional and two dimensional arrays - initialization of arrays – a simple matrix addition program. Functions - introduction - function prototyping - inline functions - function overloading –program to find the factorial of a number using function

UNIT-III: CLASSES AND OBJECTS

Introduction – specifying a class – defining member functions – creating objects - C ++ program with class - nesting of member functions - objects as function arguments - arrays within a class - friend functions-constructors –default constructors- parameterized constructors- copy constructor - multiple constructors

UNIT-IV: OPERATOR OVER LOADING AND IN HERITANCE

Introduction – defining operator overloading-over loading unary operators –binary operators – rules for overloading operators-Inheritance - single inheritance - multiple inheritance –multi level inheritance-hybrid inheritance

UNIT-V: MANAGING CONSOLE I / O OPERATIONS

Introduction - C ++ stream - C ++ stream classes - formatted console I/O operations (width, precision, fill) - working with files - classes for file steam operations - opening and closing a file – detecting end of file - opening files using constructors and open –working with single and multiple files

Books for study

1. Object oriented Programming with C++ - E.Balagurusamy, Tata Mc Graw-Hill publishing company Ltd. New Delhi
2. Programming with C++ - D. Ravichandran, Tata Mc Graw-Hill publishing company Ltd. New Delhi

Books for reference

1. Object oriented Programming in C++- 4th Edn.Robert Lafore-Macmilan publishing company Ltd.

2. Fundamentals of Programming with C++ -Richard l. Halterman

MAJOR ELECTIVE – b. COMMUNICATION ELECTRONICS

Course outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	Analyse amplitude modulation and AM envelope. To explain AM frequency bandwidth and phasor representation of AM with carrier.To determine the coefficient of modulation or percentage modulation or modulation index.	1,4	Un, An
CO - 2	illustrate AM power distribution and AM current relation and efficiency. Elaborate emitter modulations or low power AM collector modulator.Classify low level transmitter and high level transmitter	1	An
CO - 3	Analyze the comparison of AM system and Quadrature amplitude modulation. To illustrate the Principles of AM detection and AM receivers	1,5	Re,An
CO - 4	Explain about tuned radio frequency receiver or straight receiver. To elaborate double frequency conversion AM receiver.	1	Re,Ev
CO - 5	Illustrate Frequency modulation and phase modulation. To determine phase modulation and modulation index.	4,5	Re,Un
CO - 6	Elaborate the conversion of FM to PM and they can picturize the phasor representation of FM and PM. To compare AM and FM	1	Ev
CO - 7	Explain and Analyze FM detectors and balanced slope detector	4	An
CO - 8	Illustrate the ratio detector and to elaborate the important features of FM super heterodyne receiver and FM noise suppression. Also to summarize about threshold extension by FMFB technique	5	An,Un
CO - 9	Elaborate about BFSK and to summarize about Binary phase shifting Key. The importance of Quadrature PSK and Differential PSK.	1,5	An,Un
CO - 10	Comparison of digital modulations can be done.to compare and classify correlative coding and Duo binary encoding.	1,4	Un,Ap

MAJOR ELECTIVE – b. COMMUNICATION ELECTRONICS

Preamble: This course enables the students to understand various modulation and demodulation techniques used for communication. The paper needs a basic knowledge in electronics and mathematics and the learners are expected to come out with the ability to choose proper modulation techniques.

UNIT-I: AMPLITUDE MODULATION AND TRANSMISSION

Introduction–amplitude Modulation–AM envelop–AM frequency spectrum and bandwidth–Phas or representation of AM with carrier – coefficient to f modulation or percentage modulation or modulation index – degrees of modulation – AM power distribution – AM Current relation and efficiency-modulation by complex information signal –double side band suppressed carrier AM - single side band suppressed carrier AM – Vestigal side band amplitude modulation – AM modulator circuits – emitter modulations or low power AM –collector modulator or medium and high power AM modulator - AM transmitters –Broadcast AM transmitters–Low level of AM transmitter–High level AM transmitter.

UNIT-II: AMPLITUDE MODULATION - RECEPTION

Comparison of AM system – Quadrature amplitude modulation – principles of AM detection – AM receivers – receiver parameters – Tuned radio frequency (TRF) receiver or straight receiver – principles of super hetrodyne – double frequency conversion AM receiver.

UNIT-III: ANGLE MODULATION – TRANSMISSION

Introduction – Frequency modulation – Phase modulation – Phase deviation and modulation index – Multi tone modulation – Transmission band width of FM –conversion of PM to FM or frequency modulator– conversion of FM to PM / phase modulators – commercial broadcast FM – phase or representation of an FM and PM – average power of an AM/FM wave – generation of FM – direct method of FM generation – reactance tube modulator– indirect method of FM wave generation – FM transmitters – indirect method – Comparison of AM and FM.

UNIT-IV: FM RECEPTION

FM detectors – Balanced slope detector – Foster seemly discriminator – ratio detector –FM super heterodyne receiver–FM noise suppression–threshold extension by FMFB technique.

UNIT–V: DIGITAL MODULATION TECHNIQUES

Introduction–BFSK–Binary phase shift keying – Quadrature PSK –Differential PSK – Performance comparison of digital modulation schemes - M ary FSK– correlative coding– Duo binary encoding.

Book For Study

1. Principles Of Communication Engineering - Dr. K.S.Srinivasan, Second Edition:2010.

2. Electronic communication systems – George Kennedy & Bernard Davis, Tata Mcgraw Hills, 4th edition, 2008

Books for reference:

1. Electronic communication systems – Blake, Joseph J Adams ki, Sun Yifeng, Delamer publication, 2nd edition, 2012 (Rupa Publication, India)
2. Fundamentals of Electrical engineering – Wayone tomasi

Major Elective: a. Energy Physics

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	Understand the importance of conventional and non-conventional energy resources.	1, 6	U
CO - 2	Understand the applications, merits, and demerits of conventional and non-conventional energy resources.	1	U, Ap
CO - 3	Understand the basic aspects of solar energy.	1, 6	U, C
CO - 4	Understand solar energy appliances with their merits and demerits.	1	U
CO - 5	Understand the basic aspects of the photovoltaic principle.	1, 6	U, Kc
CO - 6	Learn about photovoltaic appliances and how they work.	1	C, Ap
CO - 7	Understand the solar cell with its applications and its types.	1, 6	U, Kc
CO - 8	Understand the basic ideas of biomass energy and recognise their merits and demerits.	1, 6	U, An
CO - 9	Understand the methods and classifications of biomass energy.	1	U
CO - 10	Understand the basic principles of wind energy conversion.	1, 6	U
CO - 11	Understand the fundamental concepts of oceans and chemical energy resources, as well as their benefits and drawbacks.	1, 6	U, Ap

Core–1: PROPERTIES OF MATTER & MECHANICS

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Define Stress, Strain, Poisson's ratio, Hooke's law, Torsion pendulum and determine the elastic constant by Searle's Method.	1	Re, Ap
CO-2	Understand the principle of elasticity through the study of young's Modulus and Rigidity Modulus.	1	Un
CO-3	Derive the Expression for the Bending Moment, Cantilever depression, Uniform and Non-Uniform Bending.	1,4	An
CO-4	Find the Young's Modulus of a bar by Uniform and Non-Uniform Bending Method.	1,3,4	Ca
CO-5	Analyse the different Molecular Forces that causes tension on the surface of liquid and determine the surface tension by Capillary rise method and Quincke's Method	3,4	An, Ev
CO-6	Determine the Coefficient of Viscosity of a liquid by Poiseuille's Method and apply the knowledge of viscosity in the field of lubrication	4	Ca, Un, Ap
CO-7	Understand the Analogy between translational and Rotational Motion, Angular Momentum, Angular Impulse, Moment of Inertia and Radius of gyration	1	Un
CO-8	Understand Newton's Second Law for rotation and determine the expression for rotational kinetic energy and power during rotation.	1	Un, E
CO-9	Analyse the centre of pressure on a rectangular and triangular laminar.	1	A
CO-10	Understand the law of floatation and determine the Meta Centric height of a ship and apply the principle of Bernoulli's Theorem in Pitot's tube and Venturimeter	1	Un, Ap

a. ENERGY PHYSICS

Preamble: Objective of the course is to provide an understanding of the present energy crisis and various available energy sources. The paper does not need require any special prerequisite and the learners are expected to know the use of alternate energy sources

UNIT I: INTRODUCTION TO ENERGY SOURCES

World's reserve of Commercial energy sources and their availability-Various forms of energy-renewable & non-renewable energy sources – Conventional & non-conventional energy sources–commercial & non-commercial energy sources, comparison –merits, demerits and applications of coal, oil and natural gas

UNIT II: SOLAR ENERGY

Solar energy – nature of solar radiation and its components -Basic Principles of Liquid flat plate collector –Materials for flat plate collector -Construction and working- Solar water heater - Solar crop dryer – Solar space cooling – solar ponds - solar cookers (box type) - merits and demerits of solar energy

UNIT III: PHOTOVOLTAIC SYSTEMS

Introduction – Photovoltaic principle - Basic Silicon Solar cell- Power output and conversion efficiency-Limitation to photovoltaic efficiency-Basic photovoltaic system for power generation-Advantages and disadvantages-Types of solar cells-Application of solar photovoltaic systems - PV Powered fan – PV powered area lighting system– A Hybrid System.

UNIT IV: BIOMASS ENERGY

Introduction-Biomass classification- Biomass conversion technologies-Bio-gas generation-Factors affecting bio-digestion -Working of biogas plant- floating and fixed dome type plant -advantages and disadvantage of -Bio-gas from plant wastes-Methods for obtaining energy from biomass-Thermal gasification of biomass-Working of down draft gasifier- Advantages and disadvantages of biological

conversion of solar energy.

UNIT V: WIND ENERGY AND OTHER ENERGY SOURCES

Wind Energy Conversion-Classification and description of wind machines, wind energy collectors-Energy storage-- Energy from Oceans and Chemical energy resources - Ocean thermal energy conversion-tidal power, advantages and limitations of tidal power generation-Energy and power from waves- wave energy conversion devices- Fuel cells- and application of fuel cells- batteries- advantages of battery for bulk energy storage- Hydrogen as alternative fuel for motor vehicles.

Books for study

1. Rai G. D, Non conventional Energy sources, 4th Edition, Khanna Publishers,2010

2.Solar Energy- Principles of thermal collection and storage - S.P.SUKHAME-Tata-McGraw-Hill Publishing Company Ltd.

Books for References

1. Chetan Singh Solanki, Solar Photvoltaics Fundamentals, Technologies and Applications, 2nd Edition, PHIL earning Private Limited, 2011.

2. Kothari D.P., K.C.Singal and Rakesh Ranjan, Renewable energy sources and emerging Technologies, Prentice Hall of India, 2008.

3. Jeffrey M. Gordon, Solar Energy: The State of the Art, Earthscan, 2013.

4. Kalogirou S.A., Solar Energy Engineering: Processes and Systems, 2nd Edition, Academic Press, 2013.

5. Zobaa A.F. and Ramesh Bansal, Hand book of Renewable Energy Technology, World Scientific, 2011

Major Elective : b. MEDICAL PHYSICS

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Define electromagnetic spectrum Sketch the X- ray tube design	1,2	Re, Ap
CO-2	Categorize half wave & full wave rectification	2	An
CO-3	Identify the sources of radio activity. Explain the units of radiation	1,3	Re, Un
CO-4	Measure the biological damage	4	Ev
CO-5	Discuss about CAT scanners, Identify transducers for biomedical applications	1	Ev, Un
CO-6	Estimate the computer analysis of ECG	5	Cr
CO-7	State radiography, Compare Ultrasound imaging & magnetic resonance imaging	1,3	Re,An
CO-8	Determine the uses of Gamma Camera	5	An
CO-9	Generalize the uses of lasers. Interpret the effect of laser radiation on tissues	5,8	Ap

CO-10	Justify laser as a beauticians tools	8	Ev

b. MEDICAL PHYSICS

Preamble: This course facilitates an understanding of the basic concepts in Biomedical instrumentation and awareness regarding radiation hazards and safety.

UNIT-I: X-RAYS

Electromagnetic spectrum - production of x-rays - x-ray spectra –Brehms strahlung process - Characteristic x-ray - X-ray tubes - Coolidge tube - X-ray tube design - tube cooling - stationary mode - Rotating anode X-ray tubes -Tube rating - quality and intensity of X-ray. X-ray generator circuits - half wave and full wave rectification - filament circuit - kilo voltage circuit - high frequency generator- exposure timers- HT cables.

UNIT–II: RADIATION SAFETY AND HEALTH PHYSICS

Introduction to Radio activity - Artificial and natural - radioactivity –Physical features of radiation-units of radiation- conventional sources of radiation, Interaction of different types of radiation with matter -penetration power in living cells-radiation damage to the cell-effect of radiation on cells-measurement of ionizing radiation- measurement of biological damage-Linear energy transfer (LET)-radiation risk-radiation dosimetry-security of radio-active material- radio-active waste management

UNIT–III: BIOMEDICAL INSTRUMENTATION

Development of biomedical instrumentation-biometrics-introduction to the man-instrument system-components of man-instrument system-transducers for biomedical applications-biomedical computer applications-computer analysis of ECG-computerized axial tomography (CAT) Scanners

UNIT-IV: MEDICAL IMAGING PHYSICS

Radiological imaging - Radiography - Filters - grids - cassette - X-ray film –film processing – fluoroscopy - computed tomography scanner- principle function - display - generations –

mammography - ultrasound imaging - magnetic resonance imaging - thyroid uptake system - Gamma camera (Only Principle, function and display)

UNIT-V LASERSIN MEDICINE

Introduction to laser-principle and production of laser- effects of laser radiation on tissues - photo thermal effects- photo chemical effects –photo dynamic therapy-Laser applications in therapy and diagnosis-opthalmology - Fibre optic endoscopy and dentistry-Laser as a beautician's tool-laser hazards-biological effects.

Books for study and Reference

1. Basic Radiological Physics Dr. K. Thayalan - Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi (2003)

2. The essential physics of Medical Imaging: Bushberg, Seibert, Leidholdt and Boone Lippincot Williams and Wilkins, Second Edition (2002)

3. Biomedical instrumentation-Leslie Cromwell, Fred J. Weibel-Erich A. Pfeiffer-Pearson Publications

4. Lasersin Medicine- RW Wayanant, Plenum Publishing Co

5. Nuclear medicine physics: Chandra – Lippincot Williams and Wilkins (1998)

PROGRAMME STRUCTURE

Semester	Course. No.	Course. Status	Course. Title	Contact Hrs./Week	Credits
I	1	Core– 1	Classical Mechanics	6	4
	2	Core– 2	Mathematical Physics - I	6	4
	3	Core– 3	Integrated Electronics	5	4
	4	Core– 4	Nonlinear Dynamics	5	4
	5	Core– 5 Practical1	General Physics Experiments –I	4	2
	6	Core– 6 Practical2	Electronics Experiments -I	4	2
			Subtotal	30	20
II	7	Core– 7	Mathematical Physics - II	5	4
	8	Core– 8	Electromagnetic Theory	5	4
	9	Core– 9	Microprocessor 8085 & Microcontroller 8051	5	4
	10	Core– 10	Statistical Mechanics	4	4
	11	FW/ST	Field Work/ Study Tour	3+2**	3
	12	Core–11 Practical3	General Physics Experiments–II	4	2
	13	Core–12 Practical4	Electronics Experiments -II	4	2
			Subtotal	30	23
III	14	Core– 13	Quantum Mechanics- I	6	4
	15	Core– 14	Atomic and Molecular Spectroscopy	6	4
	16	Core– 15	Condensed Matter Physics	5	4
	17	Core– 16	Numerical Methods & Programming in C++	5	4
	18	Core– 17 Practical5	Advanced Physics Experiments -I	4	2
	19	Core– 18 Practical6	Microprocessor Experiments	4	2
			Subtotal	30	20
IV	20	Core– 19	Quantum Mechanics- II	5	4
	21	Core– 20	Nuclear and Particle Physics	5	4
	22	Core– 21	Research Methodology	4*	4
	23	Core– 22 Practical7	Advanced Physics Experiments-II	4	2
	24	Core– 23 Practical8	C++Programming	4	2
	25	Elective-I	Elective I(a) Optoelectronics(OR) Elective I(b) Materials Science(OR) Elective I(c) Nano Physics(OR) Elective I(d) Renewable Energy Sources.	3	3
	26	Core– 24	Project	5+5**	8
			Subtotal	30	27

MSU / 2021-22 / PG –Colleges / M.Sc Physics/ Semester IV / Ppr.no.25 / Elective – 1 (a)

Title of the Course : **OPTOELECTRONICS**

Course Outcomes

At the end of the course, the student will be able to:

	Course Outcomes	Cognitive level
CO1	Understand fundamental properties of light and wave-propagation thereby applying it to analyze the resonant cavities at plane boundaries	K-2, K-3, K-4
CO2	Infer the operation principles of different types of integrated waveguides and examine the integrated optical network	K-3, K-4, K-5
CO3	Associate the concept of optical fibre, its construction and importance in communication physics	K-3, K-4, K-5
CO4	Analyze different laser systems and its characteristics, design architectures	K-3, K-4, K-5
CO5	Interpret the process of image formation and reproduction in hologram; Also able to examine different types of holograms	K-2, K-3, K-4

Cognitive level	Content
K-1	Remember
K-2	Understand
K-3	Apply
K-4	Analyze
K-5	Evaluate
K-6	Create

Course Description

L	T	C	P
3	0	3	0

Preamble: The student should gain knowledge on an optical communication system. The course permits students to measure different kinds of losses in an optical fiber. The student will be able to measure parameters related to LEDs as optical sources and coupling. The performance of different optical detectors can be evaluated by the student. The student will be able to obtain gainful employment in the telecommunication industry.

UNIT I: OPTICAL FIBERS AND OPTICAL COMMUNICATION SYSTEMS
Evolution of fiber optic systems – optic fiber transmission link – nature of light – basic laws of light – optic fiber modes and configurations: fiber types, ray optics representation, modes in step index fibers – linearly polarized modes – single mode fibers – graded index fiber – Fiber materials – Fiber fabrication – fiber optic cables.

UNIT II: SIGNAL DEGRADATION IN OPTICAL FIBERS
Attenuation: Attenuation Units - Absorption losses - Scattering Losses - Bending Losses - Core and cladding Losses – signal Distortion in Optical Waveguides: Information capacity Determination, Group Delay, Material Dispersion, Waveguide Dispersion - Signal Distortion in Single Mode Fibers.

UNIT III: **OPTICAL SOURCES**
Topics from Semiconductor Physics: Energy Bands, Intrinsic and Extrinsic Material, the pn junctions Direct and Indirect Band Gaps, Semiconductor Device Fabrication – Light-Emitting diodes (LED's): LED Structures, Light Source Materials - Quantum Efficiency and LED Power - Modulation of an LED – Laser Diodes: Laser diode Modes and Threshold conditions - Laser

diode.

UNIT IV: POWER LAUNCHING AND COUPLING

Source – to – Fiber Power launching: Source Output Pattern, Power – Coupling Calculation - Power Launching versus Wavelength - Equilibrium Numerical Aperture – Lensing Schemes for coupling Improvement: Non-imaging Microsphere.

UNIT V: PHOTO DETERCTORS

Physical Principles of Photodiodes - The pin Photo detector- Avalanche Photodiodes – Photodetector Noise: Noise Sources, Signal-to-noise Ratio – Detector Response Time.

Book for Study:

1. Gerd Keiser, Opitcal Fiber Communication, Third Edition, Mc Graw Hill International (2000), relevant sections of chapter 1 to 6.

Book for Reference:

1. Jasprit Singh, Optoelectronics: An introduction to materials and devices, Mc Graw Hill, Singapore (1996).

Related online resources:
1. https://youtu.be/p6uMrpX8G7s
2. https://youtu.be/VfKpqFKOccE
3. https://youtu.be/4JKjqveWGlw

Mapping of Course outcomes with Programme Outcomes and Programme Specific Outcomes:

CO/ PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO
CO1	3	3	3	1	3	3	2	3	3	3	1	3	3	3
CO2	3	3	3	1	3	3	2	3	3	3	1	3	3	3
CO3	3	3	3	1	3	3	2	3	3	3	1	3	3	3
CO4	3	3	3	1	3	3	3	3	3	3	2	3	3	3
CO5	3	3	3	1	3	3	1	3	3	3	2	3	3	2

Strongly Correlated – 3; Moderately Correlated – 2;

Weakly Correlated – 1; No Correlation – 0;

MSU / 2021-22 / PG –Colleges / M.Sc Physics/ Semester IV / Ppr.no.25 / Elective – 1 (b)

Title of the Course : <mark>**MATERIALS SCIENCE**</mark>

Course Outcomes

At the end of the course, the student will be able to:

	Course Outcomes	Cognitive level
CO1	Understand the applications of phase diagram and the overall transformation kinetics	K-2,K-3, K-5
CO2	Gains knowledge about the elastic, anelastic and viscoelastic behavior	K-2,K-4
CO3	Realize the nature of crystalline solids and also acquires knowledge about the classification of polymers	K-3,K-4, K-5
CO4	Know the concept of various imperfections exists within the crystal lattice	K-3,K-4
CO5	Acquires a good knowledge about the mechanisms of oxidation and corrosion and also the protection methods against fracture	K-3,K-4, K-5

Cognitive level	Content
K-1	Remember
K-2	Understand
K-3	Apply
K-4	Analyze
K-5	Evaluate
K-6	Create

Course Description

Preamble: The course details about the temperature effect, elastic behavior of materials, solid structure, imperfections in the crystal, the various deformation of materials.

L	T	C	P
3	0	3	0

Unit I: Phase diagram
Phase rule - Single component systems - Binary Phase diagrams - Micro structural changes during cooling - The lever rule - Some typical phase diagrams - other applications of phase diagrams Phase transformations - Time scale for phase changes - Nucleation and growth - The growth and the overall Transformation kinetics - applications.

Unit II: Elastic behaviour
Atomic model for elastic behavior - The Modulus as a parameter in Design - Rubber like elasticity – An elastic behavior - Relaxation behaviours - Viscoelastic behavior – Spring - Dashpot models.

Unit III: Structure of solids
The crystalline and non-crystalline states - Covalent solids - Metals and alloys - Ionic Solids The structure of silica and silicate – polymers - classification of polymers - Structure of long chain polymers - Crystallinity of long chain polymers.

Unit IV: Imperfections

Crystal imperfections - Point imperfections - The geometry of dislocations - other properties of dislocations - Surface imperfections.

Unit V: Oxidation, corrosion and other deformation of materials

Mechanisms of Oxidation-Oxidation resistant materials-the principles of corrosion protection against corrosion - Plastic deformation - The tensile stress-strain curve - Plastic deformation by slip-Creep-Mechanisms of creep-Creep resistant materials - Ductile fracture - brittle fracture - methods of protection against fracture.

Book for Study:

1. Materials Science and Engineering - A First Course, V. Raghavan, Fifth Edition, Prentice Hall of India, New Delhi, 2011.

Online Reference:

1. https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Book%3A_Physical_Chemistry_(Fleming)/08%3A_Phase_Equilibrium/8.02%3A_Single_Component_Phase_Diagrams
2. https://www.youtube.com/watch?v=symExnyQ49M
3. https://www.youtube.com/watch?v=lxNYAxr5lPc
4. https://www.researchgate.net/publication/322892419_Experimental_study_of_concrete_beams_prestressed_with_basalt_fiber_reinforced_polymers_Part_II_Stress_relaxation_phenomenon/figures?lo=1&utm_source=google&utm_medium=organic
5. https://www.sciencedirect.com/topics/engineering/surface-imperfection
6. https://www.fastradius.com/resources/top-5-corrosion-resistant-materials/
7. https://yenaengineering.nl/britle-and-ductile-fracture/

Mapping of Course outcomes with Programme Outcomes and Programme Specific Outcomes:

CO/PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO
CO1	3	3	2	1	3	2	1	3	3	2	1	2	3	2
CO2	3	2	3	1	3	2	1	3	3	2	1	2	2	3
CO3	3	3	3	1	3	2	1	3	3	2	1	2	3	2
CO4	3	3	3	1	3	3	1	3	3	2	1	2	3	3
CO5	3	3	3	1	3	2	1	3	3	3	1	2	3	2

Strongly Correlated – 3; Moderately Correlated – 2;

Weakly Correlated – 1; No Correlation – 0;

MSU / 2021-22 / PG –Colleges / M.Sc Physics/ Semester IV / Ppr.no.25 / Elective – 1 (c)

Title of the Course : **NANOPHYSICS**

Course Outcomes

At the end of the course, the student will be able to:

	Course Outcomes	Cognitive level
CO1	Understand various chemical and physical methods for the synthesis of diverse types of nano materials (0D, 1D and 2D)	K-2, K-4
CO2	Quantify Mechanical properties of solids in terms of stress and strain and their relationship to each other and analyze synthesis methods for various nano composite materials	K-2, K-4
CO3	Understand different Nano material Characterization and apply it to study the characterization	K-2, K-3
CO4	Able to categorize functional materials in terms of structural, mechanical, thermal, optical and electrical properties	K-2, K-4
CO5	Gain knowledge about the various applications of Nano structured materials in biotechnology, electronics, defense and photonics	K-2, K-3

Cognitive level	Content
K-1	Remember
K-2	Understand
K-3	Apply
K-4	Analyze
K-5	Evaluate
K-6	Create

Course Description

Preamble: The course permits students to study the synthesis, characterization, properties and application of nanomaterials.

L	T	C	P
3	0	3	0

UNIT I
Synthesis of Nanostructured Materials: Idea of band structure extended to nanostructured matierials-0D nanostructures (quantum dots) - 1D nanostructures (quantum wires) - 2D nanostructures (quantum wells) - Carbon Nanomaterials: Fullerenes – CNT - Graphene

UNIT II
Introduction to Nanocomposites: composite material - Mechanical properties of nano composites - stress-strain relationship – toughness – strength – plasticity - synthesis methods for various nano composite materials: sputtering - mechanical alloying - sol-gel synthesis - thermal spray synthesis

UNIT III
Nanomaterial Characterization: Principle & Applications: X-ray diffraction - Debye-Scherer Formula – FTIR - Raman Spectroscopy – SEM – TEM - Differential Scanning Calorimetery (DSC)

UNIT IV
Properties of Nanostructured materials: Mechanical properties - Thermo physical properties -

Electric properties - Electrochemical properties - Optical properties

UNIT V

Applications: Application of Nanostructured materials in biotechnology- electronics- defence - photonics

Books for Study:

1. Introduction to Nanotechnology by Charles P. Poole Jr and Frank J.Owens Wiley India Pvt. Ltd., (2003).
2. Nanostructures &Nanomaterials: Synthesis, Properties & Applications, Guozhong Cao, Imperial College Press (2004).

Books for Reference:

1. Nanocrystals: Synthesis, Properties and Applications, C. N. R. Rao, P. J. Thomas and G. U. Kulkarni, Springer (2007).
2. Physics of semiconductor nanostructures – K. P. Jain, Narosa 1997
3. Nanotechnology - Enabled Sensors, Kourosh Kalantar - zadeh and Benjamin Fry, Springer (2008).
4. Nanocomposite science and technology, Pulickel M. Ajayan, Linda S. Schadler, Paul V. Braun, Wiley-VCH Verlag, Weiheim (2003).
5. Elements of X-Ray Diffraction (second edition, Addison – Wesley, London) B. D. Cullity (1977).
6. Handbook of Microscopy for Nanotechnology, Ed. By Nan Yao and Zhong Lin Wang, Kluwer Academic Press (2005).
7. Nanotechnology: Basic Science and Emerging Technologies – Mick Wilson, Kamali Kannangara,
   Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).

Related Online Sources:

1. https://youtu.be/5lvjo0rm-F0
2. https://youtu.be/qUEbxTkPIWI
3. https://youtu.be/k61wjab7iUs

Mapping of Course outcomes with Programme Outcomes and Programme Specific Outcomes:

CO/PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO
CO1	3	3	3	3	2	2	2	3	3	2	2	2	2	2
CO2	3	3	3	3	2	2	2	3	3	2	2	2	2	2
CO3	3	3	3	3	2	2	2	3	3	2	2	2	2	2
CO4	3	3	3	3	2	2	2	3	3	2	2	2	2	2
CO5	3	3	3	3	2	2	2	3	3	2	2	2	2	2

Strongly Correlated – 3; Moderately Correlated – 2;

Weakly Correlated – 1; No Correlation – 0;

MSU / 2021-22 / PG –Colleges / M.Sc Physics/ Semester IV / Ppr.no.25 / Elective – 1 (d)

Title of the Course : **RENEWABLE ENERGY SOURCES**

Course Outcomes

At the end of the course, the student will be able to:

	Course Outcomes	Cognitive level
CO1	Describe the different types of energy sources in India and world as well	K-2, K-3, K-4
CO2	Explain solar cells and biomass conversion	K-3, K-4
CO3	Enumerate the theory of geothermal and tidal energy conversion	K-3, K-4
CO4	Differentiate thermoelectric and thermionic energy sources	K-3, K-4
CO5	Explore the applications of chemical energy sources	K-2, K-3, K-4, K-5

Cognitive level	Content
K-1	Remember
K-2	Understand
K-3	Apply
K-4	Analyze
K-5	Evaluate
K-6	Create

Course Description

Preamble: This course gives a brief knowledge about the types of various non-conventional energy sources. The societal application of these energy sources is studied.

L	T	C	P
3	0	3	0

Unit I: Introduction
Primary and secondary energy – Commercial and non commercial energy – renewable and non – renewable resources and their importance – World energy use – Indian energy scenario – Long term energy scenario for India.

Unit II: Solar and Biomass Energy
Introduction – extra terrestrial solar radiation – collectors – Solar cells – application of solar energy – Biomass energy – biomass conversion – bio gas production – ethanol production – pyrolysis and gasification – application of biomass energy.

Unit III: Geothermal and Tidal Energy
Introduction – basic theory - geothermal resources types – resource base – application for heating and electricity generation – Tidal energy – Introduction – origin of tides – Power generation scheme.

Unit IV: Other Renewable Energy Sources
Thermoelectric and Thermionic energy resources – basic principles – power generation – nuclear energy – basic principle – power generation (basic ideas only).

Unit V: Chemical Energy Sources
Introduction – fuel cells – design and principle – types – advantages and disadvantages – applications – Batteries – Introduction – Theory – classification of batteries – advantages of batteries for bulk storage.

Books for Study:

1. Non-Conventional Energy Sources, G. D. Rai, Khanna Publishers, New Delhi, 1984

Books for Reference:

1. Solar Energies of thermal processer, A. Duffie and W.A. Beckmann, john – Wiley, 1980.

2. Principle of Solar Engineering, F. Kreith and J. F. Kreider, McGraw-Hill,1978

3. Alternate Energy Sources, T. N. Veziroglu, Vol.5 and 6, Mc Graw - Hill, 1978.

4. Solar energy – Principle of thermal collection and storage S P Sukhatme and J K Nayak, Tata Mc Graw
   Hill, Tata, 2008

Related online resources:

1. https://youtu.be/UJ8XW9AgUrw
2. https://youtu.be/qSWm_nprfqE
3. https://youtu.be/IdPTuwKEfmA

Mapping of Course outcomes with Programme Outcomes and Programme Specific Outcomes:

CO/ PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO
CO1	3	3	3	3	3	3	1	3	3	2	3	2	3	1
CO2	3	3	3	3	3	3	1	3	3	2	3	2	3	1
CO3	3	3	3	3	3	3	1	3	3	2	3	2	3	1
CO4	3	3	3	3	3	3	1	3	3	2	3	2	3	1
CO5	3	3	3	3	3	3	1	3	3	2	3	2	3	1

Strongly Correlated – 3; Moderately Correlated – 2;

Weakly Correlated – 1; No Correlation – 0;

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI
B.Sc.CHEMISTRY (Affiliated Colleges)
LEARNING OUTCOME BASED CURRICULUM
(For those who joined from 2021-2022 onwards)

VISION AND MISSION OF THE UNIVERSITY

VISION

" To provide quality education to reach the unreached "`

MISSION

- To conduct research, teaching and outreach programmes to improve conditions of human living

- To create an academic environment that honours women and men of all races, caste, creed, cultures and an atmosphere that values intellectual curiosity, pursuit of knowledge, academic freedom and integrity

- To offer a wide variety of off-campus educational and training programs, including the use of information technology, to individuals and groups.

- To develop partnership with industries and government so as to improve the quality of the workplace and to serve as catalyst for economic and cultural development

- To provide quality / inclusive education, especially for the rural and un-reached segments of economically downtrodden students including women, socially oppressed and differently abled

VISION AND MISSION OF DEPARTMENT

VISION

To make the students excel in the fields of education, fundamental and advanced research in Chemistry by providing quality education so that they can compete and contribute to the varying *technology.*

MISSION

1. To teach the students to analyze problems ranging from the basics of Chemistry to advanced level.
2. To give the students adequate hands on experience to work in applied fields.

3. To train the students to act as a useful member or effective leader of a team in multidisciplinary setting.

PREAMPLE

The B.Sc Chemistry programme is fundamental to the revolution taking place in Science and Technology. The aim of the programme is to impart basic skills and knowledge on the principles of all branches of Chemistry to cater to need of Society, Scientific Organization and Industries in the context of developing needs of our country by providing extensive coverage on the fundamental aspects of chemistry relating applications of chemistry to life systems. This course provides intensive practical training to develop associate and apply various aspects of chemistry in day to day life .The programme prepares the students to achieve success in competitive examinations and make developments of needs of their life.

Eligibility for the B.Sc Chemistry Programme

B.Sc Chemistry is a three year Undergraduate course which one can apply after completing 12th from science stream. Eligibility for the course says that the interested must have science with subjects as Physics, Chemistry, Mathematics, Biology or Computer Science as their main subjects from any recognized board.

PROGRAMME STRUCUTRE

SEM	Part	SUB. No	SUBJECT STATUS	SUBJECT TITLE	contact hrs /wk	L hrs /wk	P hrs /wk	credits
I	I	1	Language	Tamil/Other Languages	6	6	0	4
	II	2	Language	Communicative English – I	6	6	0	4
	III	3	Core I	Inorganic Chemistry – I	4	4	0	4
	III	4	Core II	Professional English for Physical Science –I	4	4	0	4
	III	5	Major Practical I	Inorganic quantitative (Volumetric) Analysis – I	2	0	2	2
	III	6	Allied Course I	Allied Chemistry – I	4	4	0	3
	III	7	Allied Practical I	Allied Chemistry Practical- I	2	0	2	2
	IV	8	Common	Environmental Studies	2	2	0	2
			SUB TOTAL		**30**	**26**	**4**	**25**
II	I	9	Language	Tamil/Other Languages	6	6	0	4
	II	10	Language	Communicative English – II	6	6	0	4
	III	11	Core III	Organic Chemistry – I	4	4	0	4
	III	12	Core IV	Professional English for Physical Science-II	4	4	0	4
	III	13	Major Practical II	Inorganic quantitative (Volumetric)Analysis – II	2	0	2	2
	III	14	Allied Course II	Allied Chemistry – II	4	4	0	3
	III	15	Allied Practical-II	Allied Chemistry Practical- II	2	0	2	2
	IV	16	Common	Social Value Education	2	2	0	2
			SUB TOTAL		**30**	**26**	**4**	**25**

III	I	17	Language	Tamil/Other Languages	6	6	0	4
	II	18	Language	English	6	6	0	4
	III	19	Core V	Physical Chemistry – I	4	4	0	4
	III	20	Major Practical III	Organic Preparation & Inorganic Qualitative Analysis - I	2	0	2	2
	III	21	Allied Course II	Allied Chemistry – I	4	4	0	3
	III	22	Allied Practical II	Allied Chemistry Practical- I	2	0	2	2
	III	23	Skilled Based Coursre I	Green Chemistry/Food Chemistry	4	4	0	4
	IV	24	Non-Major Elective I	Food Science /Water Management	2	2	0	2
	IV	25	Common	Yoga	2	2	0	2
				SUBTOTAL	**30+2**	**26+2**	**4**	**27**
IV	I	26	Language	Tamil/Other Languages	6	6	0	4
	II	27	Language	English	6	6	0	4
	III	28	Core VI	Inorganic Chemistry – II	4	4	0	4
	III	29	Major Practical IV	Inorganic Qualitative Analysis – II	2	0	2	2
	III	30	Allied Course II	Allied Chemistry – II	4	4	0	3
	III	31	Allied Practical II	Allied Chemistry Practical- II	2	0	2	2
	IV	32	Skilled Based Course II	Pharmaceutical chemistry/ Industrial Chemistry	4	4	0	4
	IV	33	Non-Major Elective II	Dairy Chemistry / Chemistry in Everyday life	2	2	0	2
	IV	34	Common	Computers for Digital Era	2	2	0	2
	V	35	Extension Activity	NCC/NSS/YRC/YWF	-	-	-	1
				SUBTOTAL	**30+2**	**26+2**	**4**	**28**
	III	36	Core VII	Organic Chemistry – II	6	6	0	4

V	III	37	Core VIII	Physical Chemistry – II	6	6	0	4
	III	38	Major Elective I	Polymer Chemistry / Bio Chemistry	4	4	0	4
	III	39	Major Elective II	Modern Instrumental Analytical Techniques/ Applied Chemistry	4	4	0	4
	III	40	Major Practical V	Organic Analysis & Physical Constant Determination	8	0	8	4
	III	41	Major Practical VI	Gravimetric Estimation & Inorganic Preparation				
	IV	42	Skill Based Common	Personality Development / Effective Communication / Youth Leadership	2	2	0	2
				SUBTOTAL	**30**	**22**	**08**	**22**
VI	III	43	Core IX	Inorganic Chemistry – III	5	5	0	4
	III	44	Core X	Organic Chemistry - III	5	5	0	4
	III	45	Core XI	Physical Chemistry – III	5	5	0	4
	III	46	Major Elective III	Textile Chemistry / Nano Chemistry	4	4	0	4
	III	47	Major Practical VII	Physical Chemistry Experiments	4	0	4	2
	III	48	Major Project	Major Project	7		7	7
				SUBTOTAL	**30**	**19**	**11**	**25**
				GRANDTOTAL	**180+4**	**145+4**	**35**	**152**

Skill Based Course

One among the two given course will be selected.

Non-Major Elective

One among the two given course will be selected.

Major Elective

One among the two given course will be selected.

Major Project

Group Project –Maximum of five students per group

Extension Program for the Department

Apart from the curriculum, to enrich the skill development of the students following courses in

L	T	P	C
2	0	0	2

Course Objectives

✓ Learn the importance of food for energy.

✓ Know the needs of food additives & Spices.

✓ Know food preservatives.

✓ Study food adulterations and Quality of food standards.

UNIT I INTRODUCTION

Food : Sources and classification – Food as a source of energy - Functions and biological importance of Carbohydrates, Protein, Fat, Vitamins and Minerals - Calorific value of food – Energy requirements of individuals - Balanced diet-Glycemic index, Glycemic load.

UNIT II FOOD ADDITIVES AND SPICES

Definition, Food colourants : Natural and Artificial - Antioxidants, Sweetening agents, Stabilizers, Flavours, Bleaching and Maturing agents – Leavening agents. Chemistry of Spices.

UNIT III FOOD PRESERVATIVES

Definition – Principles of food Preservation - Classification - Methods of food preservation and Processing by heat, Cold, radiation, drying and deep freezing.

UNIT IV FOOD ADULTERATION

Definition – Types – Detection and Analysis of adulterants in foods: Milk, Chilli powder, Coffee powder, Turmeric powder, Ghee, Oil and Pulses.

UNIT V QUALITY STANDARDS

Quality control - Specification and Standards - FA, WHO standards – Packing and Labelling of foods, Essential Commodities Act - Consumer Protection Act - AGMARK.

Text books

1. B. Sivasankar Food Processing and Preservation, Prentice Hall of India Pvt. Ltd, New Delhi, 2002.

2. M. Swaminathan Textbook on Food Chemistry, Printing and Publishing Co, Ltd, Bangalore 1993.

Reference Books:

1. L.M. Mayer, Food chemistry , CBS, ISBN-9788123911496.

2. Food Science , 3rd Edition, B. Sri Lakshmi New Age International Publisher, 2005.

3. Fundamentals of Foods and Nutrition – R. Mudambi. Sumathi, and M.V. Rajagopal, Willey Eastern Ltd, Madras.

COURSE OUTCOMES

COURSE OUTCOMES		COGNITIVE LEVEL
CO1	Find the sources of food and list out major food groups	K1
CO2	Summarizes the food additives and explain its significance.	K2, K5
CO3	Explain the food preservation and functions of food preservatives	K5
CO4	Identify the adulterants available in the food.	K3
CO5	Examine the food and what are the food quality standards used to assess the food.	K5, K1

K 1 –Remember   K 2 – Understand K 3 - Apply   K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping ofCOswith POs & PSOs:

CO/PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	M	M	S	M	S	L	L	M	L	S	M	S	L
CO 2	M	S	M	L	M	S	M	S	M	S	S	M	L
CO 3	S	M	S	M	L	S	L	M	M	S	S	M	M
CO 4	S	S	M	S	S	L	M	S	S	M	S	S	M
CO 5	S	S	L	S	M	S	L	L	M	L	M	M	M

S – Strongly Correlated ; M – Medium Correlated ; L – Low Correlated

L	T	P	C
2	0	0	2

Course Objectives

The main objectives of this course are to

1.Know the various sources of Water pollution.

2.Study Water Quality Parameters.

3. Learn Water Purification Process.

4. Gain Knowledge on Waste water.

5. Develop the methods for Water Storage.

UNIT I WATER POLLUTION

Definition-Sources of water pollutionTypes of water pollutants**:** Sewage and Domestic wastes, Industrial effluents, Agricultural discharges, Detergents, Pathogens, Pharmaceutical pollutants and Radioactive materials. Eutrophication and its effects.

UNIT II WATER QUALITY PARAMETERS

Physical, Chemical and Biological water quality parameters-Turbidity, Salinity-water quality standards for drinking water –BIS and WHO. Determination of pH, Total hardness, DO, BOD and COD.

UNIT III WATER PURIFICATION

Chemical coagulation, Flocculation, Sedimentation, Filtration and Disinfection - Desalination: reverse osmosis.

Purification of water for industrial purposes: Water softening- Permutit process and Ion-exchange process.

UNIT IV   WASTE WATER TREATMENT

Elementary ideas of waste water treatment: Biological and Chemical processes- Pre-treatment-

Primary treatment-**Secondary treatment**: Aerobic and Anaerobic processes –**Tertiary treatment**: Evaporation Adsorption – Chemical precipitation.

UNIT V RESTORATION AND MANAGEMENT

Importance of lakes and rivers-Stresses on the Indian rivers and their effects –A restoration case

study: Ganga Action Plan: Objectives implementation and drawbacks. Rain water harvesting –Drip irrigation-Water recycling- The water Prevention and control of Pollution Act 1974.

Text books

1. A. K. De, Environmental Chemistry, Wiley Eastern Ltd., 3rd Edition, New Delhi,1994.

2. B. K. Sharma, Environmental Chemistry, Goel Publishing House, Meerut,2019.

Reference books

1.R. K. Trivedy and P. K. Goel, Chemical and biological methods for water pollution studies, Environmental Publications, Karad, India,2019

2.BIS 1991, Specification for drinking water, Bureau of Indian Standards, New Delhi

3.WHO 1992, International standards for drinking water, World Health Organisation, Geneva.

4. Industrial Chemistry , B.K.Sharma 2011.

COURSE OUTCOMES

	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Classify the water pollution and analyse the water pollutants	K2
CO2	List out different water quality parameters and discuss its importance.	K1
CO3	Elaborate water purification processes and show the advantages of different methods	K6
CO4	Apply various methods to treat waste water and analyze the treated water	K3
CO5	Develop the water storage methods	K3

K 1 –Remember   K 2 – Understand K 3 - Apply K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping of COs with POs & PSOs:

CO/PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	S	M	S	S	S	L	S	M	L	S	M	M
CO2	S	S	S	S	L	M	M	S	S	M	S	L	S
CO3	M	M	S	S	M	S	L	S	L	S	M	M	S
CO4	M	S	M	S	M	S	M	S	S	M	L	M	S
CO5	L	S	M	M	S	M	L	L	M	M	S	L	M

S – Strongly Correlated; M – Medium Correlated ; L – Low Correlated

L	T	P	C
2	0	0	2

Course Objective

The main objectives of this course are to

- Learn milk properties and its composition.

- Know the processing of milk.

- Know different products of milk.

- Acquire knowledge on milk products.

- Gain knowledge on condensed milk.

UNIT I PROPERTIES OF MILK

 Milk Composition – Physico Chemical properties of milk – Animal, Feed and Environmental factors influencing the composition of milk – Milk lipids, Proteins, Sugar– Minerals and Vitamins in Milk – Thermal stability of Milk- Adulterants, Preservatives, and Neutralizer - examples and their detection.

UNIT II PROCESSING OF MILK

Destruction of microorganisms in milk – Physicochemical changes during processing – Boiling, Pasteurization – Pasteurization types – Bottle pasteurization –Batch pasteurization – HTST (High Temperature Short Time) – Vacuum pasteurization –(UHT) Ultra High Temperature Pasteurisation

UNIT IIMILK PRODUCTS-I

Milk Products: Cream - Definition, Classification – Manufacturing - Chemistry of creaming process - Physico–chemical properties – Separation of cream, Estimation of fat in cream, Butter - Definition, Classification, Composition, Theory of churning, Desi butter, Salted butter. Ghee - major constituents, common adulterants and their detection.

UNIT IV MILK PRODUCTS-II

Fermented milk products - Fermentation of milk - Definition and Conditions. Ice creams - Definition, Composition, Types, Manufacture of Ice - Cream, Stabilizers, Emulsifiers and their role-Milk powder - Definition, Process of making milk Powder and Cheese.

UNIT V CONDENSED MILK

Condensed milk – Definition, Classification and Differences between Condensed milk and Skimmed milk– Sanitation - Pasteurization – Nutritive value of milk – Difference between cow milk and Buffalo milk- Milk enzymes.

Special milk - Definition and Advantages of sterilized milk, Flavoured milk, Standardized milk, Toned milk, Double toned milk.

Text Books

1. Applied Chemistry-K. Bagavathi Sundari, MJP, Publishers Chennai. 2006.
2. Principles of Dairy technology - Robert Jenness, John Wiley & Sons, Inc. New York 1959.

Reference Books :

1. Indian Dairy Products – K.S. Rangappa and K.T Acharya, Asia Publishing House, Bombay, India,1975.
2. Fundamentals of Dairy chemistry – N.P. Wong 3rd Edition,CBS Publishers 2001
3. Outlines of Dairy Technology - Sukumar De. – Oxford University Press Publishers 1996
4. Applied chemistry for home science & allied science - T.Jacob, Mcmillan India Ltd, NewDelhi,1979.

COURSE OUTCOMES

COURSE OUTCOMES		COGNITIVE LEVEL
CO1	Identify the components in the milk and analyze the properties of milk.	K3, K4
CO2	Illustrate the processing of milk and Elaborate the changes in properties during processing	K2, K6
CO3	List out the milk products and determine the constituents in it	K1. K5
CO4	Explain the fermentation of milk and list out the fermented milk products.	K5, K1
CO5	Analyzed the condensed milk and Distinguish Cow and buffalo milk.	K4

K 1 –Remember   K 2 – Understand K 3 - Apply   K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping of COs with POs & PSOs:

CO/PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	M	L	S	M	S	M	S	S	S	S	M	L
CO2	M	S	S	S	M	L	L	M	M	S	M	L	M
CO3	S	S	M	M	L	S	L	S	M	M	S	M	L
CO4	M	S	S	M	S	S	L	S	S	M	L	M	S
CO5	L	M	M	S	S	M	L	M	S	S	M	L	M

S – Strongly Correlated ; M – Medium Correlated ; L – Low Correlated

NON MAJOR ELECTIVE
CHEMISTRY IN EVERYDAY LIFE

L	T	P	C
2	0	0	2

Course Objectives

The primary objective of this course are to

- ❖ Study on the chemicals used in cosmetics.
- ❖ Know about soaps and detergents.
- ❖ Gain Knowledge on Nutrients.
- ❖ Understand the materials for agricultural chemistry.
- ❖ Know about the drugs.

UNIT I CHEMISTRY IN COSMETICS

Cosmetics – Definition, classification - Additives and its role in cosmetics–Perfumes Cleansing cream, all-purpose cream, shampoos, deodorants - Antiperspirants - face powder - Compact powder, sunscreen lotion, skin colorant – lipstick. Cosmetic soaps - moisturizing soap and medicated soap. Dentifrices - toothpaste and mouth washers.

UNIT II CHEMISTRY IN THE LAUNDRY

Soaps - Basic chemical compositions of soaps, Surface active agents, builders, additives, fillers and fragrance, toilet soap, bathing bars, washing soaps. Bio-degradability. Detergents– Introduction, Detergent action, Significance of acidity and alkalinity. Common detergent chemicals.

UNIT III CHEMISTRY IN THE KITCHEN

Butter and cooking oil - saturated and unsaturated fatty acids, hydrogenation of oil. antioxidants and cholesterols. Chemistry of cooking - physical and chemical changes, stability of nutrients during cooking. Microwave cooking.

UNIT IV CHEMISTRY IN THE GARDERN

Food for plants, nutrient deficiencies in plants. Fertilizers, composting, pesticides and their toxicities. Insecticides, fungicides. Biological control of weeds and pests.

UNIT V CHEMISTRY IN TEXTILES

Fibres, yarns, and fabrics. Dyes and dyeing. Flammability. Carpet materials. Leather materials -

chemistry of tanning.

Text Books

1.Chemistry of Cosmetics, R.Kumar, Prestige Publishers, 2018.

2.Textbook of Fibres and Science and Technology,S.P.Mishra, NewAge International Pvt Ltd., 2000.

3. B.K. Sharma, Industrial Chemistry, Goel Publishing House, Meerut, 2003.

Reference Book

1.TextBook of Herbal Cosmetics, M.Vimaladevi, CBS Publishers, 2019.

2. Introduction to textile Science – 3rd edition, Maryory L.Joshep

3. James A. Kent, Riegel's Hand book of Industrial Chemistry, Springer Science, 2013

COURSE OUTCOMES

COURSE OUTCOMES		COGNITIVE LEVEL
CO1	Outline the daily used Cosmetics.	K2
CO2	List out the soaps and detergents and classify the soaps.	K1 K2
CO3	Explain about the nutrients from food materials.	K6
CO4	Discuss the fertilizers and pesticides necessary for the grow of plants.	K5
CO5	Distinguish fibres, yarns & Fabrics andIdentify the dyes used in dyeing.	K4 K3

K 1 –Remember   K 2 – Understand K 3 - Apply K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping of COs with POs & PSOs:

CO/PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	M	L	S	M	S	L	M	L	M	S	L	M
CO2	M	L	S	M	S	S	L	L	M	S	M	S	S
CO3	M	S	S	L	M	M	M	M	M	L	S	M	S
CO4	S	S	M	S	L	S	L	S	M	S	L	M	M
CO5	M	S	M	S	S	M	M	S	S	S	M	L	S

S – Strongly Correlated ; M – Medium Correlated ; L – Low Correlated

MAJOR ELECTIVE I

POLYMER CHEMISTRY

L	T	P	C
4	0	0	4

Course Objectives

The primary objectives of this course are to

- ✓ Know types of polymer and molecular mass
- ✓ Acquire knowledge about the polymerization techniques.
- ✓ Know the details of organic and inorganic polymers.
- ✓ Understand the processing of polymer and polymer degradation.
- ✓ Familiarize about advances in polymers.

UNIT I INTRODUCTION TO POLYMERS AND MOLECULAR WEIGHT OF POLYMER

Basic concepts – Monomers – Functionality. Classification of polymers and characteristic features of each Natural and Synthetic polymers – Thermoplastic and Thermo-setting Plastic, Elastomers, Fibers and Liquid Resins – Addition and Condensation polymers – Linear, Branched and Cross – linked polymers – Homopolymers and Copolymers – Types of copolymers – Alternate, Graft, Block and Random copolymers. Tacticity in polymers – Isotatic, Syndiotactic and atactic polymers.

Importance of Molecular Weight: Degree of polymerization and molecular weight – Number average, Weight average and Viscosity average molecular weights .Glass transition temperature (T_g) – Definition – Factors affecting T_g – relationship between T_g and molecular weight and melting point. Important of T_g.

UNIT II CHEMISTRY OF POLYMERISATION AND POLYMERISATION TECHNIQUES

Chemistry of Polymerisation: Addition and Condensation polymerisation -Mechanism of polymerization – Free radical and ionic (anionic and cationic) polymerisation- Ring opening polymerization, Coordination polymerization – Zeigler Natta catalysts.

Bulk, solution, suspension, emulsion, melt condensation and interfacial poly-condenssation polymerization.

UNIT III ORGANIC AND INORGANIC POLYMERS

Preparation and Applications

Organic Polymers

Plastics : Polyethylene, Polyvinyl chloride, Polymethyl methacrylate, Polyethylene terphthalate, Teflon, Bakelite

Rubbers : Natural and synthetic rubbers – Polybutadiene, Polyisobutylene, Butyl rrubber, Nitrile rubber, Buna – S, Buna-N, Neoprene rubber.

Synthetic fibers : Nylon 6,6, Nylon 6, Rayon.

Inorganic Polymers : Poly(sulphur nitride) (SN)x, Borazine, Poly(boron nitride), Polyphosphazenes, Silicones.

UNIT IV POLYMER PROCESSING AND POLYMER DEGRADATION

Polymer Processing: Basic principles of processing – Shape and Size – Processing parameters – Polymer compounding – Additives – Fillers – Plasticizers –Antioxidants - Flame retardants – Stabilizers – Colourants .

Processing techniques : Injection moulding – Compression moulding-Blow moulding – Extrusion moulding – Calendaring – Casting – Roaming- Laminating – Coating.

Polymer Degradation – Types of degradation – Thermal degradation – Mechanical degradation. Ultrasonic degradation. Photo degradation – Oxidation degradation – Hydrolytic degradation.

UNIT V SPECIAL TOPICS IN POLYMER SCIENCE

Conducting Polymers: Definition, Types of conducting polymer- Mechanism of electrical conduction – Soliton- Polaron and Bipolaron- Polyacetylene – Polyaniline-Polyaniline nanowire.

Biopolymers: Biomedical polymers – Contact lens – Dental polymers – Polymers used in Artificial Heart, Kidney, Skin, and Blood cells.

Plastic Waste Management – Chemical recycling – Incineration – Pyrolysis – Mixed waste recycling – Types of recycling (1^0, 2^0 , 3^0 and quartenary) development for recycled material

Text books

1. V.R. Gowarikar, N.V.Viswanathan dnd J.Sreedhar. Polymer science, wiley Eastern, 1995.

2. F.N. Billmeyer, Text book of polymer science, Wiley Interscience, 1971.

3. Mcurie Morten, Rubber technology, Van Noshrand, Reinold, Newyork

4. B.K. Sharma, Polymer Chemistry, Goel Publishing Home, Meerut, 2011.

5. Nabil Mustafa – "Plastic waste management" Marcel Dekker Inc – 1993.

6. Material Science 2ndedition , P.K.Palanisamy SCITECH Publications India Pvt.Limited Chennai 1st reprint ,March 2005

Reference Books

1. M. Jenkins, Biomedical polymers, University Birningham, U.K, Woodhead Publishing 2007

2. M.G. Arora, M.Singh and M.S Yadew, Polymer chemistry, 2ndRevised edition, Anmol Publications Ltd 2003.

3. Principles of Polymer Science, P.Bahadur, N.V.Sastry, Narosa Publications 2002.4. Physical chemistry polymers – A. Tager, Miv Publishers 1972.

5. Polymer chemistry – Properties and applications, Andrew Peacock, Allidon Calhoun, Hanser Publishers, Munich 2006

6. Mordern Chemistry , David,W.Oxtoy, H.P.Gills,Allan Campion Brooks Cenage .Learning India Private Limited, 1st reprint ,March 2008

COURSE OUTCOMES

	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Classify the polymers based on their characters and structures.	K1
CO2	Explain the mechanisms and techniques of polymerization.	K5
CO3	Discuss the applications of various organic and inorganic polymers.	K6
CO4	Summarize the advantages and disadvantages of polymer processing and degradation techniques.	K2
CO5	List out the important applications of conducting polymers , biopolymers and explain the plastic waste management.	K1 K5

K 1 –Remember   K 2 – Understand K 3 - Apply K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping of COs with POs & PSOs:

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	M	S	S	M	S	L	S	M	L	S	L	M
CO2	S	S	S	M	S	S	M	S	S	M	S	M	S
CO3	S	M	L	M	L	M	L	S	M	M	L	S	S
CO4	S	L	S	S	M	S	M	M	L	S	S	M	S
CO5	S	M	S	L	M	S	L	S	M	L	S	M	S

S – Strongly Correlated ; M – Medium Correlated ; L – Low Correlated

<div align="center">

SEMESTER V

MAJOR ELECTIVE I

BIO CHEMISTRY

</div>

L	T	P	C
4	0	0	4

Course Objectives

The primary objectives of this course are to

1. Get knowledge about amino acids and protein

2. Study about carbohydrates

3. Know the lipids and its significance

4. Understand basics of enzymes and its catalytic activity

5. Acquire knowledge on nucleic acids and significance of blood.

UNIT I AMINO ACIDS AND PROTEINS

Living Cell: Plant and Animal Cells : Cell Membrane- Organells- Functions of major Cellular components- Anabolism and Catabolism and their relation to Metabolism

Amino acids : Classification- Abbreviated names (one letter- three letter)- Physical properties- Optical properties- Chemical Properties.

Peptides: Nomenclature- Properties of Peptide bond - Solid phase peptide Synthesis.

Proteins: Synthesis – Classification – properties - Structure of protein - Primary, Secondary, Tertiary and Quarternary structure- N-terminal and C-terminal aminoacid Structure analysis . Sequencing techniques-Edman degradation.

Catabolism of aminoacids: Transamination- Oxidative deamination- Urea cycle .

UNIT II CARBOHYDRATES AND METABOLISM

Monosacharides - Structure of aldoses and ketoses: Ring structure of sugars - Conformation of sugars-Mutarotation- Anomers- Epimers and Enantiomers; Structure of biologically important sugar derivatives - Oxidation and Reduction of sugars;

Disacharides and Polysaccharides: Formation of disaccharides- Reducing and Non-reducing

disaccharides-Polysacharides: Homo polysaccharides (Starch- Cellulose- Glycogen)- Hetero polysacharides (Mucopolysaccharides- Hyalunonic acid- chondroitin sulphate- Heparin)

Carbohydrate metabolism: Embden Meyerhof pathway- Citric acid cycle.

UNIT III LIPIDS

Definition and classification of lipids- Classification of Fatty acids – Glycerids - Physical and Chemical properties - Analysis of Oils and Fats (Saponification number, Iodine number, Polenske number, Richert –Meissel number, Acetyl value).

Phospholipids- Glycerophospholipids: Lecithin- Cephalin- Phosphatidylserine- Phosphatidylinositol- Plasmologens.

Sphingophospholipid: Sphingomyclin- Glycolipid-Cholesterol and Bile acids (structural elucidation not required).

UNIT IV ENZYMES

Classification and Nomenclature of enzymes - General Characterstics of enzymes - Nature of enzymes – Protein and Non-protein- Cofactor and Prosthetic group, Apoenzyme, Haloenzyme - TPP, NAD, NADP,FAD, FADR,ATP and their importance in enzyme actions.

Enzyme activity and specific activity- Features of enzyme catalysis, Factors affecting the rate of chemical reaction- Catalytic power and specificity of enzymes (concept of active sites) , Fischer lock and key model , Koshland's induced fit model.

UNIT V NUCLEIC ACIDS AND CLINICAL CHEMISTRY

Nucleic Acid: RNA-DNA- Nucleosides& Nucleotides – Structure of DNA and RNA – Ribosomal RNA (r-RNA) - Transfer RNA (t-RNA) – Messanger RNA (m-RNA)

Blood & Analysis of Blood : Components of blood and their functions- Difference between plasma and serum- **Blood groups :** Rh factors – Blood analysis: Fasting blood sugar, Random blood sugar, Post parandial blood sugar – Hb1AC – Albumin – Urea **- Cholestrol:** HDL &LDL**.**

Text Books

1.Fundamentals of Biochemistry by J.L.Jain, Sanju Jain& Nitin Jain Publisers Chand and Co Ltd, ISBN81-219-2453-7, 2008

2. Lehninger: Principles of Biochemistry 6th ed., Nelson,D.L. and Cox, M.M., W.H. Freeman and company (Newyork), ISBN: 13j 978-1-4641-09621-1, ISBN : 10: 1-4292-3414-8., 2013.

3. Textbook of Biochemistry with clinical correlations ,7th ed., T.M Delvin,., John Wiley & Sons , Inc (Newyork), ISBN: 978-0-470-28173-4, 2011.

4. Robert L.Caret, Katherine J.Dennistom Joseph J. Topping, Principles and application of organic and biological chemistry,WBB Publishers, USA, 1993.

Reference Books

1. Principles of protein structure, G.E. Schulz, and R.H. Schirmer. Springer, 1st edition 1996.

2. Medical Laboratory Technology, Volume I, Kanai, L. Mukorjee, CBS Publishers,2002.

3. Medical Laboratory Technology- Ramnik sood, , JPB Publishers,2009

4. J.L.Jain, Biochemistry, Sultan Chand and Co. 1999

5. A.Mazur amd B. Harrow, Textbook of biochemistry, 10th edition W.B. Saunders Co., Philadepia, 1971.

6. Paula Yurkanis Bruice, Organic Chemistry, 3rd edition, Pearson education, Inc.(Singapore), NewDelhi, reprint, 2002.

7. P.W. Kuchel and G.B. Ralston, Shaum series. Theory and Problems of Biochemistry , Mc Graw- hill Nool company, Newyork 1988.

COURSE OUTCOMES

COURSE OUTCOMES		COGNITIVE LEVEL
CO1	Compare the characters of amino acids and proteins.	K2
CO2	Explain the important properties and functions of carbohydrates.	K2
CO3	Classify the lipids and analyse its specific functions.	K2K4
CO4	List out the various enzymes involved in biochemical reactions and specify its catalytic activities.	K1
CO5	Distinguish DNA & RNA and find the functions of components in blood.	K4K1

K 1 –Remember K 2 – Understand K 3 - Apply K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping of COs with POs &PSOs :

CO/PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	M	S	S	L	M	L	S	M	M	L	S	M
CO2	M	S	S	L	S	S	M	S	S	S	M	L	S
CO3	S	S	M	S	M	L	L	M	M	S	M	L	M
CO4	M	L	S	M	S	S	M	S	S	S	M	M	L
CO5	S	S	S	S	M	L	L	S	L	M	S	L	M

S – Strongly Correlated ; M – Medium Correlated ; L – Low Correlated

MAJOR ELECTIVE II

MORDERN INSTRUMENTAL ANALYTICAL TECHNIQUES

L	T	P	C
4	0	0	4

Course Objectives

The main objectives of this course are

1. Understand the Principles of chromatography and its practical applications.

2. Study various thermo analytical techniques.

3. Acquire knowledge in electro analytical techniques.

4. Gain the knowledge on the basis of spectrophometry and analytical applications.

5. Study on radio analytical techniques.

UNIT I CHROMATOGRAPHY

Chromatography- Classification-Principles of adsorption- adsorbents**.**

Thinlayer Chromatography-Choice of adsorbents and solvents- Preparation-R_f values

Paper Chromatography- Principle-Solvent used –Factors affecting R_f values

Applications of Thinlayer and Paper Chromatography.

Ion-Exchange Chromatography-Principle –Type of resins- Requirements of good resin-Action of resins-Experimental techniques and applications.

Gas Chromatography : Principle –Experimental techniques and applications

High Performance Liquid Chromatography: Principle - Instrumentation-Applications.

UNIT II THERMOANALYTICAL METHODS

Thermogravimetric Analysis(TGA): Principle, Instrumentation-Working-Function of each component, Applications of TGA, Study of Oxalates, Sulphates and Nitrates by TGA .

Differential Thermal Analysis(DTA): Principle- Instrumentation- Methodology-Applications, DTA of Calcium Oxalate Monohydrate and Manganese Phosphine Monohydrates.

Differential Scanning Calorimetry (DSC): Principle –Instrumentation - Methodology-Applications-Determination of glass transition temperature(T_g).

Thermometric Titrations: Principle-Experimental Techniques- Types of Thermometric reaction and Applications.

UNIT III ELECTRO ANALYTICAL TECHNIQUES

Introduction to electroanalytical techniques – types of electroanalytical techniques.

Electrogravimetry – Principle of electrogravimetric analysis –Determination of copper – Electolytic separation of copper and nickel.

Coulometry Analysis : Principle of coulometric analysis-Coulometric Titrations-Applications

Voltametry : Polarography-Principle-Experimental assembly-Importance of polarographic curves-Aplications to qualitative and quantitative analysis.

Amperometric titrations: Principles and applications

Cyclic Voltametry : Principles and applications.

UNIT IV SPECTROPHOTOMETRY

UV-Visible spectrophotometry: Beer-Lamberts law, Instrumentation-Applications.

Fluorometry: Principles – Instrumentation –Applications.

Flame Photometry: Theory- Instrumentation and Applications.

Atomic Absorption Spectrometry: Theory – Instrumentation and Applications.

Turbidimetry and Nephelometry: Principle- Instrumentation and Applications.

UNIT V RADIOANALYTICAL METHODS

Radio active nuclides, Instrumentation, measurement of $\alpha, \beta \& \gamma$ radiations.

Radio tracers and Tracer techniques-Application of tracer techniques

Neutron activation analysis: Neutron sources, Interaction of neutrons with matter. Theory of activation methods, Experimental considerations, Non-destructive and destructive methods, Applications.

Isotopic dilution Analysis-Principle –Theory and Applications

Radiometric Titrations: Principle- Procedure, Advantages and Disadvantages, Applications to various types of titrations. Application of radiochemical methods in Biology, Agriculture and Environment.

Text Books

1. Fundamentals of Analytical Chemistry,Skooge, West and Hollers, Saunders college, publishing, edition, 6th 1991, VII edition, 1996.

2. Vogel's , Text book of Quntitative Chemical Analysis – A.I. Vogel, Pearson Education Ltd, 6th edition, 2001.

3. Hand book of Instrumental Techniques for Analytical Chemistry – F. Settle, Printice Hall Inc., 1997.

4. Radioanalytical Chemistry 2007, B. Khan, Springer,220-231,New York , 2007

Reference Books

1. Analytical Methods, R. Gopalan and K.S.Visvanathan, University Press, I edition, 2018.

2. Quantitative Chemical Analysis, DC. Harris, W.H. Freemann Publication, IV edition, 1995.

3. W. D. Ehmann, .D, E.Vance, D. Radio Chemistry and Nuclear Methods of Analysis 1st edition, Wiley-Inter Science, US 1991

4. Analytical Chemistry – Gray D. Christion, John Wiley & Sons, INC, 5th edition, 2001.

COURSE OUTCOMES

	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Discuss the application of various chromatographic techniques	K6
CO2	Explain the principles and analytical applications of Thermoanalytical techniques.	K2, K3
CO3	Determine the concentration of metal ions using suitable electro analytical techniques.	K5
CO4	Outline the principle and applications of various spectroanalytical methods	K1, K3
CO5	Analyze the basic concepts of radioanalytical methods and analytical application	K3

K 1 –Remember   K 2 – Understand K 3 - Apply K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping of COs with POs &PSOs :

CO/PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	S	S	S	S	S	L	M	S	M	M	L	S
CO2	S	S	S	S	M	S	M	S	S	M	S	L	M
CO3	S	S	S	M	S	M	L	M	S	S	L	M	S
CO4	S	S	S	S	L	M	L	S	S	S	M	L	M
CO5	S	M	S	L	M	S	M	S	M	L	M	S	S

S – Strongly Correlated ; M – Medium Correlated ; L – Low Correlated

MAJOR ELECTIVE II
APPLIED CHEMISTRY

L	T	P	C
4	0	0	4

Course Objectives

The Primary objectives of this course are to

1. Gain knowledge on fuels.

2. Study about industrially important compounds.

3.Acquire knowledge about basic needs of Agriculture developments.

4. Learn the substances useful for human life.

5.Study on Match and Silicate Industries.

UNIT I   FUEL CHEMISTRY

Fuels- Definition-Classification – Combustion and Chemical Principles - Calorific value-Characteristics of a good fuel.

Solid fuel: Coal – Types – Cross and Net colorific values- Proximate and Ultimate analysis of coal – High and low temperature of carbonization – Uses.

Liquid fuels : Petrolium and its Chemical Composition- Cracking of heavy oil residues- Thermal and catalytic cracking, Knocking, Anti-knocking and Chemical structure, Octane and Cetane numbers – Significance - Petroleum products and their applications.

Gaseous fuels: Preparation and Specific uses of Producer gas, Water gas. LPG and Gobar gas. Advantages and Disadvantages of Solid, Liquid and Gaseous fuels.

Rocket fuels- Classification of Solid Propellants, Liquid Propellents- Combustion -Spontaneous ignition temperature(SIT) - Combustion calculation.

UNIT II : PAINTS, LUBRICANTS, ADHESIVES AND PIGMENTS

Paints : Classification- Primary constituents, Manufacturing of paints, Emulsion paint- Constituent and advantages-Latex paints and Fire retardant paints, Solvents and Thinners**.**

Lubricants: Functionsof lubricants-Properties and Classifications -Additives for lubricating oil, Lubricants of mineral origin. Lubricating grease and Solid lubricants**.**

Adhesives: Classification and preparation of adhesives. Synthetic resin adhesives and Rubber based adhesives –Uses of adhesives.

Pigments: Characteristics and uses of TiO_2 , Ultramarine Blue and Red lead**.**

UNIT III AGRICULTURAL CHEMISTRY

Fertilizers: Raw material, manufacture (flow chart)- Chemical process (with equation) of ammonium nitrate, ammonium sulphate, urea, ammonium phosphate, super phosphate, triple super phosphate, NPK fertilizers.

Pesticides: Classificatin of pesticides, examples.

Insecticides: Stomach poisons, Contact insecticides, Fumigants, Manufacture and uses of Insecticides: DDT, BHC, Pyrethrin, Aldrin and Pentachlorophenol.

Fungicides: Bordeaux mixture, Lime sulphur, Creosote oil.

UNIT IV OILS, SOAPS AND DETERGENTS

Oils: Definition : Fats and Oils- Constituents- Sources-Difference between oils and fats, Manufacture of Cotton seed oil, Sunflower oil and Soyabean oil.

Soaps : Definition, Manufacture of soaps- Types of soaps -Specific uses.

Detergents: Difference between soaps detergents, Synthetic detergents- Surface active agents and their classification- Anionic, Cationic and Non –ionic detergents – Applications including cleaning action.

UNIT V   MATCH AND SILICATE INDUSTRIES

Match Industry

Types of Matches- Composition of match head and strikening surface- Manufacture of safety matches- Coloured matches- Pyrotechniques and explosives, Classification of good explosives TNT, RDX ,Gun powder, Ammonium nitrate.

Silicate industry

Cement : Types of cements, composition , manufacture of Portland cement and Setting of cement.

Ceramics: Introduction, Types, Manufacture, and Applications, Refractory materials.

Glass : Definition, Composition, Types, Manufacturing of glass products, Physical and Chemical properties, Applications.

T

ext Books

1. B.K. Sharma, Industrial Chemistry, Goel Publishing House, Meerut, 2003.

2. James A. Kent, Riegel's Hand book of Industrial Chemistry, Springer Science, 2013.

Reference Books

1. C.E. Dryden, Outlines Chemical Technology, Gopala Rao, East west Press, New Delhi

2. S . Johnson, N .Saikia, Fatty acids Profile of edible oils and fats in India, Centre for Science and Environment, New Delhi, India.

COURSE OUTCOMES

	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Define fuels and Explain various types of fuels	K1 , K5
CO2	Choose the suitable paints, pigments, lubricants and adhesives for day to day life activities.	K3
CO3	Analyze the highly useful fertilizers, pesticides, insecticides and fungicides to improve crop yield.	K4
CO4	Discuss the oils, soaps and detergents which are necessary for human health and other activities	K6, K1
CO5	Outline the industrially important compounds for the human development activities.	K2

K 1 –Remember   K 2 – Understand K 3 - Apply   K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping of COs with POs &PSOs :

CO/PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	M	S	M	S	L	L	M	M	L	S	M	S
CO2	S	S	S	S	M	S	L	S	M	L	M	M	S
CO3	S	M	S	S	L	M	M	M	M	S	S	L	S
CO4	S	S	M	L	S	S	L	L	M	S	S	L	M
CO5	S	L	S	S	M	S	M	M	S	M	L	S	S

S – Strongly Correlated ; M – Medium Correlated ; L – Low Correlat

MAJOR ELECTIVE III

TEXTILE CHEMISTRY

L	T	P	C
4	0	0	4

Course Objectives:

The primary objective of the courses are to

1. Learn types of fibres and removal of impurities in fibres

2. Know briefly about natural and manmade fibres

3. Study on Dyeing and printing fibres

UNIT I   TEXTILE FIBERS

Introduction to textiles and essential requirements of textile fibres – Classification of textile fibres – Natural and Man-made fibres – Characteristics of textile fibres. Advantanges and Disadvantages of natural and man- made fibres.

Impurities in fibres – General principle of removal of impurities in fibres – singeing – Scouring – Bleaching – Desizing – Kierboiling – Chemicking – Deguming.

Flow charts showing the process involved in textile industry.

UNIT II NATURAL FIBRES

Natural fibres – Types of   natural fibres – Natural Cellulosic fibres : Cotton and Jute – Natural protein fibres : Wool and Silk.

Cellulosic fibres : Cotton fibres ˉ Geographical distribution, Structure, Physical and Chemical properties, Grading of cotton fibres -Uses of cotton.

Protein fibres: Silk fibre –Study of life cycle of silkwarm – Extraction of silk fibre – Properties of silk fibre – Special features of silk fibre - Uses of silk– Wool- origin , different types of wool properties wool – Process involved in the removal of impurities from raw wool- Uses of wool.

Bast and leaf fibres – Types of bast fibres : Sisal and Ramie – Geographical distribution – Extraction – Properties of major bast fibres – Uses- Introduction to Coir , Hemp and Banana fibres.

UNIT III MAN-MADE FIBRES

Man-made fibres : General principle of manufacturing of Man-made fibres – Types of Man-made fibres –

comparison of Man-made fibres with narural fibres.

Regenerated fibres – Cellulosic fibres (Rayon and Acetate fibres) – Protein fibres (Azlons) – Production – Properties and Uses

Synthetic fibres – Poly amide fibres (nylons) – Polyester fibres –Polynosic fibres, Polyacrylic fibres – PolyUrethane – Polypropylene- polyolefins -Important Physical and Chemical properties and applications.

UNIT IV DYES AND DYEING OF FIBRES

Introduction of dyes – Classification, Properties and Uses of dyes – Dyeing of textile materials (Cotton, Wool and Silk) by direct, acid, basic, vat, disperse and reactive dyes – Fastness of properties of Dyed materials.

Finishes given to fabrics – Methods used to process of mercerizing anticrease and Anti shrink finishes water proofing.

UNIT V TEXTILE PRIINTING

Textile printing – Difference between dyeing and printing – Different steps involved in printing :
Preparation of materials , Preparation of printing paste, Different thickners, Drying of printing – Washing and drying of printed material – Printing procedure of fibres

Printing with direct and azoic colours.

Text Books

1. Chemical Technology of Fibrous Materials, F.Sadov, M.Kovchagin and A. Mateshy Mir Publishers,Moscow,1978.

2. Dyeing and Chemical technology of textile fibres – 5th edition, E.R.Trotman Charless – Griffin and Co Ltd,1975

3. A Textbook of Fibre and Science and Technology, S.P.Mishra, New Age International (P) Ltd-2000.

4. James Ronald, Printing and Dying of Fabrics and Plastics, Maharajan Book Distributors, 1996.

Reference Books

1.. Chemistry of Dyes and Principles of Dyeing, 2nd Edition V.A.Shenai, Sevak Publications, Mumbai,1983.

2. Berns, R.Bill Meyer and Saltzmans, Principles of Colour Technology, 3rd edition, New York, NY; JohnWiley and Sons, Inc;2000.

3. V.A. Shenai, Introduction to the Chemistry of Dye Stuffs, Sevak, Mumbai 1991.

 4. Textile Chemistry – Vol I and II, R.H. Peters Elsvier, Amsterdam, London,1963.

5. Introductory to Textile Science – 3rd edition, Maryory L.Joshep,3rd Edition, Holt, Rinehart and Winson,3 Publishers, 1977.

COURSE OUTCOMES

	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Identify the natural and man made fibres and Analyse its characters.	K3, K4
CO2	Explain the characteristics of different natural fibres	K5
CO3	Illustrate the properties and uses of manmade fibres.	K3
CO4	Elaborate the dyeing process of fibres.	K6
CO5	Define Printing of fibres andDistinguish between dyeing and printing processes of fibres.	K1, K4

K 1 –Remember   K 2 – Understand K 3 - Apply   K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping of COs with POs& PSOs :

CO/PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	M	S	M	L	S	L	S	L	L	S	L	S
CO2	M	S	M	S	M	L	M	S	S	M	M	S	M
CO3	S	S	L	S	S	S	L	S	M	S	S	L	S
CO4	S	S	S	S	M	S	L	S	S	S	L	M	S
CO5	M	S	M	S	L	M	M	S	M	L	S	M	M

S – Strongly Correlated ; M – Medium Correlated ; L – Low Correlated

MAJOR ELECTIVE III

NANOCHEMISTRY

L	T	P	C
4	0	0	4

Course Objectives

The primary objectives of this course are to

1.Know the fundamentals of nano chemistry.

2. Study the methods of preparation of nanomaterial.

3. Acquire the knowledge on characterization of nanoparticles.

4. Know the important applications of nanomaterials in various fields.

5. Gain the Knowledge on the nano materials and its uses.

UNIT I FUNDAMENTALS OF NANOCHEMISTRY

 Introduction: Background to Nanoscience – Scientific Revolution – Feynman's Vision.

Definition : Nanochemistry, Nanosized effects, Quantum effects – Surface to Volume ratio - Size dependence properties of Nanoparticles- Optical, Electrical, Magnetic and Chemical properties.

Nanomaterials : Definition and Classification of Nanomaterials -1D Nanomaterials : Quantum well -2D Nanomaterials : Nanowires, Nanotubes, Thinflim -3D Nanomaterials : Nanopaprticles, Quantum dots, Nanoclustors, Nanocrystals.

Nanocomposites: Definition and classification of Nanocomposites – Structure and specific properties of Nanocomposites.

UNIT IISYNTHESIS OF NANOMATERIALS AND NANOCOMPOSITES

Types of approaches : Topdown (physical) approach and Bottom-up (chemical) approach.

Physical methods: Laser ablation, Arc discharge and Sputtering methods.

Chemical methods: Chemical reduction, Colloidal and Chemical precipitation methods, Solgel, Sonochemical and Chemical vapour deposition methods

Biosynthesis : Synthesis of Nanoparticles by bacteria and fungi.

 Greensynthesis : Synthesis of Nanoparticles using plant extracts.

UNIT III CRYSTALINITY, SURFACE AND OPTICAL CHARACTERIZATION TECHNIQUES

Determination of Particle size, Crystallinity and Surface area: Electron Microscope, Dinamic Light Scaterring (DLS), X-ray Diffraction techniques

Morphology:

Surface Topography : Scanning Electron Microscope (SEM) Transmission Electron Microscope (TEM)

Surface compositions: Atomic Force Microscope(AFM), X-ray Photoelectron spectroscopy (XPES).

Elemental Analysis : Energy dispersive X-ray spectra(EDXS)

Band gap Analysis : UV- visible spectroscopy

Unit IV APPLICATIONS OF NANOMATERIALS AND NANOCOMPOSITES

Nanomaterials: Energy Resources : Batteries, Fuel cells, Solar cells.

Medicinal uses : Nanomedicine, Drug delivery, Cancer drugs.

Catalytic uses: Water purification, Energy storage, Biodiesel production, Automobile industries.

Sensor Applications: Environmental (toxic gases, toxic metal ions).

Nanocomposites: Lubricants, Anti-corrosion barrier, Coatings, Aerospace, Food package, Gas barrier, Chemical resistant.

UNIT V PREPARATIONS, PROPERTIES, AND APPLICATIONS OF SPECIAL NANOSCALE MATERIALS

Nanoforms of carbon : Buck minster fullurene – Graphene – Carbon nanotubes : Single wall carbon nanotube (SWNT) , Multiwall carbon nanotubes (MWNT), Carbon nanofibers.

Nanometal oxides & Chalcogenides : ZnO , TiO_2 , ZrO_2 (Semiconductor oxides) ZnS,CdSe.

Nanocomposites: Clay nanocomposites - Polymer clay nanocomposoites, Kaolins clay nanocomposite, Montmoroillonite clay nanocomposite.

Text Books

1. Geoffy A. Ozin and Andre C. Arsenault " Nanochemistry : A Chemical approach to nano materials ", RSC Publishing U.K 2005.
2. Hari singh Nalwa, " Nano Materials and Nanotechnology" Academic press, New York ,2002.

3. C.N.R. Rao, A. Muller and A.K .Cheetham, " The Chemistry of Nanomaterials, Volume I and II", Wiley- VCH Verlag GmbH & Co, KGaA, Weinheim ,2004.

4. Catalysis : Principles and Applications, Editied by B. Visvanathan, S.Sivasankar, A.V. Ramaswamy, Narosa publishing House, 2011.

Reference Books

1. Carbon nanotubes and Nanostructures techniques and applications, James E. Morries, Krzyshof, Iniewski, CRC Press, 2013.

2. Nanocomposite : Science and Technology P.M. Ajayan, L.S.Schadler,P.V Braun , Wiley – VCH Verlag 2003.

3. Fundamentals of Nanotechnology, Hornyak G,, Louis Tibbals, H-F. Dutta,Toy deep, Press, 2000

COURSE OUTCOMES

	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Define the different nanosized materials and analyze their peculiar properties.	K1, K4
CO2	List out the various physical, chemical and biological methods of synthesis of nanomaterials	K1, K2
CO3	Choose the suitable analytical techniques to characterize nanoparticles.	K3
CO4	Elaborate the various applications of nanomaterials and nanocomposites.	K6
CO5	Summarize the important nanocompounds and Explain their specific uses.	K2, K5

K 1 –Remember   K 2 – Understand K 3 - Apply   K 4 – Analyze K 5 –Evaluate K 6 - Create

Mapping of COs with POs & PSOs:

CO/PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	M	S	L	M	M	L	S	M	M	S	L	M
CO2	S	S	S	S	M	S	M	S	S	S	M	S	M
CO3	S	S	S	S	S	M	L	S	M	L	S	S	S
CO4	S	M	M	M	S	S	L	S	M	M	L	M	S
CO5	S	M	L	M	L	M	M	S	S	S	M	L	M

S – Strongly Correlated ; M – Medium Correlated ; L – Low Correlated

MANONMANIAM SUNDARANAR UNIVERSITY TIRUNELVELI
PG - COURSES – AFFILIATED COLLEGES
M.Sc. CHEMISTRY
(Choice Based Credit System)
(For those who joined from 2021- 2022 onwards)

VISION OF THE UNIVERSITY

To provide quality education to reach the un-reached.

MISSION OF THE UNIVERSITY

- To conduct research, teaching and outreach programmes to improve conditions of human living.
- To create an academic environment that honours women and men of all races, caste, creed, cultures and an atmosphere that values intellectual curiosity, pursuit of knowledge, academic freedom and integrity.
- To offer a wide variety of off-campus educational and training programs, including the use of information technology, to individuals and groups.
- To develop partnership with industries and government so as to improve the quality of the workplace and to serve as catalyst for economic and cultural development.
- To provide quality/inclusive education, especially for the rural and un-reached segments of economically downtrodden students including women, socially oppressed and differently abled.

PREAMBLE

All the changes in life in one-way or other involve chemistry. Chemistry is central to the current revolutions in science. No educated person today can understand the modern world without a basic knowledge of chemistry. The existence of a large number of chemical factories, mines and related industries necessitates chemistry education. An advanced course in chemistry will be a fascinating experience because it helps us understanding our surroundings. Hence, the Programme M.Sc. (Chemistry) is offered to meet current needs of aspiring youths and also create awareness about the in-depth scientific aspects to the society.

ELIGIBILITY

A Bachelor's degree in B. Sc Chemistry.

VISION OF THE PROGRAMME

Provide quality education and training in the field of chemistry to enable successful careers for the post graduate students in the field of education, research and industry applications of chemical science.

MISSION OF THE PROGRAMME

- To empower the youth through quality education and to provide professional leadership.

- To train and mentor students to become technically competent, responsible scientists, scientifically literate professionals and strong academicians who will constructively contribute to the overall growth of the society.

- To usher in construction of the thinking of students to scientifically tackle modern problems and global challenges.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO1: To impart knowledge in fundamental aspects of all branches of chemistry

- PEO2: To acquire deep knowledge in the study of spectroscopy, Disconnection approach, Synthetic chemistry, Coordination chemistry, Inorganic polymers, Group theory, Quantum chemistry, etc.

- PEO3: To acquire knowledge in the specialized areas of chemistry like Green chemistry, Nanoscience and Nanotechnology, Chemistry of Industrial products, Medicinal chemistry, Industrial processes, Catalysis, Forensic chemistry.

- PEO4: To impart the basic analytical and technical skills to work effectively in the various fields of chemistry.

- PEO5: To motivate critical thinking and analysis skills to solve complex chemical problems, e.g., analysis of data, synthetic logic, spectroscopy, structure and modeling, team-based problem solving, etc.

- PEO6: To enable the students to be competent, creative and highly valued professionals in industry, academia or government.

PROGRAMME OUTCOMES (POs):

On successful completion of the Programme, students will be able to

- PO1: Function as responsible individuals with ethical values, accountable to the community.
- PO2: Gain detailed knowledge of the major areas of chemistry including a wide range of factual information and experimentally observed phenomena.
- PO3: Apply chemical concepts in new situations and computational software in chemistry efficiently.
- PO4: Think critically and analyze chemical problems.
- PO5: Work effectively and safely in a laboratory environment.
- PO6: Present scientific and technical information resulting from laboratory experimentation by means of oral presentation, scientific poster or a written report.
- PO7: Pursue higher education / employable/ entrepreneur.
- PO8: Work in teams as well as independently in academia, industry or government.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Upon successful completion of M.Sc. Chemistry programme, graduates will be able to

- PSO1: Apply advanced concepts of organic, analytical, physical and inorganic chemistry to solve complex problems to improve human life.
- PSO2: Possess skill in spectral, analytical, qualitative and quantitative techniques which will be useful in industry.
- PSO3: Gain knowledge in recent and advanced developments in the area of Green Chemistry, Chemistry of Industrial products and formulation, Forensic Chemistry, Industrial Processes, Catalysis, Nanoscience and Nanotechnology, Medicinal Chemistry, Natural Products Chemistry, Bioinorganic Chemistry, Computational Chemistry, Contrasting agents in medical Diagnosis, Sensors etc.
- PSO4: Design a synthetic route for new compounds and transform innovative ideas into reality.
- PSO5: Be competent in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
- PSO6: Acquire understanding of Plagiarism and Intellectual Property Rights.
- PSO7: Use Computational software in chemistry efficiently.

- PSO8: Carry out research / investigation independently to solve practical problems and write / present a substantial technical report/document.

- PSO9: Transform learned knowledge and skills to qualify in the NET and other competitive exams for higher studies and job.

COURSE STRUCTURE

Sem.	Sub. No.	Course Status	Course Title	Contact Hrs/ week	Credits
I	1	Core - 1	Aromaticity and Organic Reaction Mechanism	4	4
	2	Core - 2	Fundamentals of Inorganic Chemistry, Nuclear Chemistry and Inorganic Polymers	5	4
	3	Core - 3	Quantum Mechanics and Spectroscopy – I	5	4
	4	Elective – I (*Choose any One*)	1.1 Green Chemistry – Techniques and Applications 1.2 Chemistry of Industrial Products and Formulation 1.3 Forensic Chemistry	4	4
	5	Core - 4 Practical - 1	Organic Chemistry Practical – I	4	2
	6	Core – 5 Practical - 2	Inorganic Chemistry Practical – I	4	2
	7	Core - 6 Practical - 3	Physical Chemistry Practical – I	4	2
	Subtotal			**30**	**22**
II	8	Core - 7	Stereochemistry, Organic Reagents and Photochemistry	5	4
	9	Core - 8	Coordination Compounds and Solid State Chemistry	4	4
	10	Core - 9	Electrochemistry and Spectroscopy - II	5	4
	11	Elective – II (*Choose any One*)	2.1 Nanoscience And Nanotechnology 2.2 Medicinal Chemistry 2.3 Industrial processes and Catalysis	4	4
	12	Core - 10 Practical - 4	Organic Chemistry Practical – II	4	2
	13	Core - 11 Practical - 5	Inorganic Chemistry Practical – II	4	2
	14	Core – 12 Practical - 6	Physical Chemistry Practical – II	4	2
	Subtotal			**30**	**22**

Sem	Sub. No	Course Status	Course Title	Contact Hrs/ week	Credits
III	15	Core - 13	Organic Spectroscopy and Rearrangements	5	4
	16	Core - 14	Spectral Methods-I, Organo Metallic and Analytical Methods	5	4
	17	Core - 15	Group Theory and Chemical Thermodynamics	4	4
	18	Core - 16	Scientific Research Methodology	4	4
	19	Core - 17 Practical - 7	Organic Chemistry Practical – III	4	2
	20	Core - 18 Practical - 8	Inorganic Chemistry Practical – III	4	2
	21	Core - 19 Practical - 9	Physical Chemistry Practical – III	4	2
	Subtotal			**30**	**22**
IV	22	Core - 20	Synthetic Strategies in Organic Chemistry	5	4
	23	Core - 21	Bioinorganic, Spectral Methods-II and Photochemistry	5	4
	24	Core - 22	Chemical Kinetics, Photochemistry and Surface Chemistry	5	4
	25	Core - 23	Selected Topics in Chemistry	4	4
	26	Core – 24 Practical-10 (*Hands on Training*)	Computational Software in Chemistry - Laboratory Course	4	2
	27	Core - 25	Project	7 + 5*	6
	Subtotal			**30**	**24**
	Total			**120**	**90**

*Extra hours for the project

For the project, flexible credits are b/w 5-8 & Hours per week are b/w 10-16.

Total number of credits ≥ 90   : 90

Total number of Core Courses   : 25 (14T+10P+1Project)

Total number of Elective Courses   : 02

Total number of Courses   : 27

Total hours   : 120

ELECTIVE - I	1.1 GREEN CHEMISTRY – TECHNIQUES AND APPLICATIONS	L	T	P	C
		4	0	0	4

Objectives:

- *To understand the basic principles of Green chemistry and Green techniques.*

- *To study Green catalysis and Green solvents.*

- *To learn Renewable energy sources, their working principle and applications.*

UNIT I – BASIC PRINCIPLES OF GREEN CHEMISTRY (12 Hours)

Green chemistry principles – Waste minimization and atom economy – atom economic reactions and calculations – Reduction of non-renewable raw materials usage – considerations in protecting group and catalysts need – process intensification – Reduction of energy requirements – alternative energy sources and energy efficient improvements – Reduction of risk and hazards – Inherently safer design and alternative solvents. Green metrics – selected metrics used: Effective Mass Yield – *E* factor – Reaction Mass Efficiency – Mass Intensity and Mass Productivity.

UNIT II – GREEN CATALYSIS (12 Hours)

Introduction to green catalysis – heterogeneous catalysis – applications of zeolites, silica, alumina, clay, polymers, cyclodextrin and solid supported catalysts in green chemical reactions. Bio-catalysis - role of enzymes in catalytic oxidation, catalytic reduction, catalytic hydrolysis and catalytic carbon-carbon formation reactions. Green aspects – microbial production of ethanol. Phase-transfer catalysis and its advantage –applications of crown ethers in oxidation, substitution, elimination and esterification reactions.

UNIT III – GREEN SOLVENTS (12 Hours)

Role of solvents in synthesis – Application of green solvents –Super critical fluids – super critical carbon dioxide and super critical water. Aqueous phase reactions – Diels Alder reaction, Wurtz reaction, Claisen rearrangement, Aldol condensation, Knoevenagel reaction, Michel reaction. Ionic liquids - properties of ionic liquids -applications of ionic liquids as catalysts and solvents. An introduction to tunable and switchable solvent systems.

UNIT IV – GREEN TECHNIQUES AND ALTERNATIVE ENERGY SOURCES (12 Hours)

Photochemical reactions – photo reduction reactions, photochemical ring closure of dienes. Green techniques using microwaves – merits and demerits of microwave techniques – mechanism of microwave heating – effects of solvents in microwave assisted synthesis – microwave assisted reactions - Hoffman elimination, Heck reaction, Suzuki reaction, Microwave solvent free reactions – Deacetylation, saponification of esters. Sonochemistry –

basics of sonochemistry – ultrasound assisted reactions – Friedal-Crafts reaction, Simmons-Smith reaction, Cannizzaro reaction, Strecker synthesis and Reformatsky reaction.

UNIT V – RENEWABLE ENERGY RESOURCES (12 Hours)

Introduction to renewable energy sources - types of renewable energy sources - Solar cells: basic principles, types and their applications - Fuel cells - basic principles, types and their applications – working principle and applications of Biofuel cells - brief introduction about hydroelectric, biomass, wind power and geothermal power and their applications and limitations - energy from some other natural sources.

TEXT BOOKS

1. Mike Lancaster, *Green Chemistry: An Introductory Text*, RSC, 2002.
2. Editors -James Clark and Duncan MacQuarrie, *Handbook of green chemistry and technology,* Blackwell Science, 2002.
3. Edited by – Paul T. Anastas, *Green Processes Vol 7: Green Synthesis,* Wiley – VCH, 2012.
4. V.K Ahluwalia and M. Kidwai, *New Trends in Green Chemistry*, Anamaya Publishers, 2004.

REFERENCE BOOKS

1. Roger Arthur Sheldon, Isabel Arends and Ulf Hanefeld, *Green Chemistry and Catalysis*, Wiley – VCH, 2007.
2. John Twidell and Tony Weir, *Renewable Energy Resources*, Routledge Third Edition, 2015.
3. Francesca M. Kerton, *Alternative Solvents for Green Chemistry*, RSC Publishing, 2009.
4. Edited by Suresh C. Ameta and Rakshit Ameta, *Green Chemistry: Fundamentals and Applications,* Apple Academic Press, 2013.
5. Gadi Rothenberg, *Catalysis: Concepts and Green Applications*, Wiley-VCH, 2008.

COURSE OUTCOMES (COs)

Upon completion of the course, the students will be able to

CO Nos	CO Statement	Cognitive Level
CO1	Explain the basic principles of green chemistry, alternative energy sources and green metrics.	K2
CO2	Apply the green catalysis in chemical reactions.	K3
CO3	Identify the role of important green solvents in organic reactions.	K5
CO4	Illustrate name reactions and analyze the various green reactions using microwave techniques.	K2, K4
CO5	Explain the principles of renewable energy resources and generate its importance to the environment.	K2, K6

MAPPING OF COURSE OUTCOMES WITH POs AND PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	S	S	S	S	S	L	S	S	S	S	S	S	S	N	L	S	S
CO2	S	S	S	S	S	L	S	S	S	S	S	S	S	N	L	S	S
CO3	S	S	S	S	M	L	S	S	S	S	S	S	S	N	L	S	S
CO4	S	S	S	S	S	L	S	S	S	S	S	S	S	N	L	S	S
CO5	S	S	S	S	M	L	S	S	S	S	S	S	S	N	L	S	S

ELECTIVE - I	1.2 CHEMISTRY OF INDUSTRIAL PRODUCTS AND FORMULATION	L	T	P	C
		4	0	0	4

Objectives:

- *To study paint formulations, various cosmetics and manufacture and refining of pulp.*
- *To learn milk processing, milk products and textile fibres.*

UNIT I - PAINTS AND PIGMENTS (12 Hours)

General characteristics of pigments - Types of pigments, methods of preparation and properties of white pigments - Paints, varnishes and Lacquers – function and classification - Function of vehicle, solvent, thinner, pigment, dyes, filler, resins, drier and additives in paint formulations - oil and alkyd paints - drying mechanism, epoxy coatings - Luminous paints.

UNIT II - COSMETICS (12 Hours)

Cosmetics – Definition, classification - Additives and its role in cosmetics – surfactants – Humectants – Antiseptics, Preservatives and Anti -oxidants. Perfumes – source, classifications, blending and fixations.

Formulation of the following cosmetics: Cleansing cream, all-purpose cream, shampoos, deodorants - Antiperspirants - face powder - Compact powder, sunscreen lotion, skin colorant – lipstick. Cosmetic soaps - moisturizing soap and medicated soap. Dentifrices - toothpaste and mouth washers.

UNIT III - PULP AND PAPER SCIENCE (12 Hours)

Raw materials for paper - Important fibre producing plants - Woody & non woody fibres used in paper industry - Pulp Manufacture: Mechanical pulping, Thermomechanical and Refiner mechanical pulping, semi-chemical & chemical pulping, Kraft pulping. Papermaking: Beating and Refining of pulp - Evaluation of Paper: Physical, optical, electrical properties and Chemical properties of paper.

UNIT IV - DAIRY CHEMISTRY (12 Hours)

Milk – definition of milk, composition - factors affecting the composition - physicochemical properties of milk, fat, proteins, enzymes, vitamins, minerals, milk processing - pasteurisation, sterilization, homogenisation, effect of heat on milk. Milk products - Definition and composition of butter, ghee, ice cream, milk powder, cheese. Special milk - definition and advantages of sterilized milk, flavoured milk, standardized milk, toned milk, double toned milk.

UNIT V - TEXTILE FIBRES   (12 Hours)

Introduction and classification of textile fibres - characteristics of textile fibres - Manufacture of eco-friendly regenerated cellulosic fibre – viscose, cuprammonium rayon. Manufacture of Nylon-6 and Nylon 6,6. Brief study of physical & chemical properties of cotton, wool and silk. Enhancement of fibre properties by surface treatments - Plasma treatment, enzyme treatment, antimicrobial treatment - UV protection.

TEXT BOOKS

1. J. Bentley and G.P.A. Turner, *Introduction to Paint Chemistry and Principles of Paint Technology,* Fourth edition, Springer US, 1998.

2. Harry Ralph Gordon and Rosen Meyer R, *Harry's Cosmeticology*, Volume 2, Ninth edition, Chemical publishing company, 2015.

3. H. Butler, *Poucher's Perfumes, Cosmetics and Soaps*, 10th edition, springer, 2010.

4. Pratima Bajpai, *Environmentally Friendly Production of Pulp and Paper*, John wiley, 2010.

5. Jenness Robert and Patton Stuart, *Principles of Dairy Chemistry*, Scientific international, 2018.

6. De Sukumar, *Outlines of Dairy technology*, Oxford press, 1980.

7. H.V Sreenivasa Murthy, *Introduction to textile fibres*, Revised edition, Woodhead publishing India, 2015.

8. Seema Sekhri, *Textbook of Fabric Science - Fundamental to finishing,* PHI Learning, Delhi, Second Reprinting, 2013.

REFERENCES BOOKS

1. D. Stoye and W. Freitag, *Paints, Coatings and Solvents*, Second edition, Wiley-VCH, 1998.

2. Ernest Flick, *Cosmetic and Toiletry Formulations* Volume 8, Second Edition, 2007.

3. Pratima Bajpai, *Biermann's Handbook of Pulp and Paper: Raw Material and Pulp Making*, Third edition, Elsevier, 2018**.**

4. P. Walstra, T.J. Geurts, A. Noomen, A. Jellema and M.A.J.S. Van Boekel, *Dairy technology: Principles of Milk Properties and Processes. Part II: Processes*, Marcel decker Inc. 1999.

5. Robert R Mather and Roger H Wardman, *The chemistry of textile fibres,* second edition, Royal Society of Chemistry, 2015.

COURSE OUTCOMES (COs)

On completion of the course, the students will be able to

CO Nos	CO Statement	Cognitive Level
CO1	Acquire knowledge of paints and pigments and investigate its drying mechanism.	K2
CO2	Apply and formulate the role of cosmetics in industries.	K3, K6
CO3	Identify the fibre for paper making and evaluate its properties.	K5
CO4	Apply processing operations of milk and milk products in day to day life.	K3
CO5	Explain types of textile fibres and analyze its characters by various treatments	K2, K4

MAPPING OF COURSE OUTCOMES WITH POs AND PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	S	S	S	S	M	L	S	S	S	S	S	M	L	N	N	M	S
CO2	S	S	S	S	M	L	S	S	S	S	S	M	L	N	N	M	S
CO3	S	S	S	S	M	L	S	S	S	S	S	M	L	N	N	M	S
CO4	S	S	S	S	M	L	S	S	S	S	S	M	L	N	N	M	S
CO5	S	S	S	S	M	L	S	S	S	S	S	M	L	N	N	M	S

ELECTIVE - I	1.3 FORENSIC CHEMISTRY	L	T	P	C
		4	0	0	4

Objectives:

- *To understand the importance of Forensic science, GPS, Finger printing and Forensic serology.*

- *To learn the role of chemistry in Forensic science, toxicology and DNA finger printing.*

- *To understand the concept of Cyber technology.*

UNIT I - ELEMENTARY FORENSIC SCIENCE   (12 Hours)

Definition of Forensic science, The role of Forensic laboratory, Biometrics in Personal Identification- Introduction, Concepts of Biometric Authentication, Role in person Identification, Techniques and Technologies - Finger Print Technology, Face Recognition, IRIS, Retina Geometry, Hand Geometry, Speaker Recognition, Signature Verification. Geo-forensics - Global Positioning System, Basic principles and applications.

UNIT II - FINGER PRINTING AND FORENSIC SEROLOGY   (12 Hours)

Fingerprinting - General principles of Finger Printing, Fingerprinting systems, Fingerprint Detection - Powder tests – dry powder method, detection using cellophane tape, small particle reagent analysis, vacuum metal deposition method, Chemical tests – silver nitrate test, iodine fuming, ninhydrin, superglue (cyanoacrylate), Physical Developer, and ruthenium oxide tests. Optical methods – Reflected Ultraviolet Imaging Systems, laser tests.

Forensic Serology – Blood types, Polymorphic Proteins and Isoenzymes, Characterization of Blood stains, Blood stains patterns. Testing of Saliva.

UNIT III - FORENSIC ANALYSIS   (12 Hours)

Forensic Drug Analysis – How drugs work - analysis of selected drug classes –Gamma hydroxybutyric acid (GHB), Gamma butyro lactone (GBL), Marijuana, Anabolic steroids, Heroin, Cocaine, Amphetamines.

Forensic analysis of Inks and paints – Questioned documents – Physical analysis, chemical analysis of inks and paper – analytical methods – Optical microscopy, Fluorescent techniques, TLC, FT-IR.

UNIT IV- FORENSIC TOXICOLOGY AND DNA FINGER PRINTING   (12 Hours)

Forensic Toxicology – Overview - Sample types – Blood and Plasma, Urine, Vitreous fluid, Hair. Types of Forensic Toxicology – Alcohol, Postmortem toxicology, Sport Toxicology. Analytical methods in Forensic Toxicology – Breath alcohol test (BrAC).

DNA Fingerprinting – An introduction to DNA, Forensic DNA typing - methods of DNA typing - RFLP and PCR methods – Procedures for DNA typing, Applications of DNA testing.

UNIT V - CYBER TECHNOLOGY AND FORENSIC SCIENCE **(12 Hours)**

Use of computers in Forensic science - Forensic Databases, Image Databases, DNA Databases, Paint Databases. Forensic Archiving of X-Ray Spectra, Video Image Processing and Animation Software, Use of Networks in Forensic Science.

Computer related crime - Definitions and types - Framework for Investigating Computer-Related Crime, Human Aspects of Computer-Related Crime.

TEXT BOOKS

1. Anil K. Jain, Arun A. Ross and Karthik Nandakumar, *Introduction to Biometrics*, Springer, 2011.
2. David E. Newton, *Forensic Chemistry*, Fact on File, Inc, 2007.
3. Suzanne Bell, *Forensic Chemistry,* Pearson International, Second Edition, 2014.
4. Edited by Stuart H. James and Jon J. Nordby, *Forensic Science - An Introduction to Scientific and Investigative Techniques,* CRC Press, 2003.

REFERENCE BOOKS

1. Editor – G.R. Sinha, *Advances in Biometrics - Modern Methods and Implementation Strategies*, Springer, 2019.
2. Editor – Jay A. Siegel, *Forensic Chemistry -Fundamentals and applications*, Wiley-Blackwell, First edition, 2016**.**
3. Max M. Houck**,** *Forensic Science-Modern methods of solving crime*, Praeger Publishers, 2007.
4. Kelly M. Elkins, *Introduction to Forensic chemistry**,*** CRC Press, 2019.
5. Matthew Johll, *Investigating Chemistry: A Forensic Science Perspective*, W.H. Freeman & Co, Second Edition, 2008.

COURSE OUTCOMES (COs)

Upon completion of the course, the students will be able to

CO Nos	CO Statement	Cognitive Level
CO1	Acquire knowledge on forensic science and apply through biometric and finger printing technique.	K2, K3
CO2	Interpret the different methods of finger printing and characterization of blood stains.	K5
CO3	Analyze the selected drugs, inks and paints using different techniques.	K4
CO4	Identify the samples using forensic toxicology methods and DNA finger printing.	K3
CO5	Explain the proper applications of computer network in forensic science to investigate the crimes.	K2, K6

MAPPING OF COURSE OUTCOMES WITH POs AND PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	S	S	S	S	M	M	S	S	S	S	S	N	S	N	L	S	S
CO2	S	S	S	S	M	M	S	S	S	S	S	N	S	N	L	S	S
CO3	S	S	S	S	M	M	S	S	S	S	S	N	S	N	M	S	S
CO4	S	S	S	S	M	M	S	S	S	S	S	N	S	N	S	S	S
CO5	S	S	S	S	M	M	S	S	S	S	S	N	S	N	S	S	S

ELECTIVE - II	2.1 NANOSCIENCE AND NANOTECHNOLOGY	L	T	P	C
		4	0	0	4

Objectives:

- *To study structure, properties and synthetic methods of nanomaterials.*
- *To understand nano composites and carbon nanostructures.*
- *To learn nano medicines, nano robots and dendrimers.*

UNIT I - NANOSTRUCTURE AND NANOMATERIALS   (12 Hours)

Definition and terminology of Nano particles and Nano structural materials - crystalline and amorphous materials – surface energy – surface area to volume ratio – surface relaxation – Types of nanostructured materials - One dimensional (thin films, layers, coatings), Two dimensional (Nanotubes, Nanofibers, Nanowires) and Three dimensional nanostructured materials (Nano particles, Nano shells, Nano rings),-properties of nanomaterials - Mechanical properties, Optical properties, Magnetic properties, electrical conductivity – electronic properties – Engineered nanomaterials - Quantum dots, Buckyballs/nanotubes, Metal oxides, Nano capsules.

UNIT II - SYNTHETIC METHODS OF NANOMATERIALS   (12 Hours)

Top-down and bottom-up approaches– nucleation and growth -homogeneous nucleation and heterogeneous nucleation-Synthesis of Nano particles by Physicalmethods-Mechanical milling, Physical vapor deposition, Laser ablation, Sputter deposition, Photo lithography– Chemical reductionmethod -Reduction of metal ions by Citrate and borohydride- capping agents-role of capping agents, Polyol synthesis - Biological methods - green synthesis – Viral nanotechnology.

UNIT III - NANO COMPOSITES   (12 Hours)

Nanocomposites - Polymer-based Nanocomposites - Polyamide/clay Nano composites – Synthesis, characterization and properties of Nylon 6 - clay hybrid - Polystyrene/clay Nanocomposites – syndiotactic polystyrene/clay Nano composites, properties. Poly(butylenes terephthalate) (PBT) based nano composites. Bio-Nanocomposites - properties and applications.

UNIT IV - CARBON NANOSTRUCTURES AND FUNCTIONALIZATION   (12 Hours)

Carbon nanotube (CNT) and its Applications: Carbon nanotube (CNT), structure of CNT, synthesis and functionalization of CNT, electronic, vibrational, mechanical and optical properties of CNT, applications of CNT and Fullerenes.

Graphene: Graphene, structure of Graphene, synthesis and functionalization of Graphene, electronic application of Graphene, Electrochemical deposition, Graphene Oxide and its application.

UNIT V - BIOMEDICAL NANOTECHNOLOGY   (12 Hours)

Nanomedicines - Diagnosis of diseases, treating and preventing of diseases – targeted drug delivery systems – Tissue Engineering - scaffolds for tissue fabrications – materials for scaffolds – materials for hydrogel scaffolds - Medical Devices - Imaging, implantable sensors, cell specific gene therapy – nano robots and their bio-medical applications. Dendrimers - structural description and its biomedical applications.

TEXT BOOKS

1. C.N.R. Rao, A. Muller and A.K. Cheetham, *The Chemistry of Nanomaterials – Synthesis, properties and Application,* Wiley – VCH – verlog GMOH & Co., Wilhelm, 2004.

2. C.P.Poole Jr., and F.J. Owens, *Introduction to Nanotechnology*, John Wiley &Sons, 2006.

3. Rajendra Kumar Goyal, *Nanomaterials and Nanocomposites: Synthesis, Properties, Characterization Techniques, and Applications,* First edition, CRC Press, 2018.

4. Joseph Koo, *Polymer Nanocomposites*, First Edition, McGraw-Hill, 2006.

5. Ahmet Gürses, *Introduction to Polymer–Clay Nanocomposites*, CRC Press, 2016.

6. Edited by Vinod Labhasetwar and Diandra L.Leslie-Pelecky, *Biomedical Applications of Nanotechnology*, John Wiley & Sons, 2007.

7. Editor - Stergios Logothetidis, *Nanomedicine and Nanobiotechnology*, Springer, 2012.

REFERENCE BOOKS

1. G.L. Hornyak, J. Dutta, H.F. Tibbals and A.K. Rao, *Introduction to Nanoscience*, CRC Press, Taylor & Francis Group, 2008.

2. Guozhong, *Nanostructures and Nanomaterials: Synthesis, Properties and Applications,* Imperial College Press, 2004.

3. Edited by Vikas Mittal, *Synthesis Techniques for Polymer Nanocomposites*, Wiley-VCH, 2015.

4. Sati N. Bhattacharya, Musa R. Kamal and Rahul K. Gupta, *Polymeric Nanocomposites - Theory and Practice* Hanser Gardner Publications, 2008.

5. Yury Gogotsi, *Carbon Nanomaterials*, CRC Press, First Edition, 2006.

6. Daniel Alfonso Melendrez Armada, John Edward Proctor and Aravind Vijayaraghavan, *An Introduction to graphene and carbon nanotubes*, CRC Press, 2016.

7. K. Tanaka and S. Iijima, *Carbon Nanotubes and Graphene*, Elsevier, Second Edition, 2014.

8. Editor - M. Reza Mozafari, *Nanomaterials and Nanosystems for Biomedical Application,* Springer, 2007.

9. Editor - Ajay Kumar Mishra, *Nanomedicine for Drug Delivery and Therapeutics*, John Wiley & Sons, 2013.

COURSE OUTCOMES (COs)

Upon completion of the course, the students will be able to

CO Nos	CO Statement	Cognitive Level
CO1	Explain the unique properties and structure of nanomaterials.	K2
CO2	Trace the different methods of synthesis of nanomaterials.	K2
CO3	Acquire knowledge about polymer based nanocomposites and applications of bio- nanocomposites.	K2, K3
CO4	Evaluate the synthesis and potential applications of carbon nanotubes and grapheme.	K5
CO5	Apply nanotechnology in bio-medical field.	K3

MAPPING OF COURSE OUTCOMES WITH POs AND PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	M	S	M	M	L	L	S	S	S	M	S	M	L	N	L	S	S
CO2	S	S	S	S	L	L	S	S	S	S	S	S	M	N	M	S	S
CO3	S	S	S	M	L	L	S	S	S	S	S	M	M	N	M	S	S
CO4	M	S	S	S	L	L	S	S	S	S	S	S	M	N	M	S	S
CO5	S	S	S	S	L	L	S	S	S	S	S	M	M	N	M	S	S

ELECTIVE - II	2.2 MEDICINAL CHEMISTRY	L	T	P	C
		4	0	0	4

Objectives:

- *To introduce the mechanism of drug action, drug delivery systems and molecular docking.*
- *To learn drug design and drug synthesis.*
- *To learn various types of drugs and their mode of action.*

UNIT I - GENERAL ASPECTS OF MEDICINAL CHEMISTRY   (12 Hours)

Medicinal chemistry - Definition and major processes involved in drug action – pharmacokinetics - Definition and elementary aspects of ADME – Pharmacodynamics – Definition - receptors and their structures - agonist and antagonist - concept of bioisosterism - prodrugs and soft drugs. Drug delivery systems - Definition and types - Carrier based drug delivery system, Transdermal drug delivery system, Mucoadhesive drug delivery system. Molecular docking - Definition and types - Rigid docking (Lock and Key), Flexible docking (Induced fit).

UNIT II: DRUG DESIGN   (12 Hours)

Development of new drugs - Lead identification and optimization - Structure and Ligand based drug design - Structure Activity Relationship (SAR) of morphine and Penicillin - Physico – chemical parameters, Lipophilicity, partition coefficient, electronic ionization constants - Quantitative Structure Activity Relationship. Free – Wilson analysis, Hansch analysis, relationships between Free– Wilson and Hansch analysis – case study. Elementary treatment of Drug receptor interactions.

UNIT III - ANTISEPTICS, ANTIBIOTICS AND CELL MEMBRANE   (12 Hours)

Structure and function of bacterial cell wall, Gram-positive and Gram-negative bacteria, comparison of bacterial and fungal cell wall - Microbe killers: Antiseptics and Disinfectants - Definition and mode of action. Antibiotics - Definition, classification and uses - Structure and mode of action of Bacitracin, Fosfomycin, Isoniazid, Ethambutol, β-Lactam antibiotics - Synthesis of penicillin G, ampicillin, amoxicillin, Cephalosporin. Mutations and origins of drug-resistance.

UNIT IV - DRUG SYNTHESIS (12 Hours)

Definition, synthesis and mode of action of following classes (i) Anxiolytics – Benzodiazepines (ii) Neuroleptics – Phenothiazines (iii) Hypnotics and Sedatives – Piperidinediones (iv) Local anesthetics – Aminobenzoic acid and its derivatives (v) Anti – coagulants – 1,3 – Indandione derivatives (vi) Hypoglycemic agents – Sulfonyl ureas (vii). Antihistaminic agents – Ethylenediamine derivatives (viii) Antimalarials – Aminoquinolines (ix) Analgesics and Antipyretics – Paracetamol, Phenylbutazone. (x) Anti – inflammatory – Diclofenac.

UNIT V - ANTINEOPLASTIC AGENTS AND CARDIOVASCULAR DRUGS (12 Hours)

Antineoplastic Agents: Introduction, cancer chemotherapy, special problems, role of alkylating agents and antimetabolites in treatment of cancer - Introduction of carcinolytic antibiotics and mitotic inhibitors - Synthesis of mechlorethamine, cyclophosphamide, melphalan, and uracil - Recent development in cancer chemotherapy.

Cardiovascular Drugs: Introduction and classification, cardiovascular diseases - Synthesis of amyl nitrate, sorbitrate, diltiazem, quinidine, verapamil, methyldopa, atenolol.

TEXT BOOKS

1. Ashutosh Kar, *Medicinal Chemistry*, New Age International, fourth edition, 2007.

2. Graham L. Patrick, *An Introduction to Medicinal Chemistry*, Oxford University Press, fifth edition, 2013.

3. Gareth Thomas, *Fundamentals of Medicinal chemistry*, Wiley-Blackwell, First Edition, 2003.

4. D. Sriram and P. Yogeeswari, *Medicinal Chemistry*, Pearson India, second edition, 2010.

5. N. Weaver, *Medicinal Chemistry*, Oxford, 2006.

6. G.R. Chatwal, *Medicinal Chemistry*, Himalaya, New Delhi, 2002.

7. P. Graham, *Instant Notes Medicinal Chemistry*, Viva, New Delhi, 2002.

REFERENCE BOOKS

1. Thomas Lemke and David A. Williams, *Foye's Principles of Medicinal Chemistry,* 7th edition, Lippincott Williams & Wilkins Pulications, 2012.

2. John M. Beale and John H. Block, *Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry,* 12th Edition, Lippincott Williams & Wilkins Publications, 2010.

3. Ruben Vardanyan and Victor Hruby, *Synthesis of Essential Drugs*, 1st edition Elsevier Science, 2006.

4. Richard B. Silverman, *The Organic Chemistry of Drug Design and Drug Action*, 2nd edition, Elsevier Academic Press, 2004.

5. Camille Georges Wermuth, David Aldous, Pierre Raboisson, and Didier Rognan, *The Practice of Medicinal Chemistry*, 4th edition, Elsevier Academic Press, 2015.

6. T. J. Franklin and G. A. Snow, *Biochemistry and Molecular Biology of Antibacterial Drug Action*, 5th edition, Springer Science, 1998.

COURSE OUTCOMES (COs)

Upon completion of the course, the students will be able to

CO Nos	CO Statement	Cognitive Level
CO1	Categorize the drug delivery system and gain knowledge on molecular docking.	K4, K2
CO2	Acquire knowledge about structure activity relationship of drugs.	K2
CO3	Explain the structure and functions of antiseptics, antibiotics and differentiate bacterial and fungal cell walls.	K2, K4
CO4	Illustrate the synthesis and mode of actions of some important drugs.	K2
CO5	Create certain developments in cancer chemotherapy and cardiovascular drugs.	K6

MAPPING OF COURSE OUTCOMES WITH POs AND PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	S	S	S	S	L	L	S	S	S	S	S	M	S	N	S	S	S
CO2	S	S	M	M	L	L	S	S	S	S	S	S	S	N	S	S	S
CO3	S	S	M	M	L	L	S	S	S	M	S	M	M	N	L	S	S
CO4	S	S	M	S	L	L	S	S	S	M	S	S	S	N	L	S	S
CO5	S	S	S	S	L	L	S	S	S	S	S	M	S	N	M	S	S

ELECTIVE - II	2.3 INDUSTRIAL PROCESSES AND CATALYSIS	L	T	P	C
		4	0	0	4

Objectives:

- *To learn unit operations and reverse osmosis in industrial plants.*
- *To study catalyst and homogeneous and heterogeneous catalysis in industries.*
- *To understand the environmental impact of chemical industries.*

UNIT I – UNIT OPERATIONS   (12 Hours)

Concepts of unit operation and unit process. Basic Unit operation – batch and continuous, Distillation – azeotropic, steam and extractive distillation, Evaporation – single effect and multiple effect, Extraction – liquid-liquid and solid – liquid extractions, Crystallization – evaporative, cooling, precipitation and fractional crystallization. Size reduction and size separation – definition and objectives, factors affecting size reduction, Law governing Energy & Power requirements in comminution - size reduction equipment – ball mill, hammer mill and fluid energy mill.

UNIT II – REVERSE OSMOSIS   (12 Hours)

Principle of Reverse Osmosis, dead - end filtration, cross – flow filtration, Industrial applications of reverse osmosis. Basic terms and definitions – recovery, rejection, flux, concentration polarization, beta, fouling, scaling, silt density index, modified fouling index, langelier saturation index. Membrane types and function – cellulose acetate membranes, polyamide and composite membranes. Membrane modules – plate and frame modules, tubular modules, spiral wound modules. Pretreatment of water – mechanical and chemical pretreatments.

UNIT III – CATALYST AND CATALYSIS   (12 Hours)

Catalyst – general features and industrial applications, Catalysis – homogeneous catalysis and its limitations, heterogeneous catalysis – general kinetic behavior - chemisorption and active sites - physical form and preparation of bulk and supported catalysts – catalytic deactivation and reusability – advantages and operational modes of heterogeneous catalysis in industry.

UNIT IV – CATALYSIS IN PETROCHEMICAL INDUSTRY   (12 Hours)

Overview of Petrochemical Industry and Refinery processes – importance of catalysis. Catalytic selectivity – mesoporous materials and shape selectivity – zeolites and zeotypes – zeolites in petrochemistry and refining – shape selective catalysis by zeolites – shape selectivity in conversion of methanol to hydrocarbon – shape selectivity in hydrocracking – shape selectivity in carbonylation.

UNIT V – ENVIRONMENTAL IMPACT OF CHEMICAL INDUSTRIES   **(12 Hours)**

Environment and human interactions, Sources of Pollution – Atmospheric pollution, Aquatic pollution, land pollution, Control and treatment of pollution and wastes from industry – Control of atmospheric discharges, control of aquatic discharges, disposal of solid wastes from industrial sites. Hazards of the chemical industry – chemical exposure and toxicity – control techniques used in chemical plants.

TEXT BOOKS

1. Alan Heaton, *An Introduction to Industrial Chemistry*, Springer, Third Edition, 1996.
2. M. Gopala Rao and Marshall Sittig, *Dryden's Outlines of Chemical Technology*, East – West Press, Third Edition, 1997.
3. Jane Kucera, *Reverse Osmosis: Design, processes and applications*, Scrivener Publishing LLC and Wiley, Second Edition, 2015**.**
4. B.K Sharma, *Industrial Chemistry*, Goel Publishing House, Fifteenth Edition, 2006**.**

REFERENCE BOOKS

1. Editor – James A. Kent, *Handbook of Industrial Chemistry and Biotechnology*, Vol 1 &2, Springer, Twelfth Edition, 2012.
2. Editors - Lawrence K. Wang, Yung-Tse Hung, Howard H. Lo and Constantine Yapijakis, *Waste Treatment in the Process Industries*, CRC Press, First Edition, 2006.
3. Editors - Adriano Zecchina, Silvia Bordiga and Elena Groppo, *Selective Nanocatalysts and Nanoscience*, Wiley – VCH, 2011.
4. Editor – John Regalbuto, *Catalyst Preparation: Science and Engineering,* CRC Press, 2007.

COURSE OUTCOMES (COs)

On completion of the course, the students will be able to

CO Nos	CO Statement	Cognitive Level
CO1	Acquire knowledge on unit operations and unit process in industry.	K2
CO2	Explain reverse osmosis and how to apply it in the pretreatment of water.	K2, K3
CO3	Distinguish homogeneous and heterogeneous catalysis and analyze the advantages of heterogeneous catalysis in industry.	K4
CO4	Evaluate the role of catalysis in petrochemical industry.	K5
CO5	Save the environment from hazardous industrial chemical waste.	K6

MAPPING OF COURSE OUTCOMES WITH POs AND PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	S	S	M	M	S	L	S	S	S	S	S	L	S	N	N	S	S
CO2	S	S	S	S	S	L	S	S	S	S	S	L	S	N	N	S	S
CO3	M	S	M	S	S	L	S	S	S	S	S	S	M	N	N	S	S
CO4	S	S	S	S	M	L	S	S	S	S	S	S	M	N	N	S	S
CO5	S	S	S	S	S	L	S	S	S	M	S	S	M	N	N	S	S

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc . COMPUTER SCIENCE

(Choice Based Credit System)

(with effect from the academic year 2020-2021 onwards)

Sem	Part I/ II/ III/ IV/ V	Subject No.	Subject Status	Subject Title	Contact Hrs/ Week	L	T	P	Credits
III	III	15	Core	Java Programming	5	4	1	0	4
	III	16	Core	Digital Design	4	4	0	0	4
	III	17	Major Practical - III	Java Programming Lab	6	0	0	6	2
	III	18	Allied -III	Scripting Languages	4	4	0	0	3
	III	19	Allied Practical - II	Scripting Languages Lab	4	0	0	4	2
	III	20	Skill Based Core-I	Introduction to Big Data analytics	5	5	0	0	4
	IV	21	Non-Major Elective	1. Fundamentals of Internet and Emerging Technologies 2. Basic Programming Design	2	2	0	0	2
			Common	Yoga*	2	2	0	0	2
	Subtotal (excluding Yoga)				**30**	**19**	**1**	**10**	**21**
IV	III	22	Core	Data Structures	5	4	1	0	4
	III	23	Core	Computer Architecture	5	5	0	0	4
	III	24	Major Practical - IV	Data Structure lab	5	0	0	5	2
	III	25	Allied -IV	Machine Learning	4	4	0	0	3
	IV	26	Allied Practicals	PYTHON	4	4	0	0	2

III	27	Skill Based – Core II	Multimedia Applications	5	5	0	0	4
IV	28	Non-Major Elective	1. HTML 2. Programming in C	2	2	0	0	2
		Common	Computers for Digital Era *	2	2	0	0	2
V		Extension Activity	NCC, NSS, YRC, YWF	0	0	0	0	1
			Subtotal **(Excluding Computer for Digital Era)**	**30**	**24**	**1**	**5**	**23**
	III	29	Core	Relational Database Management System	4	4	0	0	4
	III	30	Core	Data Communication and Computer Networks	5	5	0	0	4
	III	31	Core	PHP and mySQL	5	4	1	0	4
	III	32	Major Practical - V	PHP and mySQL Lab	4	0	0	4	2
V	III	33	Major Practical - VI	Machine learning practicals	5	0	0	5	2
	III	34	Major Elective – I (Anyone)	1. Mobile application Development 2. Introduction to Security in Computing 3. Cloud Computing	5	5	0	0	4
	III	35	Skill Based Common	Personality Development/ Effective Communication/ Youth Development	2	2	0	*	2
			Subtotal	**30**	**20**	**1**	**9**	**22**
	III	36	Core	Operating System	5	5	0	0	4
	III	37	Core	Software Engineering and Testing	4	4	0	0	4
VI	III	38	Core	Computer Graphics and Visualization	5	4	1	0	4
	III	39	Core	Introduction to Digital Image Processing	4	4	0	0	4

				L	T	P		
III	40	Major Practical - VII	Computer Graphics Lab	4	0	0	4	2
III	42	Major Elective - II	1. Internet of Things(IoT) 2. Information Technology Service Management (ITSM) 3. Neural Networks	4	4	0	0	4
III	41	Project	Digital Image Processing using SciLab/MathLab	4	0	0	4	4
			Subtotal	**30**	**21**	**1**	**8**	**26**
	Total credits(including Yoga & Computers for Digital Era)							**141**

➢ **L**-Lecture **T**-Tutorial **P**-Practical

Distribution of marks between External and Internal Assessment is

For Theory 75 : 25

For Practical 50 : 50

Internal Marks for Practical shall be allotted in the following manner

Continuous Assessment:25 marks "N" number of practical's being conducted based on the practical prescribed in the syllabus and the marks should be distributed equally for each practical.

Test: 25 marks Two tests should be conducted and average of tests be taken.

Calculation of marks: Sum of marks awarded to number of practicals + the average marks of two tests

Total-50 marks

L T P C

2 0 0 2

1. FUNDAMENTALS OF INTERNET AND EMERGING TECHNOLOGIES

Course Objective:

1. To introduce the background, drivers and history in the invention of computers so that the student gains a big picture of the subject.

2. To provide a high level understanding various branches of Computer Science so that students can detect their interest and specialization

3. To introduce the computational models such as cloud computing and make students choose one for their use

4. Understand the Artificial Intelligence technologies, Networks and Cybersecurity and its impact on human life in future

5. Introduce Computer Ethics and help the society retain human values while technology is developing.

Unit I

Man and Machines - Human Capability of five senses to see, hear, smell, speak and act - Basic Structure of a Computer - Data - Characteristics of a Computer-History of Computers - - Classification of Computers (6L)

Unit II

Application Software and Programming Languages - Application Software - Packaged Software Products (Off-the-Shelf Products) - Office Automation - Core Banking System - Enterprise Software Products – SAP - Sales Force – Oracle - CRM and ERP - Early High Level Programming Languages - Translators (Compilers and Interpreters) – FORTRAN – BASIC – COBOL – PASCAL - C Language - Web Programming Languages – HTML - Java Script - Objected Oriented Programming with C++ - C++ Language - C# Language - Java Programming - Modern Programming Language – Python - GO Language - Swift Language - Kotlin Language - R Language - Artificial Intelligence Languages - Database Management Software (6L)

Unit III

Digital Transformation - Data (High Value Commodity) - Digital Transformation in Business - Features of Digital Transformation - Banking and Financial Services Industry (BFSI) - Human Resource Management – Healthcare - Big Data Analytics in Healthcare - Virtual Reality Wearable medical devices - Retail Industry and CPG -Computer Networks - Basic Networking Terminologies - Node / Host - Client / Server - MAC Address - IP Address - Unicast, Multicast and Broadcast - Half Duplex and Full Duplex – Encapsulation - Network Protocols - Open System Interconnection (OSI) Model - TCP/IP Protocol Suite - Transfer Control Protocol (TCP) - User Datagram Protocol (UDP) – Ethernet - Hardware Used for Networking - Hubs and Switches – Routers - Networking Cables - Coaxial Cable - Twisted Pair Cable - Fiber Optics Cable - Network Topology - Ring Topology - Star Topology (Hub and Spoke Topology) - Bus Topology - More Topologies - Wireless Networks - Radio Waves - Micro Waves – Bluetooth – WiFi - Types of Networks - Personal Area Network (PAN) - Local Area Network (LAN) - MAN and WAN (6L)

Unit IV

Cyber Security - IT Assets - Risk and Vulnerabilities - Computer Security Types - Fundamental Principles of Security - Physical Safety and Security - Access Control - Biometric Access Control - Network Security - AAA Server -– Firewall – Malware – Spyware – Adware – Spamware – Virus – Ransomware – Worms - Trojan Horse - Computer Virus - Types of Computer Viruses - Antivirus Protection - Digital Signature - Cyber Crime – Hacking – Phishing - Spam e-mails - Attack using Malware - ATM Skimming – Ransomware - Fake News - Deep fake – Cyberbullying - Cyber Law (IT Law) -Cloud Computing and Virtualization - Own Versus Hire - Benefits and Challenges of Cloud Computing
– Virtualization –Hypervisor - Data Center - Hardware Platform Infrastructure - Infrastructure as a Service (IaaS) - Software as a Service (SaaS) - Platform as a Service (PaaS) - Application as a Service (AaaS) - Functions as a Service (FaaS) - Cloud Deployment Models - Private Cloud - Community Cloud - Public Cloud - Hybrid Cloud (6L)

Unit V

Artificial Intelligence - Machine Learning - Training Data - Machine Learning Models - Deep Learning and Neural Networks - Robotics Process Automation (RPA) - Speech Recognition - Natural Language Processing – Bots - Natural Language Generation - Computer Vision – Biometrics - Sentiment Analysis - Artificial Intelligence Applications - Banking and Financial Fraud Detection - Medical Diagnostics - Retail Business - Autonomous Car / Driverless Car
Professional Ethics in Computer - Ethics and Law - Ethical Behaviors - Professional Ethics Frameworks

- Utilitarian Ethics - Deontological Ethics - Virtue Ethics, Communitarian Ethics - Ethical Issue in Computer Science - Intellectual Property Rights (IPR) - Data Protection Law - Information Security and Privacy - Software License - Open-Source Software - Freeware - Unethical Content Filtering - Technology Impact on Society (6L)

Textbook

Fundamentals of Internet and Emerging Technologies (2021) , C. Xavier, New Age International Publishers Ltd., New Delhi., Chapters 1, 2, 3 and 9 to 16 only.

Reference Book

1. Introduction to Computer Science, Second Edition, ITL Education Solutions Ltd, Pearson Education
2. Introduction to Computers, Peter Norton, 7th Edition, McGraw Hill Education
3. Fundamentals of Computers, V.Rajaram, 5th Edition, PHI

2. BASIC PROGRAMMING DESIGN

Objectives

- ➢ Understand the basic design in programming
- ➢ Know the various techniques in program design

Unit-I

Computer Program: Introduction – Developing a program – Algorithm – Flowchart – Decision Tables.(6L)

Unit-II

Program Testing and Debugging – Program Documentation – Program Paradigms: Unstructured programming, Structured programming and Object Oriented Programming – Characteristics of a Good Programming. (6L)

Unit-III

Computer Languages: Evolution Programming Languages – Classification of Programming Languages – Generation of Programming Languages – Features of Good Programming language. (6L)

Unit-IV

Computer Software: Software Definition – Relationship between Software and Hardware - Software Categories : System Software and Application Software – Terminology Software Firmware, Liveware, Freeware, Public Domain Software, Shareware, Commercial Software and Proprietary Software. (6L)

Unit V

Evolution of Internet - Internet Basics: Basic Internet Terms – Getting connected to Internet -Internet Applications – E-mail – Searching the Web – Internet and Viruses. (6L)

Text Book:
Introduction to Computer Science, ITL Education Solutions Limited, 2/e, Pearson

Reference Books:
1.   Fundamentals of Computers, V.Rajaram, 5th Edition, PHI
2.   Introduction to Computers, Peter Norton, 7/e, TMH.

L T P C

2 0 0 2

1. HTML

Objectives:

To study the basic concepts of Web design using HTML.

To learn the various tags used in HTML

To make use of Dynamic HTML

Unit I:

Introduction to HTML: Designing a Home page – History of HTML – HTML generations- HTML Documents-Anchor tag –Hyper links –Sample HTML documents.(6L)

Unit II :

Head and Body section: Header Section –Title-Prologue-Links-Colorful web page –Comments lines Designing the body: Heading printing –Aligning the headings-Horizontal rule- paragraph-Tab settings-Image and pictures-Embedding PNG format Images(6L)

Unit III:

Ordered and unordered lists: List-Unordered lists- headings in a list – ordered lists- Nested lists. Table handling: Tables- table creation in HTML- Width of the Tables and cells-Cells spanning multiple rows/Columns- Coloring cells – Column specification(6L)

Unit IV:

Frames: Frame set - Definition – Frame definition –Nested Frames Web Page Design Project : Frameset Definition – Animals – Birds – Fish Forms: Action attributes –Method attributes –Enctype attribute – Drop down list- sample forms(6L)

Unit V:

DHTML and Style sheets: Defining styles –Elements of styles- Linking a style sheet to an HTML document –Inline styles –Internal & External style sheets –Multiple styles(6L)

Text Book:

World Wide Web Design with HTML, C. Xavier, TMH, 2001

Reference Book:

Internet & World Wide Web, H.M.Deital, P.J.Deital & A.B.Goldberg, Pearson Education

Fundamentals of information technology, Mathew's lenon and Alxis leon, Vijay Nicole privatelimited, Chennai.

2..PROGRAMMING IN C

Objectives:

To obtain knowledge about the structure of the programming language C and todevelop the program writing and logical thinking skill.

UNIT I

C Declarations –Introduction-Character Set-C tokens-Keywords and Identifiers- Constants-Variables-Data types- Declaration of Variables- Initializing Variables- Dynamic Initialization- Type Modifiers-Type Conversion- Constant And Volatile Variables

Operators and Expressions:- Introduction – Arithmetic Operators – Relational Operators – Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operator – Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Operator Precedence.(6L)

Unit II

Input and Output in C: Introduction – Formatted Functions – Flags, widths andPrecision with Format String – Unformatted Functions – Commonly used Library functions. **Decision Statements :** Introduction – Simple IF statement – The IF…Else Statement – Nesting of IF…Else Statements – The ELSE IF ladder – The Break Statement – The Continue Statement – The Goto Statement – The Switch Statement.(6L)

Unit III

Loop Control:- Introduction –The WHILE Statement – The DO Statement – The FOR statement – Nested FOR Loops. **Arrays :-** Introduction – One-dimensional arrays

Declaration of One-dimensional arrays – Initialization of One-dimensional arrays –Array terminology -Two-dimensional arrays – Initialization of Two-dimensional arrays.(6L)

Unit IV

Strings and Standard functions:- Introduction – Declaring and Initializing String Variables – Display of strings in different formats – String Standard functions – String Conversion Functions.(6L)

Unit V

Functions:- Introduction – Basics of a function - Function definition – The Return statement Types of functions – Call by Value and Reference – Function as an argument – Function with operators – function and decision statements – function andloop statements – functions with arrays.(6L)

Text Book:

Programming in ANSI C – 8th Edition by E Balagurusamy – McGraw Hill Publishing Company Limited.

Reference Book:

Programming in C – 3th Edition by Ashok Kamthane – Pearson Education

Computer Basics and C Programming by V. Rajaraman – PHI Learning PrivateLimited

Programming with C, Third Edition, Byron S Gottfried, McGraw HillEducation Private Limited.

MSU/ 2020-21 / UG-Colleges /Part-III (B.Sc. Computer Science) / Semester – V /Major Elective-I

L T P C

5 0 0 4

1.   **MOBILE APPLICATION DEVELOPMENT**

Objective:

To make the students understand the basics of Mobile Applications

Unit-I:

Getting Started: Diving in - Welcome to Androidville - The Android platform - Install Android Studio - How to build the app - Activities and layouts - first Android app - a complete folder structure - Useful files in your project - Edit code with the Android Studio editors - Run the app in the Android emulator - Creating an Android Virtual Device - Run the app in the emulator - watch progress in the console - What's in the layout? - activity_main.xml has two elements - Update the text displayed in the layout.

Building Interactive Apps: Apps that do something: building a Beer Adviser app - Create the project - a default activity and layout - A coser look at the design editor - Add a button using the design editor - activity_find_beer.xml has a new button - A closer look at the layout code - the app, test drive - Hardcoding text makes localization hard - Create the String resource - Use the String resource in your layout - The code for activity_find_beer.xml - Add values to the spinner - Add the string-array to strings.xml - Test drive the spinner - We need to make the button do something - Make the button call a method - The activity code - Add an onClickFindBeer() method to the activity - onClickFindBeer() needs to do something - Once you have a View, you can access its methods - Update the activity code - The first version of the activity - What the code does - Build the custom Java class.(12L)

Unit-II:

Multiple Activities and Intents: State your intent - More than one activity in an app - the app structure - create the project - Update the layout - Create the second activity and layout - Android manifest file - An intent - What happens when you run the app - Pass text to a second activity - Update the text view properties - putExtra() method - Update the CreateMessageActivity code - Get ReceiveMessageActivity

to use the information in the intent - What happens when the user clicks the Send Message button - send messages to other people

How Android apps work - Create an intent that specifies an action - Change the intent to use an action - the intent filter - if users ALWAYS want to choose an activity - when createChooser() method is called - Change the code to create a chooser.

The Activity Lifecycle: Being an activity - How do activities really work? - The Stopwatch app - Add String resources - How the activity code will work - Add code for the buttons - The runTimer() method - The full runTimer() code - The full StopwatchActivity code -

Rotating the screen changes the device configuration - The states of an activity - The activity lifecycle: from create to destroy - The updated StopwatchActivity code - What happens when you run the app - There's more to an activity's life than create and destroy -

The updated StopwatchActivity code - when the app is run - when an app is only partially visible - The activity lifecycle: the foreground lifetime - Stop the stopwatch if the activity's paused - Implement the onPause() and onResume() methods - The complete StopwatchActivity code - Your handy guide to the lifecycle methods.(12L)

Unit-III:

Views and View Groups: Enjoy the view - Your user interface is made up of layouts and GUI components - LinearLayout displays - Add a dimension resource file - Using margins - change a basic linear layout - adding weight to a view - Values you can use with the android:gravity attribute - The full linear layout code - Frame layouts stack their views - Add an image to your project - The full code to nest a layout - FrameLayout: a summary - Playing with views - Editable text view - Toggle button - Switch - Checkboxes - Radio buttons - Spinner - Image view - Adding images to buttons - Scroll views - Toasts.

Constraint Layouts: Put things in their place - Nested layouts can be inefficient - the Constraint Layout - the Constraint Layout Library - Add the String resources to strings.xml - Use the blueprint tool - Position views using constraints - Add a vertical constraint - Changes to the blueprint are reflected in the XML - center views - Adjust a view's position by updating its bias - change a view's size - align views - build a real layout.(12L)

Unit-IV:

List views and Adapters: Getting organized - Every app starts with ideas - Use list views to navigate to data - The drink detail activity - The Starbuzz app structure - The Drink class - The top-level layout contains an image and a list - The full top-level layout code - Get list views to respond to clicks with a

listener - Set the listener to the list view - A category activity displays the data for a single category - Update activity_drink_category.xml - For nonstatic data, use an adapter - Connect list views to arrays with an array adapter - Add the array adapter to DrinkCategoryActivity - App review - How clicks are handled in TopLevelActivity - The full DrinkCategoryActivity code - Update the views with the data - The DrinkActivity code - when the app is run.

Fragments: Make it modular - Your app needs to look great on ALL devices - Your app may need to behave differently too - Fragments allow you to reuse code - The phone version of the app - Create the project and activities - Add a button to MainActivity's layout - How to add a fragment to your project - The fragment's onCreateView() method - Add a fragment to an activity's layout - Get the fragment and activity to interact - The Workout class - Pass the workout ID to the fragment - Get the activity to set the workout ID - The fragment lifecycle - Set the view's values in the fragment's onStart() method - How to create a list fragment - The updated WorkoutListFragment code - The code for activity_main.xml - Connect the list to the detail - The code for WorkoutListFragment.java - MainActivity needs to implement the interface - DetailActivity needs to pass the ID to WorkoutDetailFragment.(12L)

Unit-V:

SQLite Databases: Fire up the database - Back to Starbuzz - Android uses SQLite databases to persist data - SQLite classes - The current Starbuzz app structure - change the app to use a database - The SQLite helper manages database - Create the SQLite helper - Inside a SQLite database - create tables using Structured Query Language (SQL) - Insert data using the insert() method - Insert multiple records - The StarbuzzDatabaseHelper code - What the SQLite helper code does - What if changes to the database is needed? - SQLite databases have a version number - when the version number is changed - Upgrade your database with onUpgrade() - Downgrade your database with onDowngrade() - upgrade the database - Upgrade an existing database - Update records with the update() method - Apply conditions to multiple columns - Change the database structure - Delete tables by dropping them - The full SQLite helper code.

Basic cursors: Getting data out - The new Starbuzz app structure - change DrinkActivity to use the Starbuzz database - The current DrinkActivity code - Get a reference to the database - Get data from the database with a cursor - Return all the records from a table - Return records in a particular order - Return selected records - The DrinkActivity code so far - To read a record from a cursor, you first need to navigate to it - Navigate cursors - Get cursor values - The DrinkActivity code - The current

DrinkCategoryActivity code - Get a reference to the Starbuzz database - replace the array data in the list view - A simple cursor adapter maps cursor data to views - use a simple cursor adapter - Close the cursor and database - The DrinkCategoryActivity code.(12L)

Text Book:

1. Head First Android Development (Nov 2019) - Dawn Griffiths & David Griffiths, O'Reilly Media/Shroff Publishers & Distributors Pvt. Ltd.- ISBN: 9789352136063 (Chapters 1-7, 9, 15, 16)

Reference Books:

1. Beginning Android Programming with Android Studio (Wrox Beginning Guides) 4e, 2016 - J. F. DiMarzio - Wiley

2. Android Developer Fundamentals Course: 2017
   https://google-developer-training.github.io/android-developer-fundamentals-course-concepts/en/android-developer-fundamentals-course-concepts-en.pdf

3. Android Programming Unleashed, 1e, 2013 - B.W.Harwani – Pearson

2.INTRODUCTION TO SECURITY IN COMPUTING

Objectives

> ➢ To understand the concepts of basic concepts in security in computing

> ➢ To know about the various security algorithms

Unit-I

Model of network security – Security attacks, services and attacks –   OSI security architecture – Classical encryption techniques – SDES – Block cipher PrinciplesDES – Strength of DES – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC4 - Differential and linear cryptanalysis – Placement of encryption function – traffic confidentiality.(12L)

Unit-II

 Number Theory – Prime number – Modular arithmetic – Euclid's algorithm - Fermet's and Euler's theorem – Primality – Chinese remainder theorem – Discrete logarithm –

Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography. (12L)

Unit-III

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS. (12L)

Unit-IV

Authentication applications – Kerberos – X.509 Authentication services - E- mail security – IP security - Web security(12L)

Unit-V

Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security(12L)

Text Book:

1. William Stallings, "Cryptography & Network Security", Pearson Education,Fourth Edition 2010.

Reference Books:

1. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security, Private communication in public world", PHI Second Edition, 2002.
2. Bruce Schneier, Neils Ferguson, "Practical Cryptography", Wiley Dreamtech India Pvt Ltd, First Edition, 2003.

3. Douglas R Simson "Cryptography – Theory and practice", CRC Press, First Edition, 1995.

3.CLOUD COMPUTING

Objective:

To know in detail about the various Cloud Computing concepts

UNIT I:

Introduction to cloud computing- History of cloud computing. Fundamentals of the cloud computing ecosystem. Cloud computing characteristics. Technical characteristics of cloud computing Basic characteristics of cloud computing- Advantages and disadvantages of cloud computing. Comparison of traditional and cloud computing paradigms. Cluster computing- Grid computing.. Cloud computing-Evaluating the cloud's business impact and economics Business drivers of cloud computing adoption. Future of the cloud (FoC).

Cloud Services and Deployment Models. Objectives. Cloud deployment models. Public (external) cloud. Private/Internal/Corporate cloud. Hybrid cloud. Cloud Service Models- Infrastructure-as-a-Service (laas) Platform-as-a-Service (Paas). Software as a-Service (Saas) Cloud infrastructure mechanisms Logical network perimeter (LNP) Virtual server. Cloud storage devices (CSD) Cloud usage monitor -Resource replication. Ready-made environment. Cloud service management**.(12L)**

UNIT II:

Cloud Computing Architecture.. Objectives. Cloud computing architecture design principles.. Cloud computing life cycle (CCLC). Phase 1- Architect. Phase 2- Engage Phase 3- Operate.. Phase 4-Refresh .Cloud computing reference architecture Load balancing approach Mobile cloud computing (MCC). Mobile computing features.. Challenges.. Mobile cloud computing architecture.

Virtualization Technology. Objectives. Understanding virtualization Adopting virtualization. Techniques of virtualization. How virtualization works? XEN- Kernel-based virtual machine (KVM). VMware. Virtual Box –Citrix.Types of Virtualization Data virtualization-Desktop virtualization -CPU virtualization Network virtualization. Storage virtualization -Server virtualization. Virtualization in Cloud**(12L)**

UNIT III:

Service oriented Architecture Objectives SOA foundation.. Web Services and SOA .SOA communication. SOA components. SOA Infrastructure. Need of SOA. Business Process Management (BPM).Business Process Management Platform as a Service - BPM PaaS Business Process as a Service-BPaaS.

Cloud Security and Privacy... Objectives. Cloud security - Cloud CIA security model.. Data confidentiality Data integrity.. Data availability., Cloud computing security architecture Service provider security issues. Security issues in virtualization. Cloud legal issues . Performance monitoring and management of cloud services Legal issues in cloud computing Data security in cloud .The cloud risk management framework. Risk management process for cloud consumers- Requirement for risk management in ISO/IEC 27001- Data privacy risks in the cloud. Availability risks. Service provisioning risks . **(12L)**

UNIT IV:

Business continuity and disaster recovery Disaster recovery requirements... Mechanisms for cloud disaster recovery. Disaster recovery as a service. The cloud disaster recovery architecture. Challenges of the cloud disaster recovery. Threats in cloud. Security techniques for threats protection. Cloud service level agreements (SLA) practices Components of a cloud SLA. Types of SLAS. Cloud vendors. Issues of Quality of Cloud Services. Techniques for providing QoS to the cloud applications. Migration of a local server into cloud.. Preliminary checklist/planning for migration. Migration steps. Types of migration for cloud-enabled applications.. Trust management. Trust management evaluation attributes. Cloud trust management techniques
Cloud Computing Applications.. Objectives. Introducing cloud computing applications Google App Engine. Google Apps. Gmail. Google Docs.. Google Calendar Google Drive. Google Cloud Data store. Drop box Cloud. Apple iCloud Microsoft Windows Azure Cloud. Amazon Web Services (AWS) Amazon Elastic Compute Cloud (Amazon EC2) Amazon Simple Storage Service (S3). **(12L)**

UNIT V:

Cloud Computing Technologies, Platforms and Services. Objectives. High-performance computing with cloud technologies. Message Passing Interface (MPI).. Map Reduce programming model. Dryad and DryadLINQ.. Eucalyptus cloud platform. Components of Eucalyptus OpenNebula cloud platform. Layers of OpenNebula Features of OpenNebula. OpenStack cloud platform.. OpenStack components Benefits of Open Stack.. Nimbus Cloud Computing Platform Features of Nimbus. The Apache Hadoop ecosystem

Architecture of IHladoop Major components of Hadoop. Hadoop and cloud..

Adoption of Cloud Computing. Objectives. Adoption of cloud computing in the current era Factors affecting cloud computing adoption. Technological factors. Organizational factors Environmental factors.. Cloud computing existing areas of application.. Cloud computing in education. Cloud computing in healthcare. Cloud computing in politics. Cloud computing in business. Cloud computing in agriculture. Case studies Cloud computing adoption in Sub-Saharan Africa. Cloud computing adoption in India. Cloud computing certifications Google Cloud Certifications.. IBM Cloud Certifications.. Amazon Web Services (AWS) Cloud Certifications**.(12L)**

Text Book:

Cloud Computing, Kamal Kant Hiran,Ruchi Dosai, Temitayo Fagbola,Mehul Mahrishi, BPB publication, First edition 2019.

Reference Book:

1. Cloud Computing, V. K. Pachghare, PHI Learning Pvt Ltd, 2016
2. 2 Cloud Computing, Anthony T.Velte, Toby J.Velte, Pobert Elsenpeter, TMH, 2010
3. Cloud Computing Bible, Barrie Sosinsky, Wiley Publishing, Inc.

DIGITAL IMAGE PROCESSING USING SCILAB / MatLab

L T P C

4 0 0 4

Objective:

➢ To get knowledge about the basic programs on Digital Image Processing

1) Perform 2D Linear Convolution, Circular Convolution between two 2D matrices.

2) Perform Discrete Fourier Transform(DFT), Discrete Cosine Transform(DCT) of 4x4 gray scale image.

3) Perform Brightness enhancement, Contrast Manipulation, Image negative of an image.

4) Perform threshold operation on an image.

5) Perform Edge detection using different edge detectors.

6) Perform Dilation and Erosion operation.

7) Perform Opening and closing operations

8) Read a colour image and separate the image into red, blue and green planes.

Reference:

1) Scilab Textbook Companion for Digital Image Processing, S. Jayaraman, S. Esakkirajan And T. Veerakumar, 2016 (https://scilab.in/textbook_companion/generate_book/125)

MSU/ 2020-21 / UG-Colleges /Part-III (B.Sc. Computer Science) / Semester – VI /Major Elective - II

1. INTERNET OF THINGS

L T P C

4 0 0 4

Objective:

➢ To give a brief idea about IOT working

➢ To make the students understand the Architecture of IOT

UNIT I:

Fundamentals of Internet of Things: Introduction – Characteristics of IoT – The Physical Design of IoT – Iot Architecture an Components – Logical design of IoT – Communication Models – IoT Communication API – IoT Architecture and Protocols – Introduction –Fog based Architecture of IoT – Near Field Communication – Wireless Sensor Networks – IoT Network protocol stack – IoT technology stack – Blue tooth – Zig Bee – and 6LowPAN.(12L)

UNITII:

Programming Framework for IoT: Interoperability – Programming Paradigm – Assembly – Introduction to Arduino Programming – Introduction to Python Programming – Introduction to Raspberry Pi . Virtualization: Introduction – Types – Virtualization and IoT – Embedded Virtualization.(12L)

UNIT III:

IoT Application Area: Introduction – Homes – Health care – Agriculture – Military applications – Politics – Constructions – Other application areas . Cloud an IoT : Introduction – Cloud – IoT – Difference between cloud and IoT – Cloud IoT architecture –challenges.(12L)

UNIT IV:

Smart City using IoT: Introduction – Concept – The emergence – Dimensions and Components – Design strategies – Factors affecting automation – IoT applications in smart cities – Education – E-governance – Industry . IoT Use Cases: Industrial IoT Use Case – IoT and smart energy – Smart transportation – Smart health – Smart home – Smart Education system – Governance use case – Smart cities.(12L)

UNIT V:

Network Security for IoT and M2M communications: Introduction – Network Technologies for IoT and M2M – Security for IoT and M2M Technologies – Securities in IETF M2M network Technologies – Security in ETSI M2M Network Technologies – Other M2M standard Efforts.(12L)

Text Books:
1. Internet of Things – Principles, Paradigms and Applications of IoT by Dr.Kamlesh Lakhwani, Dr.Hemant Kumar Gianey, Joseph Kofi Wireko, Kamal Kant Hiran (BPB publication First Edition 2020)

2. Internet of Things(IoT) Systems and Applications By Jamil Y . Khan & Mehmet R.Yuce Jenny

Stanford Publishing.

Reference Book

1.Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014

2.INFORMATION TECHNOLOGY SERVICE MANAGEMENT

L T P C
4 0 0 4

Objectives:
➢ To make the students understand about the various Information Technology Services
➢ To make them understand the working principles

Unit I
Information Technology – System model Layers – Networks, Hardware, Operating System - Software, Software Tools- Database- Business Process. Service Desk - Omni-channel ticket management - email, social media, live chat, phone - Ticket Workflow (12L)

Unit II
Infrastructure layer and Software Layer – Key Infrastructure management activities – Asset Management - Network – Servers – Operating System -Unix / Windows- Software Tools / platforms- Desktop / Workstation support – Mobile handheld device support License management – Licensing models – Warranty management – Hardware Life cycle management- Remote Infrastructure management – Cloud Infrastructure maintenance(12L)

Unit III
Incident Management – Priority and Severity – L1 – L2- L3- L4 Tickets– Ticket management system – Incident Workflow– Customer Feedback for incident resolution. Root cause analysis (RCA) – Documentation of RCA – Five-Why Analysis – Corrective and Preventive Actions – Tracking the preventive and corrective actions for closure – Managing critical incidents (P1/P2 incidents) – Lessons Learned – Success Stories(12L)

Unit IV
Problem Management – Problem Definition – Problem ticket – Problem ticket workflow - RCA and tracking – scheduling the closure. Change Management – Ticket Workflow – Release management – Maintenance release – minor release – major release. Knowledge Management – Success Stories – Lessons Learned – Documentation – Sharing of the knowledge – Ticket Analysis and Reporting – Incident Reduction – Training the user community and Service Desk L1 support – Automation of mundane jobs(12L)

Unit V

ITIL (Infrastructure Technology Information Library) ITIL v3/ 4 Framework – Service Strategy – Service Design – Service Transition – Service Operations – (Continual) Service Improvement – Ticket Management Tools in the market – Role of Artificial Intelligence in ITSM(12L)

Reference Books:

1. ITSM QuickStart Guide: The Simplified Beginner's Guide to IT Service Management, by ClydeBank Technology, Amazon Books (2016)
2. Measuring ITIL, Randy A. Steinberg, Google Books (2006)
3. Implementing Itsm: From Silos to Services: Transforming the It Organization to an It Service Management Valued Partner, Randy A. Steinberg, Amazon Books (2014)
4. Foundations of IT Service Management based on ITIL Google Books (2005)

3.NEURAL NETWORKS

L T P C
4 0 0 4

OBJECTIVES:

➢ Basic neuron models: McCulloch-Pitts model and the generalized one, distance or similarity based neuron model, radial basis function model, etc.

➢ Basic neural network models: multilayer perceptron, distance or similarity based neural networks, associative memory and self-organizing feature map, radial basis function based multilayer perceptron, neural network decision trees, etc.

➢ Basic learning algorithms: the delta learning rule, the back propagation algorithm, self-organization learning

➢ Applications: pattern recognition, function approximation, information visualization, etc.

UNIT I

Introduction to Neural networks: Neural processing- Neural networks- an overview – the raise of neuro computing – introduction to artificial neural networks : introduction- artificial neural networks – historical development of neural networks – biological neural networks – comparison between the brain and the computer – artificial and biological neural networks – basic building blocks of artificial neural networks – artificial neural network terminologies. (12L)

UNIT II

Fundamental models of artificial neural networks: McCulloch-Pits neuron Model-Learning rules. Perceptron networks: Introduction –single layer perceptron –brief introduction to multi layer perceptron networks. (12L)

UNIT III

Feedback networks: Introduction- discrete Hopfield net-continuous Hopfield net-relation between BAM and Hopfield nets. Feed forward networks: introduction-back propagation networks. (12L)

UNIT IV

Kohonen self - organizing feature maps - counter propagation network: introduction-Full counter propagation network-Forward only propagation network. (12L)

UNIT V

Applications of Neural Networks: Applications of neural networks in Arts-Bioinformatics - Knowledge Extraction – Forecasting - Bankruptcy forecasting-Healthcare-Intrusion - Detection. (12L)

TEXT BOOK

Introduction to Neural Networks using MATLAB 6.0., S N Sivanandam S Sumathi S N Deepa , McGraw Hill, 2006.

REFERENCE BOOKS

1. Artificial neural Networks B.Yegnanarayana, Prentice Hall India, 2005.

2. Neural Networks Alogorithms, Applications and programming Techniques, James A Freeman David M Skapura, Pearson Education.
3. Neural Networks for Pattern Recognition, Christopher M. Bishop, Indian Edition, OXFORD University Press.

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc . COMPUTER SCIENCE

Learning Outcome Based Curriculum

(With effect from the academic year 2021-2022 onwards)

Introduction

Outcome Based Education is incorporated into the curriculum based on the requirements of NAAC – UGC-Quality Mandate .To fulfill these requirements, the Program Educational Objectives(PEO's) ,Program Outcomes (POs) and Program Specific Outcomes(PSOs) and Course Outcomes(CO) were framed for all programs in alignment with the Vision and Mission of the respective departments and in-turn with the Vision and Mission and Educational Objectives of the University.

Vision Of the University

To provide quality education to reach the unreached

Mission Of the University

To conduct research ,teaching and outreach programs to improve conditions of human living

To create an academic environment that honours women and men of all races, caste, creed, cultures and an atmosphere

That values intellectual curiosity ,pursuit of knowledge ,academic freedom and integrity

To offer a wide variety of off campus educational and training programs, including the use of information technology, to individuals and groups

To develop partnership with industries and government so as to improve the quality of the workplace and to serve as

Catalyst for economic and cultural development

To provide quality /inclusive education ,especially for the rural and un-reached segments of economically downtrodden students including women, socially oppressed and differently abled.

Vision and Mission of Computer Science Department

Vision

Empower students to become independent life long learners with originality and high principles of character catering to the ever changing industrial demands and societal needs

Mission

To be the front runner in Computer Science and to foster the students into globally

competent professionals with expertise in software development and aptitude for research and ethical values.

Preamble

Education is a powerful driver of development and one of the strongest instruments in reducing poverty and improving health, gender equality, peace and stability in the community. Quality in higher education is pivotal for the progress of the country as it provides innovations with novel research initiatives and workforce in the industrial sector and in this regard, universities play a vital role in uplifting economy. It imparts skills, new knowledge, encourages entrepreneurship, escalates individual thinking, creativity, understanding, implementation skills, thereby developing an individual to compete internationally.

Based on UGC recommendations and Tamil Nadu governments education department, curriculum revision is updated and revised to ensure quality education, inclusion of present knowledge, new ideas, concepts, knowledge of the concerned discipline, national and international developments. A comprehensive course design is developed giving priority to Innovation, Application, Scope, Job opportunity and preparedness for competitive exams in upgrading the framework and above all imparting quality education for all, including from rural and backward sectors.

B. Sc. Computer Science Under Graduate programme is spread over 6 semesters of 3 years. This course aims at instilling technical competence in problem solving and application development. This programme cultivates the needed expertise in problem solving for a successful career in the IT sector thereby laying the foundation for a better computer science higher learning. This is a student oriented structure with an exposure in basics of computer sciences to the recent technologies like machine learning, Internet of Things(IoT), Digital Image processing(DIP). It also exposes students to the abilities like Big Data Analytics, Mobile Application Development.

The present curriculum of B.Sc Computer Science have been framed with the Programme Outcomes (POs)/Programme Specific Outcomes(PSOs) which have definite goals that each student will attain at the end of his graduate programme. PO goals include understanding of basic logic, ability to create novel ideas, propose new algorithms and implement them. The whole syllabus has been proposed based on Outcome Based Education(OBE) which focuses on the student procuring deeper level of understanding in the subject which lead to mastery of both knowledge and skill.

The POs/PSOs are framed based on the guidelines of Learning Outcomes-based Curriculum Framework(LOCF). At the end of each programme the PO/PSO assessment in done from the CO attainment of all curriculum components. There are 5 POs in the UG programme . PSOs are framed by the departments and they are 5 in number. For each Course, there are 5 Course

Outcomes (CO) to be achieved at the end of the course. These Course outcomes are framed to achieve the POs/PSOs.

Surely, this curriculum will aid the student in the basic as well as the recent developments in computer science when the student completes the programme.

Eligibility Norms for Admission

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education , Government of Tamil Nadu or any other Examinations accepted by the syndicate as equivalent thereto with Mathematics / Computer Science as one of the subjects

Duration of the Course

The students shall undergo the prescribed course of study for a period of not less than three academic years (Six semesters) .

Program Structure

Sem	Part I/II/III/IV/V	Subject No.	Subject Status	Subject Title	Contact Hrs/Week	L	T	P	Credits
I	I	1	Language	Tamil/Other Language	6	6	0	0	4
	II	2	Language	Communicative English-I	6	6	0	0	4
	III	3	Core	Programming in C	4	3	1	0	4
	III	4	Major Practical - I	Programming in C	4	0	0	4	2
	III	5	**Allied – I** a) For theB.Sc.(CS) Programme	a)Discrete Mathematics	4	4	0	0	3
			b) For other U.G. Programme*	b)Introduction to Computers MSOffice Practical	4 2	4 0	0 0	0 2	3 2
	III	6	Professional English		4	4	0	0	4
	IV	7	Common	Environmental Studies	2	2	0	0	2
	Subtotal				30	25	1	4	23
II	I	8	Language	Tamil/Other Language	6	6	0	0	4
	II	9	Language	Communicative English-II	6	6	0	0	4
	III	10	Core	Programming in C++	4	3	1	0	4
	III	11	Major Practical - II	Programming in C++	4	0	0	4	2
	III	12	Professional English		4	4	0	0	4
	III	13	**Allied Practical – I** a)For the B.Sc.(CS) Programme	a) Linux	4	0	0	4	2
			b) For other U.G. Programme*	b) C Programming C programming lab Lab	4 2	4 0	0 0	0 2	3 2

Part	No.	Category	Title					
IV	14	Common	Value Based Education	2	2	0	0	2
Subtotal				**30**	**21**	**1**	**8**	**22**
III	15	Core	Java Programming	5	4	1	0	4
III	16	Core	Digital Design	4	4	0	0	4
III	17	Major Practical - III	Java Programming Lab	6	0	0	6	2
III	18	Allied -III	Scripting Languages	4	4	0	0	3
III	19	Allied Practical - II	Scripting Languages Lab	4	0	0	4	2
III	20	Skill Based Core-I	Introduction to Big Data analytics	5	5	0	0	4
IV	21	Non-Major Elective	1. Fundamentals of Internet and Emerging Technologies 2. Basic Programming Design	2	2	0	0	2
		Common	Yoga*	2	2	0	0	2
Subtotal (excluding Yoga)				**30**	**19**	**1**	**10**	**21**
III	22	Core	Data Structures	5	4	1	0	4
III	23	Core	Computer Architecture	5	5	0	0	4
III	24	Major Practical - IV	Data Structure lab	5	0	0	5	2
III	25	Allied -IV	Machine Learning Techniques	4	4	0	0	3
IV	26	Allied Practicals	PYTHON	4	0	0	4	2
III	27	Skill Based – Core II	Green Foot Lab	5	0	0	5	2
IV	28	Non-Major Elective	1. HTML 2. Programming in C	2	2	0	0	2
		Common	Computers for Digital Era *	2	2	0	0	2
V		Extension Activity	NCC, NSS, YRC, YWF	0	0	0	0	1

L T P C

2 0 0 2

1. FUNDAMENTALS OF INTERNET AND EMERGING TECHNOLOGIES

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

CO1: To recall the background, drivers and history in the invention of computers so that the student gains a big picture of the subject.

CO2: To provide a high level understanding various branches of Computer Science so that students can detect their interest and specialization

CO3: To identify the computational models such as cloud computing and make students choose one for their use

CO4: To Understand the Artificial Intelligence technologies, Networks and Cyber security and its impact on human life in future

CO5: Elaborate Computer Ethics and help the society retain human values while technology is developing.

Unit I 6 Hours

Man and Machines - Human Capability of five senses to see, hear, smell, speak and act - Basic Structure of a Computer - Data - Characteristics of a Computer-History of Computers - - Classification of Computers

Unit II 6 Hours

Application Software and Programming Languages - Application Software - Packaged Software Products (Off-the-Shelf Products) - Office Automation - Core Banking System - Enterprise Software Products – SAP - Sales Force – Oracle - CRM and ERP - Early High Level Programming Languages - Translators (Compilers and Interpreters) – FORTRAN – BASIC – COBOL – PASCAL - C Language - Web Programming Languages – HTML - Java Script - Objected Oriented Programming with C++ - C++ Language - C# Language - Java Programming - Modern Programming Language – Python - GO Language - Swift Language - Kotlin Language - R Language - Artificial Intelligence Languages - Database Management Software

Unit III   6 Hours

Digital Transformation - Data (High Value Commodity) - Digital Transformation in Business - Features of Digital Transformation - Banking and Financial Services Industry (BFSI) - Human Resource Management – Healthcare - Big Data Analytics in Healthcare - Virtual Reality Wearable medical devices

- Retail Industry and CPG -Computer Networks - Basic Networking Terminologies - Node / Host - Client / Server - MAC Address - IP Address - Unicast, Multicast and Broadcast - Half Duplex and Full Duplex – Encapsulation - Network Protocols - Open System Interconnection (OSI) Model - TCP/IP Protocol Suite - Transfer Control Protocol (TCP) - User Datagram Protocol (UDP) – Ethernet - Hardware Used for Networking - Hubs and Switches – Routers - Networking Cables - Coaxial Cable - Twisted Pair Cable - Fiber Optics Cable - Network Topology - Ring Topology - Star Topology (Hub and Spoke Topology) - Bus Topology - More Topologies - Wireless Networks - Radio Waves - Micro Waves

– Bluetooth – WiFi - Types of Networks - Personal Area Network (PAN) - Local Area Network (LAN)

- MAN and WAN

Unit IV   6 Hours

Cyber Security - IT Assets - Risk and Vulnerabilities - Computer Security Types - Fundamental Principles of Security - Physical Safety and Security - Access Control - Biometric Access Control - Network Security - AAA Server -– Firewall – Malware – Spyware – Adware – Spamware – Virus

– Ransomware – Worms - Trojan Horse - Computer Virus - Types of Computer Viruses - Antivirus Protection - Digital Signature - Cyber Crime – Hacking – Phishing - Spam e-mails -

Attack using Malware - ATM Skimming – Ransomware - Fake News - Deep fake – Cyberbullying -

Cyber Law (IT Law) -Cloud Computing and Virtualization - Own Versus Hire - Benefits and Challenges of Cloud Computing

– Virtualization –Hypervisor - Data Center - Hardware Platform Infrastructure - Infrastructure as a Service (IaaS) - Software as a Service (SaaS) - Platform as a Service (PaaS) - Application as a Service (AaaS) - Functions as a Service (FaaS) -

Cloud Deployment Models - Private Cloud - Community Cloud
- Public Cloud - Hybrid Cloud

Unit V   6 Hours

Artificial Intelligence - Machine Learning - Training Data - Machine Learning Models - Deep Learning and Neural Networks - Robotics Process Automation (RPA) - Speech Recognition - Natural Language Processing – Bots - Natural Language Generation - Computer Vision – Biometrics - Sentiment Analysis
- Artificial Intelligence Applications - Banking and Financial Fraud Detection - Medical Diagnostics - Retail Business - Autonomous Car / Driverless Car

Professional Ethics in Computer - Ethics and Law - Ethical Behaviors - Professional Ethics Frameworks
- Utilitarian Ethics - Deontological Ethics - Virtue Ethics, Communitarian Ethics - Ethical Issue in Computer Science - Intellectual Property Rights (IPR) - Data Protection Law - Information Security and Privacy - Software License - Open-Source Software - Freeware - Unethical Content Filtering - Technology Impact on Society

Textbook

Fundamentals of Internet and Emerging Technologies (2021) , C. Xavier, New Age International Publishers Ltd., New Delhi., Chapters 1, 2, 3 and 9 to 16 only.

Reference Book

1. Introduction to Computer Science, Second Edition, ITL Education Solutions Ltd, Pearson Education
2. Introduction to Computers, Peter Norton, 7th Edition, McGraw Hill Education
3. Fundamentals of Computers, V.Rajaram, 5th Edition, PHI

2. BASIC PROGRAMMING DESIGN

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

➢ CO1: Define the basic design in programming

➢ CO2:Summerize various techniques in program testing

➢ CO3: To develop and evaluate Programming Languages

➢ CO4: To analyze computer hardware and software programs

➢ CO5: To evaluate the Internet Applications

Unit-I   6 Hours

Computer Program: Introduction – Developing a program – Algorithm – Flowchart – Decision Tables.(6L)

Unit-II   6 Hours

Program Testing and Debugging – Program Documentation – Program Paradigms: Unstructured programming, Structured programming and Object Oriented Programming – Characteristics of a Good Programming.

Unit-III   6 Hours

Computer Languages: Evolution Programming Languages – Classification of Programming Languages

– Generation of Programming Languages – Features of Good Programming language.

Unit-IV   6 Hours

Computer Software: Software Definition – Relationship between Software and Hardware - Software Categories : System Software and Application Software – Terminology Software Firmware, Liveware, Freeware, Public Domain Software, Shareware, Commercial Software and Proprietary Software.

Unit V   6 Hours

Evolution of Internet - Internet Basics: Basic Internet Terms – Getting connected to Internet -Internet Applications – E-mail – Searching the Web – Internet and

L T P C

2 0 0 2

1. HTML

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

CO1: To recall the basic concepts of Web design using HTML.

CO2: To learn the various tags used in HTML

CO3:To make use of Dynamic HTML

CO4:To compare the lists in HTML

CO5:To build Frames

Unit I: 6 Hours

Introduction to HTML: Designing a Home page – History of HTML – HTML generations- HTML Documents-Anchor tag –Hyper links –Sample HTML documents.

Unit II :   6 Hours

Head and Body section: Header Section –Title-Prologue-Links-Colorful web page –Comments lines Designing the body: Heading printing –Aligning the headings-Horizontal rule- paragraph-Tab settings-Image and pictures-Embedding PNG format Images

Unit III: 6 Hours

Ordered and unordered lists: List-Unordered lists- headings in a list – ordered lists-Nested lists. Table handling: Tables- table creation in HTML- Width of the Tables and cells-Cells spanning multiple rows/Columns- Coloring cells – Column specification

Unit IV: 6 Hours

Frames: Frame set - Definition – Frame definition –Nested Frames Web Page Design Project : Frameset Definition – Animals – Birds – Fish Forms: Action attributes –Method attributes –Enctype attribute – Drop down list- sample forms

Unit V: 6 Hours

DHTML and Style sheets: Defining styles –Elements of styles- Linking a style sheet to an HTML document –Inline styles –Internal & External style sheets –Multiple styles(6L)

Text Book:
World Wide Web Design with HTML, C. Xavier, TMH, 2001

Reference Book:

Internet & World Wide Web, H.M.Deital, P.J.Deital & A.B.Goldberg, Pearson Education

Fundamentals of information technology, Mathew's lenon and Alxis leon,

Vijay Nicole privatelimited, Chennai.

LOCF MAPPING

Course code and title : HTML										
CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5	% of co's
CO1	3	2	2	2	2	2	3	2	2	2	2.2
CO2	2	3	2	3	3	2	3	2	2	2	2.4
CO3	2	2	3	3	3	2	2	3	3	3	2.6
CO4	2	3	2	3	2	2	2	3	3	3	2.5
CO5	2	2	2	3	3	2	2	2	3	3	2.4
Average of CO's = 2.42(high)										

Strongly correlated -3 Moderately correlated -2 weakly correlated-1
 No correlation -0

2. PROGRAMMING IN C

COURSE OUTCOMES

On Successful completion of the course, the student will be able to

CO1: To define the structure of the programming language C

CO2: To explain the program writing and logical thinking skill.

CO3: An ability to incorporate exception handling in OOP

CO4: An ability to develop overloading operators

CO5: To compare the difference between function overloading and function

overriding

UNIT I   **6 Hours**

C Declarations –Introduction-Character Set-C tokens-Keywords and Identifiers-Constants-Variables- Data types- Declaration of Variables- Initializing Variables-Dynamic Initialization- Type Modifiers- Type Conversion- Constant And Volatile Variables

Operators and Expressions:- Introduction – Arithmetic Operators – Relational Operators – Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operator – Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Operator Precedence.

UNIT II   6 Hours

Input and Output in C: Introduction – Formatted Functions – Flags, widths andPrecision with Format String – Unformatted Functions – Commonly used Library functions. **Decision Statements :** Introduction – Simple IF statement – The IF…Else Statement – Nesting of IF…Else Statements – The ELSE IF ladder – The Break Statement – The Continue Statement - The Goto Statement – The Switch Statement.

Unit III   12 Hours

Loop Control:- Introduction –The WHILE Statement – The DO Statement – The FOR statement – Nested FOR Loops. **Arrays :-** Introduction – One-dimensional arrays

Declaration of One-dimensional arrays – Initialization of One-dimensional arrays –Array terminology -Two-dimensional arrays – Initialization of Two-

dimensional arrays.

Unit IV   6 Hours

Strings and Standard functions:- Introduction – Declaring and Initializing String Variables – Display of strings in different formats – String Standard functions – String Conversion Functions.

Unit V   6 Hours

Functions:- Introduction – Basics of a function - Function definition – The Return statement Types of functions – Call by Value and Reference – Function as an argument – Function with operators – function and decision statements – function andloop statements – functions with arrays.

Text Book:

Programming in ANSI C – 8th Edition by E Balagurusamy – McGraw Hill Publishing Company Limited.

Reference Book:

Programming in C – 3th Edition by Ashok Kamthane – Pearson Education Computer Basics and C Programming by V. Rajaraman – PHI Learning PrivateLimited Programming with C, Third Edition, Byron S Gottfried, McGraw HillEducation Private Limited.

LOCF MAPPING

Course code and title : **PROGRAMMING IN C**										
CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5	% of co's
CO1	3	2	3	2	2	2	3	3	2	2	2.4
CO2	3	3	3	2	2	3	3	3	2	2	2.6
CO3	2	3	3	2	2	2	3	3	2	2	2.4
CO4	2	2	2	3	3	2	2	3	3	3	2.5
CO5	2	2	3	3	3	2	2	3	3	2	2.5
									Average of CO's = 2.48(high)		

Strongly correlated -3 Moderately correlated -2 weakly correlated-1 No correlation -0

SEMESTER WISE COURSE LIST

SEMESTER I					
Semester	Course No.	Course type	Course Name	Contact Hrs./ Week	Credits
I	1	Core-1	Design and Analysis of Algorithms	5	4
	2	Core-2	Advanced Java Programming	5	4
	3	Core-3	Mathematical Foundation for Computer Science	4	4
	4	Core-4	Compiler Design	4	4
	5	Core - 5	Distributed operating system	4	4
	6	Core - 6 Practical - 1	Algorithm Lab	4	2
	7	Core - 7 Practical - 2	Advanced Java Lab	4	2
			Subtotal	30	24

SEMESTER II					
Semester (1)	Course No. (2)	Course Type (3)	Course Name (4)	Contact Hrs./ Week (5)	Credits (6)
II	8	Core- 8	Advanced Web Technology	5	4
	9	Core- 9	Machine Learning	5	4
	10	Core- 10	Advanced DBMS	4	4
	11	Core- 11	Cryptography and Network Security	4	4
	12	Elective– 1 (Select any one)	1.Free open source Software 2.Data Mining 3.Data Science and Big Data Analytics	4	3
	13	Core - 12 Practical - 3	Advanced Web Technology Lab	4	2
	14	Core - 13 Practical - 4	Machine Learning Lab using Python	4	2
			Subtotal	30	23

SEMESTER III					
Semester (1)	Course No. (2)	Course Type (3)	Course Name (4)	Contact Hrs./ Week (5)	Credits (6)

III	15	Core-14	Digital Image Processing	4	4
	16	Core-15	Soft Computing	4	4
	17	Core-16	Advanced Computer Networks	4	4
	18	Core-17	Research Methodology	4	4
	19	Elective - 2 (Select any one)	1. Cloud Computing 2. Mobile Computing 3. Optimization Technique	4	3
	20	Core - 18 Practical - 5	Digital Image Processing using Sci lab	4	2
	21	Core –19	Mini Project	6+2*	6
			Subtotal	**30**	**27**
IV	22	Core – 20	Major Project	30+2*	16
			Subtotal	**30**	**16**
			Cumulative total	**120**	**90**

Scheme of Examination / Question Paper Pattern I - Theory Course:

(Total Marks: 100 (Internal: 25 Marks, External: 75 Marks)

Parameters Student shall secure pass in both internal and external and also obtain 50 marks together to get a pass	
CIA- Internal Marks	**End semester Examination - External Marks**
i. Average of best two tests from three: 15 Marks ii. Seminar: 05 Marks iii. Assignment: 05 Marks ------------- Total : 25 Marks	Total : 75 Marks
Passing minimum 40% i.e. 10 marks	Passing minimum 50% i.e. 38 marks

Elective 1- (a) FREE OPEN SOURCE SOFTWARE   [C L T P 3 4 1 0]

Course Objectives:

➢ To familiarize fundamentals of the shell programming, pipes, input and output redirection Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts.

➢ To impart fundamentals of file concepts kernel support for file, File structure related system calls (file API's).

➢ To teach principles of operating system including File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking Commands, Basic Linux commands, Scripts and filters.

➢ To know the basics of algorithmic problem solving

➢ To read and write simple Python programs. To develop Python programs with conditionals and loops.

➢ To define Python functions and call them.

➢ To use Python data structures —- lists, tuples, dictionaries

Course Outcomes

CO1   Ability to use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.

CO2   Ability to write Shell Programming using Linux commands.

CO3   Ability to design and write application to manipulate internal kernel level Linux File System.

CO4   Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs.

CO5   Structure simple Python programs for solving problems.

CO6   Decompose a Python program into functions

Course Outline   **(Total   45 hours)**
UNIT 1: INTRODUCTION TO LINUX AND LINUX UTILITIES   **(9 hours)**

A brief history of LINUX - architecture of LINUX - features of LINUX - introduction to vi editor – Basic Linux commands- File handling utilities - Security by file permissions - process utilities - disk utilities - networking commands -Text Processing utilities and backup utilities.

UNIT - II INTRODUCTION TO SHELLS   **(9 hours)**

Linux Session - Standard Streams- Redirection – Pipes - Tee Command - Command Execution –

Command Line Editing - Quotes - Command Substitution - Job Control – Aliases - Variables - Predefined Variables – Options - Shell/Environment Customization - Filters: Filters and Pipes - Concatenating files - Display Beginning and End of files - Cut and Paste – Sorting - Translating Characters - Files with Duplicate Lines - Count Characters - Words or Lines - Comparing Files.

UNIT III – ALGORITHMIC PROBLEM SOLVING IN PYTHON (9 hours)

Algorithms, building blocks of algorithms (statements, state, control flow, functions) - notation (pseudo code, flow chart, programming language), algorithmic problem solving - simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list-insert a card in a list of sorted cards - guess an integer number in a range - Towers of Hanoi.

UNIT IV- EXPRESSION, STATEMENTS AND CONTROL STRUCTURES (9 hours)

Python interpreter and interactive mode - values and types - int, float, Boolean, string, and list; variables – expressions – statements - tuple assignment - precedence of operators - comments; modules and functions - function definition and use - flow of execution - parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables. Conditionals: Boolean values and operators - conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass.

UNIT V- FUNCTIONS (9 hours)

Fruitful functions: return values – parameters - local and global scope - function composition - recursion; Strings: string slices - immutability - string functions and methods - string module - Lists as arrays - Illustrative programs: square root, gcd, and exponentiation, sum an array of numbers, linear search, binary search. Files, Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Mapping of COs to POs and PSOs

Course Outcome	PO Addressed PO1 to PO7			Correlation Level L/M/H			PSO Addressed PSO1 to PSO7				Correlation Level L/ M/ H				Cognitive Level K_1 to K_6
CO1	PO1			H			PSO1				H				K_1, K_2
CO2	PO2		PO3	M		M	PSO2				M				K_3
CO3	PO4		PO7	M	M		PSO2,	PSO3	PSO4		M	M	M		K_4, K_5
CO4	PO4	PO5	PO7	M	M	M	PSO2,	PSO3	PSO4		M		M	M	K_4, K_5
CO5	PO5		PO7	M		M	PSO4	PSO5	PSO6		H	H	H		K_5
CO6	PO2,	PO5	PO6	M	M	M	PSO4,	PSO5	PSO6	PSO7	M		M	M	M	K_6

(L – Low, M – Medium, H – High; K_1 – Remember, K_2 – Understand, K_3– Apply, K_4– Analyze, K_5–Evaluate, K_6– Create)

Text and Reference books

- W. Richard. Stevens (2005), Advanced Programming in the UNIX Environment, 3rd edition, Pearson Education, New Delhi, India.
- Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson
- Allen B. Downey, "Think Python: How to Think like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
- Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
- Charles Dier bach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
- Gowri shankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

Elective 1- (b) DATA MINING [C L T P 3 4 1 0]

Course Objectives:
- ➢ Examine the types of the data to be mined.
- ➢ Explore and understand data mining algorithms.

Course Outcomes:

CO1: To evaluate various mining techniques on complex data objects

CO2: To develop applications using Data Mining Tools.

CO3: To develop ability to design various algorithms based on data mining tools.

CO4: To develop further interest in research and design of new Data Mining techniques

Course Outline **(Total 45 hours)**

UNIT-1 **(9 hours)**

Data Mining and Data Preprocessing: Data Mining – Motivation – Definition – Data Mining on what Kind of Data –Functionalities – Classification – Data Mining Task Primitives – Major Issues in Data Mining .Data Preprocessing – Definition – Data Cleaning – Integration - Transformation – Data Reduction.

UNIT – II **(9 hours)**

Data Warehousing: Definition -Data Warehouse Architecture- Multidimensional Data Model. Frequent Patterns, Associations: Market basket analysis - Association Rule, Support and Confidence - apriori algorithm - Generating association rule from frequent itemset - Mining frequent item sets without candidate generation (FP- growth) - Overview of multilevel association rule - Multidimensional association rule- - closed item set - maximal item set.

UNIT – III **(9 hours)**

Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbor – Other Classification Methods.

UNIT – IV **(9 hours)**

Cluster Analysis: Definition – Types of data in Cluster Analysis – Categorization of major Clustering Techniques – Partitioning Methods – Hierarchical Clustering – BIRCH - ROCK – Grid Based Methods – Model Based Clustering Methods – Outlier Analysis.

UNIT – V **(9 hours)**

Spatial, Multimedia, Text and Web Data: Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining. Data mining tool – Orange Tool.

Mapping of COs to POs and PSOs

Course Outcome	PO Addressed PO1 to PO7			Correlation Level L/M/H		PSO Addressed PSO1 to PSO7			Correlation Level L/ M/ H			Cognitive Level K_1 to K_6
CO1	PO1			H		PSO1			H			K_1, K_2
CO2	PO2		PO3	M	M	PSO2			M			K_3
CO3	PO4		PO7	M	M	PSO2,	PSO3	PSO4	M	M	M	K_4, K_5
CO4	PO4	PO5	PO7	M	M	M	PSO2,	PSO3	PSO4	M	M	M	K_4, K_5

(L – Low, M – Medium, H – High; K_1 – Remember, K_2 – Understand, K_3– Apply, K_4– Analyze, K_5–Evaluate, K_6– Create)

Text and Reference books

1. Jiawei Han and Micheline Kambar, — "Data Mining Concepts and Technique:", Second Edition, Elsevier, Reprinted 2008.
2. Marget H. Dunham, — "Data Mining Introductory and Advanced Concepts" Pearson Education 2003.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, - "Introduction to Data Mining", Pearson Education, 2007.
4. G.K. Gupta, - "Introduction to Data Mining with Case Studies", 3rd Edition, PHI, 2015.
5. http://www.celta.paris-sorbonne.fr/anasem/papers/miscelanea/InteractiveDataMining.pdf

Elective 1- (c) DATA SCIENCE & BIG DATA ANALYTICS   [C L T P 3 3 1 0]

Course Objectives:

- ➢ To know the fundamental concepts of big data and analytics.
- ➢ To explore tools and practices for working with big data
- ➢ To learn about stream computing.
- ➢ To know about the research that requires the integration of large amounts of data.

Course Outcomes:

CO1:   Work with big data tools and its analysis techniques

CO2:   Design efficient algorithms for mining the data from large volumes

CO3:   Design an efficient recommendation system

CO4:   Design the tools for visualization

CO5:   Learn NoSQL databases and management.

Course Outline: *total 45 hours*

UNIT-1 INTRODUCTION   (9 hours)

Introduction to Big Data Analytics : Big Data Overview – Data Structures – Analyst Perspective on Data Repositories - State of the Practice in Analytics – BI Versus Data Science - Current Analytical Architecture – Drivers of Big Data – Big Data Ecosystem - Data Analytics Lifecycle – Data Discovery – Data Preparation – Model Planning – Model Building – Communicate Results – Operationalize.

UNIT – II DATA ANALYTIC METHODS   (9 hours)
Basic Data Analytic Methods Using R : Introduction to R programming – R Graphical User Interfaces – Data Import and Export Attribute and Data Types – Descriptive Statistics Exploratory Data Analysis : Visualization Befor Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables Data Exploration Versus Presentation -– Statistical Methods of Evaluation : Hypothesis Testing – Difference of Means – Wilcoxon Rank-Sum Test – Type I and Type II Errors – Power and Sample Size – ANOVA.

UNIT – III ADVANCED METHODS **(9 hours)**

Advanced Analytical Theory and Methods: Clustering – K Means – Use Cases – Overview – Determining number of clusters – Diagnostics Reasons to choose and cautions – Additional Algorithms - Association Rules: A Priori Algorithm – Evaluation of Candidate Rules Applications of Association Rules – Validation and Testing – Diagnostics. Regression: Linear Regression and Logistic Regression: – Use cases – Model Description – Diagnostics - Additional Regression Models.

UNIT – IV CLASSIFICATION **(9 hours)**

Classification : Decision Trees – Overview – Genetic Algorithm – Decision Tree Algorithms – Evaluating Decision Tree – Decision Trees in R - Na'ive Bayes – Bayes Theorem – Naïve Bayes Clasifier – Smoothing – Diagnostics – Naïve Bayes in R – Diagnostics of Classifiers – Additional Classification Methods - Time Series Analysis : Overview – Box – Jenkins Methodology – ARIMA Model – Autocorrelation Function – Autoregressive Models – Moving Average Models – ARMA and ARIMA Models – Building and Evaluating and ARIMA Model - Text Analysis :Text Analysis Steps – Example – Collecting – Representing Term Frequency – Categorizing – Determining Sentiments – Gaining Insights.

UNIT – V TECHNOLOGY **(9 hours)**

Advanced Analytics-Technology and Tools:MapReduce and Hadoop: Analytics for Unstructured Data .- UseCases - MapReduce - Apache Hadoop – The Hadoop Ecosystem – pig – Hive – Hbase – Manout – NoSQL - Tools in Database Analytics : SQL Essentials – Joins – Set operations – Grouping Extensions – In Database Text Analysis - Advanced SQL – Windows Functions – User Defined Functions and Aggregates – ordered aggregates- MADiib – Analytics Reports Consolidation – Communicating and operationalizing and Analytics Project – Creating the Final Deliverables : Developing Core Material for Multiple Audiences – Project Goals – Main Findings – Approach Model Description – Key points support with Data - Model details – Recommendations – Data Visualization

Mapping of COs to POs and PSOs

Course Outcome	PO Addressed PO1 to PO7			Correlation Level L/M/H		PSO Addressed PSO1 to PSO7			Correlation Level L/ M/ H			Cognitive Level K_1 to K_6
CO1	PO1			H		PSO1			H			K_1, K_2
CO2	PO2	PO3		M	M	PSO2			M			K_3
CO3	PO4	PO7		M	M	PSO2,	PSO3	PSO4	M	M	M	K_4, K_5
CO4	PO4	PO5	PO7	M	M	M	PSO2,	PSO3	PSO4	M	M	M	K_4, K_5
CO5	PO5	PO7		M	M	PSO4	PSO5	PSO6	H	H	H	K_5

(L – Low, M – Medium, H – High; K_1 – Remember, K_2 – Understand, K_3 – Apply, K_4 – Analyze, K_5 – Evaluate, K_6 – Create)

Text and Reference books

1. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", EMC Education Services Published by John Wiley & Sons,
2. Noreen Burlingame , "The little book on Big Data", New Street publishers, 2012.
3. Anil Maheshwari, " Data Analytics", McGraw Hill Education, 2017.
4. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.
5. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
6. DietmarJannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.
7. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.

Elective - 2 (a) CLOUD COMPUTING   [C L T P 3 3 1 0]

Course Objectives:

➢ To understand the concept of cloud computing.
➢ To appreciate the evolution of cloud from the existing technologies.
➢ To have knowledge on the various issues in cloud computing.
➢ To be familiar with the lead players in cloud.
➢ To appreciate the emergence of cloud as the next generation computing paradigm.

Course Outcomes:

At the end of the course, the student will be able to

CO1	:	Interpret the key dimensions of the challenges of Cloud Computing
CO2	:	Examine the economics, financial, and technological implications for selecting cloud computing for own organization
CO3	:	Assessing the technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications
CO4	:	Evaluate own organizations' needs for capacity building and training in cloud computing-related IT areas
CO5	:	Illustrate Virtualization for Data-Centre Automation

Course Outline: **(Total 45 hours)**

UNIT-1 INTRODUCTION   *(9 hours)*
Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing –
Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in
Cloud – On-demand Provisioning.

UNIT – II CLOUD ENABLING TECHNOLOGIES   *(9 hours)*
Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-
Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of
Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU –
Memory – I/O Devices –Virtualization Support and Disaster Recovery.

UNIT – III CLOUD ARCHITECTURE, SERVICES AND STORAGE   *(9 hours)*

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public,
Private and Hybrid Clouds – laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage
– Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT – IV   RESOURCE MANAGEMENT AND SECURITY IN CLOUD   *(9 hours)*
Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods
– Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges –

Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

UNIT – V   CLOUD TECHNOLOGIES AND ADVANCEMENTS   *(9 hours)*

Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine —— Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

Mapping of COs to POs and PSOs

Course Outcome	PO Addressed PO1 to PO8		Correlation Level L/M/H		PSO Addressed PSO1 to PSO8		Correlation Level L/ M/ H		Cognitive Level K_1 to K_6
CO1	PO1		H		PSO1		L		K_1, K_2
CO2	PO2		L		PSO4		M		K_3
CO3	PO3	PO4	M	M	PSO4	PSO5	M	M	K_3, K_4
CO4	PO3		H		PSO4		M		K_5
CO5	PO6		H		PSO6		H		K_5

(L – Low, M – Medium, H – High); K_1 – Remember, K_2 – Understand, K_3 – Apply, K_4 – Analyze, K_5 –Evaluate, K_6 – Create

Text and Reference books

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017.
3. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.

Elective - 2 (b) MOBILE COMPUTING   [C L T P 4 3 1 0]

Course Objectives:

- To learn the fundamental technologies that help in the networking of wireless devices.
- To learn about different wireless technologies
- To learn about the evolution of cellular systems
- To understand the various wireless standards

Course Outcomes:

At the end of the course, the student will be able to

CO1 : Describe what Mobile Computing is and how it works today

CO2 : Recognize the factors that contributed to the emergence of Mobile Computing

CO3 : Able to Understand different mobile application paradigms

CO4 :Apply different protocols for mobile communication

CO5 : Define and identify infrastructure requirement for Mobile Applications

CO6 :Ability to conceptualize new ideas and present them as intellectual property

Course Outline   *(Total 45 hours)*

UNIT-1   *(9 hours)*

Introduction: Mobility of bits and bytes–Mobile Device Profiles-Wireless the beginning–Mobile Computing–Dialogue control–Networks–Middle ware and gateways–Applications and services–Developing mobile computing applications. Mobile Computing Architecture: Architecture of Mobile Computing – Three Tire Architecture –Design Consideration for mobile computing – Making existing applications to mobile enabled. Mobile Computing Through Telephony: Multiple Access procedure – Satellite Communication System- Mobile Computing Through Telephone–Developing an IVR Application –Voice XML– Telephony Application Program Interface-Multi Channel and Multi-mode user Interface-Developing Mobile GUI's – VUI's

UNIT – II   *(9 hours)*

Emerging Technologies: Introduction – Bluetooth – Radio Frequency Identification(RFID) – Wireless Broadband(WIMAX)– Mobile IP –Internet Protocol version6(IPV6). Global System for Mobile Communication: Introduction – GSM Architecture and Services– GSM Entities –Call Routing in GSM – PLMN interface – GSM addresses and identifiers – Network Aspects in GSM – Mobility Management – GSM frequency allocation – Personal Communication service – Authentication and Security. Short Message Service: Mobile Computing over SMS - Short Message Service (SMS) – SMS Architecture-Value added Services through SMS– Accessing the SMS bearer.

UNIT – III *(9 hours)*

General Packet Radio Service (GPRS): Introduction – GPRS and Packet data Networking –GPRS Network Architecture - GPRS Network Operations – Data Services in GPRS – Applications for GPRS–Limitations of GPRS– Billing and Charging in GPRS– Enhanced Data rate for GSM Evaluation (EDGE).Wireless Application Protocol: Introduction–WAP–MMS –GPRS Applications. CDMA and 3G: Introduction – Spread Spectrum Technology – IS-95 – Wireless Data – Third Generation Networks–Applications of 3G.

UNIT – IV *(9 hours)*

Wireless Networks: Wireless Network and Topology-Cellular Telephony-Wireless Transmission and Wireless LAN - Wireless LAN Advantages–IEEE802.11Standards–Wireless LAN Architecture – Mobility in Wireless LAN – Deploying Wireless LAN – Mobile Adhoc Networks and Sensor Networks – MAC Protocol-Routing Protocol-Transport Layer Protocol – QOS - Dynamic Linking and Services-Communication via Web-Wireless LAN security – Wireless Access in Vehicular Environment –Wireless Local Loop– Hiper LAN–WIFI versus 3G. Intelligent Networks and Interworking: Fundamentals of Call Processing – Intelligence in the Networks – SS#7 Signaling – IN Conceptual Model (INCM) – Soft switch – Programmable Networks– Technologies and Interfaces for IN .Client Programming: Mobile Phones–Features of Mobile phones–PDA–Design constraints in Applications for Handheld devices– Recent Developments in Client Technology.

UNIT – V *(9 hours)*

Programming for the PALM OS: History of PALM OS–PALM OS architecture–Application Development– Communication in PALM OS– Multimedia. Wireless Devices with Symbian OS: Introduction to Symbian OS- Symbian OS Architecture –Security on Symbian OS. Security Issues in Mobile Computing: Information Security– Web Security-Security Techniques and Algorithms – Security Protocols– Public Key Infrastructure.

Mapping of COs to POs and PSOs

Course Outcome	PO Addressed PO1 to PO7		Correlation Level L/M/H		PSO Addressed PSO1 to PSO7		Correlation Level L/ M/ H		Cognitive Level K_1 to K_6
CO1	PO1		M		PSO2		M		K_1, K_2
CO2	PO1	PO2	M	H	PSO2		H		K_1
CO3	PO3	PO4	M	L	PSO2		M		K_2
CO4	PO3		H	M	PSO4	PSO2	M	L	K_2
CO5	PO5		M		PSO4		M		K_3
CO6	PO6	PO7	M	M	PSO5		M		K_5

(L – Low, M – Medium, H – High); K_1 – Remember, K_2 – Understand, K_3 – Apply, K_4 – Analyze, K_5–Evaluate, K_6 – Create

Text and Reference books

1. AsokeKTalukder, Hasan Ahmed and RoopaRyavagal, "Mobile Computing:Technology, Applications and Service Creation", Second Edition , TMH,2010
2. Jochen Schiller, "Mobile Communications",Second Edition, Pearson Education, 2012
3. T.G. Palanivelu, R. Nakkeeran, Wireless and Mobile Communication, PHI Learning Private Limited, 2009
4. Raj Kamal, "Mobile Computing" ,Second Edition, Oxford University Press, 2012
5. William Stallings, "Wireless Communication and Networks", Pearson Education Asia,2002
6. C.Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks –Architectures and Protocols", 2nd Edition, Pearson Education.2004
7. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw-Hill, 2005.
8. JochenBurkhardt, Dr. HorstHenn, Klaus Rintdoff, Thomas Schack, "Pervasive Computing", Pearson, 2009.

Elective - 2 (c)   OPTIMIZATION TECHNIQUES   [C L T P 3 3 1 0]

Course Objectives:

- To get the basic knowledge of Optimization Techniques.
- To study the measurement and scaling techniques.
- To learn about Assignment Problems.

Course Outcomes:

At the end of the course, the student will be able to

CO1: Recognize the areas of problem solving that needs optimization methods
CO2: Describe and develop various optimization algorithms for real-world problems
CO3: Apply algorithms for optimizing mathematical problems and interpret results.
CO4: Identify appropriate problem solving technique based on problem's nature
CO5: Construct scientific research papers and present them in a seminar

Course Outline: **(Total 45 hours)**
UNIT-1 INTRODUCTION   *(9 hours)*

Statement of an optimization problems – classification of optimization problem – classical optimization techniques; Single variable optimizations, Multi variable optimization, equality constrains, inequality constraints, No constraints.

UNIT – II LINEAR PROGRAMMING   *(9 hours)*
Graphical method for two dimensional problems – central problems of Linear Programming – Definitions – Simples – Algorithm – Phase I and II of simplex Method – Revised Simplex Method. Simplex Multipliers – Dual and Primal – Dual Simplex Method – Sensitivity Analysis – Transportation problem and its solution – Assignment problem and its solution – Assignment problem and its solution by Hungarian method – Karmakar's method – statement, Conversion of the Linear Programming problem into the required form, Algorithm.

UNIT – III NON LINEAR PROGRAMMING   *(9 hours)*

NON LINEAR PROGRAMMING (ONE DIMENSIONAL MINIMIZATION: Introduction – Unrestricted search – Exhaustive search – interval halving method – Fibonacci method. NON LINEAR PROGRAMMING: (UNCONSTRAINED OPRIMIZATION): - Introduction– Random search method – Univariate method – Pattern search methods – Hooke and Jeeves method, simplex method-Gradient of a function – steepest descent method – Conjugate gradient method.

UNIT – IV   DYNAMIC PROGRAMMING   *(9 hours)*

Introduction – multistage decision processes – Principles of optimality – Computation procedures.

UNIT – V   DECISION MAKING   *(9 hours)*

Decisions under uncertainty, under certainty and under risk – Decision trees – Expected value of perfect information and imperfect information.

Mapping of COs to POs and PSOs

Course Outcome	PO Addressed PO1 to PO7	Correlation Level L/M/H	PSO Addressed PSO1 to PSO7	Correlation Level L/ M/ H	Cognitive Level K_1 to K_6
CO1	PO1	H	PSO1	H	K_1,
CO2	PO3	L	PSO4	M	K_5
CO3	PO4	M	PSO1	M	K_4
CO4	PO1	H	PSO1	H	K_1
CO5	PO7	M	PSO7	M	K_6

(L – Low, M – Medium, H – High); K_1 – Remember, K_2 – Understand, K_3 – Apply, K_4 – Analyze, K_5–Evaluate, K_6 – Create

Text and Reference books

1. Kalynamoy Deb, "Optimization for Engineering Design, Algorithms and Examples", Prentice Hall, 2004.
2. Hamdy A Taha, "Operations Research – An introduction", Pearson Education, 2002.
3. An Introduction to optimization Techniques by Vikrant Sharma, Vinod Kumar Jain, Atul Kumar April 20,2021 by Chapman and Hall/CRC
4. H.A. Taha, "Operation Research" Prentice Hall of India,2012

Common Course Structure for other UG Degree programmers in Science

B.Sc Zoology Major

(with effect from the academic year 2020-2021 onwards)

III	I	Language	Tamil/Other Language	1	6	4	25	75	100	30	40
	II	Language	English	1	6	4	25	75	100	30	40
	III	Core	Developmental Zoology	1	4	4	25	75	100	30	40
	III	Major Practical- III	Developmental Zoology	1	2	1	25	75	100	30	40
	III	II-Allied-I	Cell Biology, Genetics and Biotechnology / Industrial Fish and Fisheries-Biology of Fish	1	4	3	25	75	100	30	40
	III	II-Allied Practical- I	Cell Biology, Genetics and Biotechnology / Industrial Fish and Fisheries-Biology of Fish	1	2	1	50	50	100	20	40
	III	Skill Based-Core	(Any one) 1. Home Aquarium 2. Nutrition and Dietetics	1	4	4	25	75	100	30	40
	IV	Non- Major Elective	(Any one) 1. Bee Keeping 2. Clinical Biology	1	2	2	25	75	100	30	40
	IV	Common	YOGA*		2	2	25	75	100	30	40
			Sub total	**8**	**30**	**25**					
IV	I	Language	Tamil/Other Language	1	6	4	25	75	100	30	40
	II	Language	English	1	6	4	25	75	100	30	40
	III	Core	Cell and Molecular Biology	1	4	4	25	75	100	30	40
	III	Major Practical- IV	Cell and Molecular Biology	1	2	1	50	50	100	20	40
	III	II-Allied-II	Developmental Zoology, Ecology, Animal Physiology and Evolution / Industrial	1	4	3	25	75	100	30	40

	Part	Category	Title								
			Fish and Fisheries-Capture Fisheries								
	III	II-Allied Practical- II	Developmental Zoology, Ecology, Animal Physiology and Evolution / Industrial Fish and Fisheries-Capture Fisheries	1	2	1	50	50	100	20	40
	III	Skill Based -Core	(Any one) 1.Biophysics and Bioinstrumentation 2.Vermitechnology	1	4	4	25	75	100	30	40
	IV	Non- Major Elective	(Any one) 1. Public Health and Hygiene 2.Community and Social Preventive Medicine.	1	2	2	25	75	100	30	40
	V	Extension Activity	NCC/NSS/YRC/YW/PE			1	25	75	100	30	40
	IV	Common	Computer for Digital Era*			2	25	75	100	30	40
			Sub total	**8**	**30**	**26**					
V	III	Core	Ecology and Toxicology	1	5	4	25	75	100	30	40
	III	Core	Genetics	1	5	4	25	75	100	30	40
	III	Core	Animal Physiology and Biochemistry	1	5	4	25	75	100	30	40
	III	Core	Immunology and Microbiology	1	5	4	25	75	100	30	40
	III	Major Practical- V	Ecology and Toxicology and Genetics	1	3		50	50	100	20	40
	III	Major Practical- VI	Animal Physiology and Biochemistry	1	3	4	50	50	100	20	40
	III	Major Practical-VII	Immunology and Microbiology	1	2		50	50	100	20	40
	IV	Skill Based Common	Personality Development/ Effective Communication/ Youth	1	2	2	25	75	100	30	40

Common Course Structure for other UG Degree programmers in Science

B.Sc Zoology Major

(with effect from the academic year 2020-2021 onwards)

			Leadership								
			Sub total	**8**	**30**	**22**					
VI	III	Core	Evolution	1	5	4	25	75	100	30	40
	III	Core	Animal Biotechnology	1	5	4	25	75	100	30	40
	III	Core	Biostatistics, Computer Applications & Bioinformatics	1	5	4	25	75	100	30	40
	III	Major Elective	Group A (Any one) 1. Sericulture 2. Economic Entomology 3. Dairy farming	1	5	4	25	75	100	30	40
	III	Major Elective	Group B (Any one) 1. Apiculture 2. Food and Food Processing Technology 3. Poultry Science	1	4	4	25	75	100	30	40
	III	Major Practical-VIII	Evolution and Animal Biotechnology	1	2		50	50	100	20	40
	III	Major Practical- IX	Biostatistics, Computer Applications & Bioinformatics	1	2	4	50	50	100	20	40
	III	Major Elective Practical- X	Corresponding Major Electives	1	2		50	50	100	20	40
			Sub total	8	**30**	**24**					

SEMESTER III
PRACTICAL III: DEVELOPMENTAL ZOOLOGY

2Hrs / Week **Credits 1**

1. Mounting and Observation of live sperms of a vertebrate
2. Mounting and Observation of egg of a frog
3. Temporary mounting and Observation of chick embryo: 24, 48, 72 & 96 Hrs.
4. Museum specimens, Slides, Models and Charts

Sperm of a vertebrate, chick egg
Blastula and Gastrula of a vertebrate
Chick embryo – 24, 48, 72 & 96 Hrs
IUCD: Condom, Mala – D, Copper T.
Placenta in mammals: Discoidal, Cotyledonary, Zonary and Diffuse placenta.

SEMESTER III
(SKILL BASED CORE SUBJECT)- Any One
PART III - CORE PAPER: 3.2A- HOME AQUARIUM
4 Hrs / Week **Credits-4**

OBJECTIVES:
To understand the construction and maintenance of aquarium, selection, culture and breeding techniques**.**

OUTCOME:
To gain knowledge about the culture practices of aquarium fishes**.**

UNIT I
Construction of Home Aquarium.
Materials needed – Wooden and metal frames – Frameless tanks – Sealants and Gums.
Design and Construction of Public Freshwater and Marine Aquaria.
Aerators and Filters – Hand net and other equipment.
Water quality requirements – Temperature control and Lighting.
(13L)

UNIT II
 Setting up aquarium – gravel/pebbles – Plants – Ornamental objects and fishes – Selection. of species – Introducing fishes to the aquarium. Nutritional requirements of aquarium fishes.
Different kinds of feeds. Culture of food organisms. Preparation of dry feeds. Feeding methods
(11L)

UNIT III

Species of ornamental fishes – Taxonomy and biology of Gold fish, Guppies, Swordtails, Marine fishes – Angels and Butterfly fishes.

Fresh water species – live bearers and egg layers, one example each – Common Community fishes – Freshwater and marine, any two examples each.

(12L)

UNIT IV

Reproductive biology of gold fish and angel fish – Maturation, Secondary sexual characters, Breeding habits, Spawning, Parental care, Fertilization and Development of eggs. Common diseases of freshwater and marine aquarium fishes – Parasitic, Fungal, Bacterial- Symptoms – Treatment – Prevention and control.

(13L)

UNIT V

Fresh water plants – their taxonomy and morphology, any three of aquarium plants – provision of nutrient and optimum environmental condition for their growth.

Other Ornamental organisms – Anemones, Lobsters, Shrimps, Octopus, Star fishetc.,

(11L)

(TOTAL: 60L)

REFERENCE BOOKS: Home Aquarium

1.   Guide to tropical fish keeping, 1967, Braymer, J.H.P.ILiffe.
2.   Tropical Marine aquaria, 1974. Cox, J.F.Hamlyn.
3.   Tropical Fish: Setting up and maintaining fresh water and Marine aquaria,1972. Dussa Octopus BookLtd.
4.   Aquarium systems, 1981. Hawkins, A.S.(Ed.) Academicpress.
5.   Living Aquarium, 1981. Hunnam, P. WardLock.
6.   Aquarium Fishes and Plants, 1971, Rataj, K. and R. Zukal –Hamlyn.
7.   Ornamental Fish for Garden and Home Aquariums, 1956, R and C.P Home Aquariums.
8.   Sea Water Aquariums, 1979.Spotte, S. JohnWiley.
9.   Collins Guide to Aquarium Fishes and Plants, 1969.Schiotz, A.Collins.
10.   Complete Aquarium, 1963.Vogt,D. and H. WermuthThames.

(SKILL BASED CORE SUBJECT)- Any one
PART III - CORE PAPER: 3.2B -NUTRITION AND DIETETICS
4Hrs/Week   Credits-4

OBJECTIVES:

   To understand the importance of the various food stuffs on one side and to study malnutrition, Nutrition related diseases and special diets for persons suffering from diseases on the other side.

OUTCOME:

To understand the food we have to take and balanced diets to maintenance of health practices.

UNIT I

Macronutrients and their function – Carbohydrates – Fats – Proteins -Water.

Micronutrients and their function - Vitamins and Minerals.

Nutritive value of the foodstuff – Cereals – Pulses – Vegetables – Fruits – Milk – Egg – Meat – Fish.

(11L)

UNIT II

Parboiling of rice – process of parboiling and uses of parboiled rice.

Germination of cereals – process of germination and uses of sprouts & its nutritive value.

Metabolism of foodstuffs – protein, carbohydrate and lipid.

Food choice and preparation methods.

Effect of cooking on protein, carbohydrate and fat content.

Menu planning and meal pattern – vegetarian and non – vegetarian.

(13L)

UNIT III

Role of fibres innutrition.

      Determination of energy contents of food – Bomb calorimeter.

BMR – Determination of BMR – using direct calorimeter and Benedict Methods, Roth basal metabolic apparatus – Factors affecting BMR.

(11L)

UNIT IV

Balanced diet – Nutritional requirements of different age groups – Pre schoolers- schoolers – Adolescents – Pregnant, lactating women and aged people.

Nutritional diseases – causes and prevention and dietary management of malnutrition, under nutrition and obesity.

Common nutritional deficiency diseases in India – Kwashiorkor – Marasmas –Anaemia- Goitre.

(15L)

UNIT V

Therapeutic diet and its importance, diet planning.

Symptoms, causes, prevention and dietary management for diabetes mellitus, ulcer, renal diseases, hepatitis, hypertension, atherosclerosis, gastro-intestinal disorders, constipation.

(10L)

(TOTAL: 60L)

REFERENCE BOOKS: Nutrition and Dietetics

1.Ann Louise Gittleman. The Fat Flush Plan. Tata Mc Graw Hill Publishing Company

Limited,444/1,Sri EmbaraNaicker Industrial Estate, Alapakkam, Porur,Chennai

2 .Hellen Kowtaluk. Food for Today, Tata Mc Graw Hill Publishing Company Limited,
444/1,Sri EmbaraNaicker Industrial Estate, Alapakkam, Porur,Chennai

3. Shubhangini A. Joshi, Nutrition and Dietetics.T Tata Mc Graw Hill Publishing Company Limited, 444/1,Sri EmbaraNaicker Industrial Estate, Alapakkam, Porur,Chennai.

4. Swaminathan, M. Food Science, Chemistry andExperiment.
    Swaminathan, M. Principles of Nutrition and Dietetics.
    You and Your food and its utilization, Manuscript.IGNOU.

5. Rajalakshmi, R. Applied Nutrition.

6. Sumathi, R. Mudambi and M.V. Rajagopal. Fundamentals of Food andNutrition. 	
    Stanley Davidson, Passmore, R. Nutrition and Dietetics   Poggy, S., Stanfield. Nutrition and Diet therapy. Fergos Clydesdate, M. Food Nutrition And Health.

PART IV- PAPER: 3.3A- BEE KEEPING
(NON- MAJOR ELECTIVE) - Any One

2 Hrs/Week   **Credits-2**

OBJECTIVE:
To know the knowledge of rearing of honey bees and extraction of honey.
OUTCOME:
To encourage the students to develop self employment and keep apiary.

UNIT I
Comparative study of Rock bee, Indian bee, Little bee and Dammer bee – Life history of *Apis indica*. Queen, Drones and Workers – Identification, Salient features and Functions.
(6L)

UNIT II
Food of the bees – honey and pollen. Relationship of plants and bees. Arranging an apiary position – space – direction.
(6L)

UNIT III
Acquiring bees – Care of newly captured colonies. Architecture of bee comb- Different kinds of cells. Swarming - Dividing the colony- Applications- protection of colony from enemies.
(6L)

UNIT IV
Primitive hives – Different types. Advantages and disadvantages of primitive hives. Newton's bee hive and its architecture. Appliances used in Apiaries.
(6L)

UNIT V
Honey – Collection and Extraction of honey, preservation, storage, Physical properties, chemical composition, Nutritive value, medicinal values, Honey as Daily Food.
(6L)

(TOTAL: 30L)

REFERENCES: Bee Keeping

1.   Bee Keeping in India – Sardar Singh- KAR,Delhi.
2.   Bee keeping in South India – Cherian M.C. & Ramachandran, Govt.Press,Chennai.
3.   Handbook of bee keeping – Sharma P.L. & Singh S.,Chandigarh.
4.   Apiculture – J. Johnson and Jeyachandra, Marthandam, TamilNadu.

(NON-MAJOR ELECTIVE)- Any one
PART IV- PAPER: 3. 3B- CLINICALBIOLOGY
2Hrs/Week   **Credits-2**

OBJECTIVE:
To understand the methodology of collection, analysis and preservation of samples related to various diseases.
OUTCOME:
To understand various preventive measures

UNIT I
     Introduction- Normal and Abnormal conditions of body – Symptoms – Samples to be collected for analysis – diagnosis – Instruments used in the analysis - Sterilization .
(6L)

UNIT-II
Urine Analysis –Collection and preservation of sample and chemical estimation. Protein, Urea, Glycemia, sediments and casts, impaired renal function and clearance test..
(6L)

UNIT-III
Estimation of Gastro intestinal contents –Saliva constituents, Collection and estimation of Gastric juice, Secretion of liver, Duodenal contents and Pancreatic function tests.
 (6L)

UNIT-IV
      Clinical Haematology – Ways of obtaining blood, Haemoglobin estimation. Cell counting
      (DC/ TC), Estimation of Erythrocyte sedimentation test (ESR) ,pathological ,physiological and hereditary disorders, Blood banking, Blood grouping ,and typing ,Glucose Tolerance Test (GTT), Impaired Glucose Tolerance Test , Elisa test.
(7L)

UNIT-V
Fertility test-semen analysis and pregnancy test, RIA test- Agglutination test- Morphological variations – Types- Count and Abnormalities.
(5L)
(TOTAL: 30L)

REFERENCE BOOKS: Clinical Biology

1. Medical laboratory techniques-R.Sood
2. Text book of preventive medicine-J.E Park, Benansidar Bhalot
3. Introduction of medical laboratory technology-Baker, F.J.Silverton
4. Medical laboratory technology-Lynch.

SEMESTER IV
PART III -CORE PAPER : 4.2A -
BIOPHYSICS AND BIOINSTRUMENTATION
SKILL BASED CORE SUBJECTS (Any One)

4Hrs / Week   **Credits 4**

OBJECTIVES :
To know the methods of various instrumentations related to biological systems and functions.

OUTCOME:
To gain knowledge about the establishment of clinical laboratory and also useful for research purposes.

UNIT I
Biophysics – Scope and Method – Atoms – Molecules – Molecular Interactions – Chemical bonds – Primary chemical bonds – Secondary chemical bonds. Principles of Thermodynamics – Laws of Thermodynamics – Enthalpy – Entropy – Living systems and energy changes.
(12L)

UNIT II
Bioenergetics – Energy and Work – Energy Transformation – ATP – Bioenergetics – Structure of ATP – Formation of ATP – NADP – Structure – NADP / NADPH Redox couple – Mitochondrial bioenergetics – Chloroplast bioenergetics. Membrane Conductivity – Diffusion – Active transport – Osmosis – Electric conductivity.
(12L)

UNIT III
Photobiology – Nature of light and its properties – Absorption and Emission Spectra – action spectrum, Refractive index – Huyge's Principle – Polarized light – Solar radiation – UV – Infrared – De- excitation- Bioluminescence – Fluorescence – Phosphorescence.
(11L)

UNIT IV
Instrumentation – Microscopy – Principle and application of Electron Microscope. Basic Instruments – Principle and applications of pH meter and Colorimeter-Centrifugation – Principle and Types – Chromatography – Principle – Types – Paper, Ion exchange, HPLC and applications **(11L)**

UNIT V
Labelling Techniques: Isotopes, Radioactivity, Radioactive decay, half – life, autoradiography, biological use of radioactivity, Radioactivity Counter – Principle – Types – Geiger Muller – Scintillation Counter.
Electrophoresis – Principle – Types – Agarose Gel electrophoresis, Polyacrylamide gel – Sodium

Dodecyl Sulphate Polyacrylamide gel – Applications

PCR Technology: Working mechanism of PCR

Gel Doc. – Principle – Working mechanism – Lyophiliser – Pinciple – Working mechanism – applications.

(14L)

 (TOTAL: 60L)

REFERENCE BOOKS:
Biophysics and Bioinstrumentation

1. Saleel Bose: Elements of Biophysics.
2. Casey: Biophysics – Concepts & Mechanism.
3. Vasanthapattabhi N. Gautham: (Narosa publishing House) – Biophysics.
4. Jeyaraman, K. : Laboratoy Manual in Biochemistry. New Age International publishers.
5. Kalaichelvan, P.T: A Laboratory Manual, MJP Publishers,47, Nallathambi Street, Triplicane,Chennai 600 005.
6. Gurumani, N: Research Methodology for Biological Sciences.MJP 47, Nallathambi Street, Triplicane, Chennai 600 005.
7. Palanivelu, P.Analytical Biochemistry and Separation Techniques.A Laboratory Manual for B.SC and M.SC Students.Department of Molecular Biology,M.K.University, Madurai-625 021.
8. L.Veerakumari,Bioinstrumentation MJP Publishers,47, Nallathambi Street, Triplicane,Chennai 600 005

PART III
CORE PAPER: 4.2B-VERMITECHNOLOGY
SKILL BASED CORE SUBJECT-Any one
4Hrs / Week   **Credits-4**

OBJECTIVE:
To get a thorough knowledge of producing vermicompost and vermiculture
OUTCOME:
To encourage the self employment practices and save the human being and environment by the way of minimizing the use of chemical fertilizers.

UNIT I
Earthworm taxonomy – Morphological and anatomical – Classification of earthworms – Food habits – Digestive system – Excretion – Reproduction and Life cycle – Earthworm as farmer's friend.
(11L)

UNIT II
        Types of earthworm – Exotic and native species – South Indian and North Indian species used in Vermicomposting – Collection and Preservation of earthworms for vermicomposting – Culture techniques of earthworms.
(11L)

UNIT III
Vermicompost production – Requirements – Different methods of Vermicomposting – Heap method – Pot method and Tray method – changes during Vemicomposting.
 (11L)

UNIT IV
        Role of Earthworms in soil fertility – Use of Vermicompost for crop production – Use of earthworms in land improvement and land reclamation – Economics of Vermicompost and Vermiwash production. Earthworms are asanimal feed – Medicinal value of earthworm meal – Roles of Earthworms in Solid Waste, Sewage and faecal waste management and Vermifilters. Earthworm as a bioreactor.
 (15L)

UNIT V
        Interactions of earthworms with other organisms – Influence of chemical inputs on earthworm activities – Large scale manufacture of Vermicompost, packaging of vermicompost and its marketing – Financial supporting – Government and NGOs for vermiculture work.
 (12L)
 (TOTAL: 60L)

REFERENCE BOOKS:
Vermitechnology

1. Invertebrate Zoology – EkambaranathaAyyar.

2. Earthworm in Agriculture – S.C. Talashikar and Dosani, Agrobios Publications, Near Nasarani Cinema, Jodhpur, 342 002.

3. Vermicompost for sustainable Agriculture – P.K. Gupta Agrobios 2nd Edition.

4. Organic Farming for sustainable Agriculture – A.K.Dahama,Agrobios. 5.A Hand book of Organic farming – A.K.Sharma.Agrobios publication.

6. Earthworm ecology – Clive A. Edwards St. Lucie press – CRC Press Washington DC.

7. Biology of Earthworm - Edward and Lofti – Chapman and Hall Publication.

8. Vermicology – Sultan A. Ismail – Orient Longman Press.

9. Vermiculture Biotechnology – U.S. Bhawalkar BERI, PUNE

SEMESTER IV
PART IV
PAPER: 4.3A - PUBLIC HEALTH AND HYGIENE
NON -MAJOR ELECTIVE- (ANY ONE)

2 Hrs / Week **Credits 2**

OBJECTIVES
To understand the physical, mental and social health and also know the safer disposal of various wastes.

OUTCOME
To gain the knowledge about the preventive measures.

UNIT I
Physical, Mental,Social – Positive health – Quality of life Index. Nutrition and Health – Food hygiene – Food toxicants. Population explosion in India – Birth control measures.
(6L)

UNIT II
Environment and health – Water – Sources of water – Uses of water. Water borne diseases – Cholera – Ascariasis. Standards of Housing – Ventilation.
(6L)

UNIT III
Excreta disposal – Importance – Methods of excreta disposal. Sanitary health measures during fares and festivals. First aid with reference to accident.
(6L)

UNIT IV
Communicable disease – Viral diseases – AIDS, Rabies. Bacterial diseases – Tuberculosis, Typhoid. Protozoan diseases – Amoebiasis. Helminth diseases – Filariasis.
(6L)

UNIT V
Health situation in India – Health problems – Primary health care in India – PHC – National Programmes – National AIDS control – National Malaria Eradication Programme – National Tuberculosis.
(6L)
(TOTAL: 30L)

REFERENCE BOOKS:

Public Health and Hygiene

1. Anderson R.Cliford. Your Guide toHealth.

2. Basu, S.C. Preventive and SocialMedicine.

3. Goel, S.O.L. Public HealthAdministration.

4. Harold Shoryock and Hubert O. Swartout. You and Your Health illustratedDealing with   Diseases.

5. Park, K.Park"s Text Book of Preventive and Social Medicine.BanarsidasBhanot Publishers,1167 PremNager,Jabalpur – 482001.

6. Ramarao,   V.First   Aid   in   accidents.   Sri   Krishna   brothers, ThambuChettyStreet,Chennai.

7. Sanitarians Hand Book. Theory and Administrative Practice.PearlesPublications, New   Orleans, USA.

SEMESTER IV
PART IV
PAPER:4.3B – COMMUNITY AND SOCIAL PREVENTIVEMEDICINE
(NON- MAJOR ELECTIVE) –ANY ONE
2Hrs/Week **Credits 2**

OBJECTIVES:
To understand the knowledge of epidemic and endemic diseases
OUTCOME:
To gain the knowledge about the maintenance of hygienic conditions, various diseases and their preventive measures
UNIT-I
Community and Health
Meaning and concept- Biomedical, Ecological, Psychological, Social and Holistic. Determinants of health& Indicators of health. Concept of community health, Role of primary health centers. **(6L)**
UNIT-II
Drug Addiction:
In India today –incidence among college students-common drugs in vogue-their side effects, control and management of drug addiction.
Alcoholism:
Its effect on various organs like heart, lungs, liver, pancreas, brain and intestine-chronic alcoholism – alcoholic withdrawal syndrome - its control and treatment.
 (6L)
UNIT-III
Sexually transmitted diseases:
Gonorrhoea- Syphilils – AIDS - Causative agent, causes - symptoms-diagnosis - treatment and control measures.
(6L)
UNIT-IV
Child abuse:
Definition-causes-effects- protection and Legal measures for eradication – remedial measures.
 (6L)
UNIT-V
Problems of old age:
Concept of ageing. Housing and health care of the aged. Problems – Cardiovascular - alimentary –Locomotion and joints-welfare service provided to the aged by the Government.
 (6L)
 (TOTAL: 30L)
.

REFERENCE BOOKS:
Community and Social Preventive Medicine
1.Social Problems in India – Ram Akuja.
2.Social Preventive Medicine – Park& Park.
3.Ageing and Aged – Paul Chowthry.
4.Indian Social Problem –G.R. Madan

SEMESTER VI

MAJOR ELECTIVE
(Any One)
ELECTIVE PAPER: 6.4A -SERICULTURE

5Hrs/Week   **Credits-4**

OBJECTIVES:

To explore the scope for students adopting Sericulture as a vocation after their graduation
as it is rural based and welfare oriented agro based industry.

OUTCOME:

Students learned how to rear, maintain the silk wormsscientifically and know
the reeling of silk.

UNIT I

Importance of Sericulture: Sericulture industry in India- Sericulture as cottage industry, role
of Central Silk Board, Moriculture: Morphology of Mulberry plant- High yielding varieties –
methods of propagation- irrigation. Manuring: Biofertilizers – Green manuring – Triacontanol for
increased mulberry productivity – Seriboost. Pruning- Harvesting and storing of mulberry leaves-
Package of practices for mulberry cultivation. **(15L)**

UNIT II

Diseases of mulberry: Fungal diseases – fungal root diseases, fungal shoot diseases;
Bacterial diseases – leaf blight disease, rot disease; Viral diseases – mulberry leaf mosaic disease,
dawn disease; Neamatode diseases: root knot disease; Deficiency diseases: nitrogen deficiency,
phosphorus deficiency, potassium deficiency, magnesium deficiency and calcium deficiency
diseases; Pests of mulberry – leaf eating insect pests and borer pests one example each.
(15L)

UNIT III

Silkworm: Classification of Mulberry silkworm- habit and habitats; Voltinism- races of
silkworms; Life cycle- Structure of egg- larva- pupa and adult- Sexual dimorphism. Digestive
system- circulatory system- excretory system- respiratory system, nervous system and reproductive
system, endocrine glands - other glands of Silkworm.
 (15L)

UNIT IV

Rearing of Silkworm: Rearing house – Rearing appliances. Rearing operation: Disinfection –
Brushing – Maintenance of optimum conditions, Feeding – Bed cleaning – Spacing. Methods of
Rearing; Young age worms – Chawki rearing - Rearing of late age larva-Types;Shelf rearing.
Floor rearing, Shoot rearing- Application of Sampoorna. Mounting: Mountages- Methods –
Precautions. Cocoon marketing: Characteristics of cocoon – defective cocoons – methods of
harvesting.
(15L)

UNIT V

Diseases of silkworms; Protozoan diseaes – Pebrine; Viral diseases – Flacherie, Gattine, Grasserie; Bacterial diseases – Flacherie, Septicemia, Sotto, Court, Fungal diseases – Muscardine. Pests: Uzy fly, Dermestid beetle of silkworm. Silk reeling: Cocoon stifling – types- storage of stifled cocoons-sorting- cocoon boiling and deflossing – brushing, Process of reeling: Different methods- silk waste and byproducts of silk reeling- Raw silk and marketing.

(15L)

(TOTAL: 75L)

REFERENCE BOOKS:

1. Ganga, G. and I. Sulochana Chetty, An introduction to Sericulture. Oxford & IBH Publishing Company Private Limited, S -155,Panchshila Park, New Delhi.
2. Ganga,G. Comprehensive Sericulture, Volume – 2 Silkworm Rearing and Silk Realing. Oxford & IBH Publishing Company Private Limited, S -155, Panchshila Park,New Delhi.
3. Dandin, S.B, Jayant Jayaswal and K. Giridhas, Hand Book of Sericultural Technologies, Central Silk Board, Madivala, Bangalore –68.
4. Kamile Afifa. S and Masoodi M. Amin, Principles of Temperate Sericulture,Kalyani Publishers, B – 1/1292,Rajinder Nagar, Ludhians.
   Kesary, M and M.Johnson, Sericulture, Department of Zoology, N.M.. Christian College, Marthandam

PRACTICALS:

1. Dissection of silk glands, digestive and nervous systems.
2. Dissection of male and female reproductive system.
3. Selection of mulberry leaves according to different stages.
4. Life history – egg, larva, pupa and adult.
5. Sexual dimorphism in larva, pupa and adult.
6. Mulberry varieties such as MR2, S30, S36,V2.
7. Chandrika.
8. Rearing tray and rearing stand.
9. Raw silk.
10. Report on field visit to Sericulture farm/ unit.

.

MAJOR ELECTIVE
ELECTIVE PAPER: 6.4B -ECONOMIC ENTOMOLOGY
5Hrs/Week   **Credits-4**

OBJECTIVES:
To understand the role of insects in the ecosystem and their beneficial
and harmful impacts on the society and plants.
OUTCOME
Students learned about the beneficial and harmful insects.
UNIT I
Structure and salient features
Brief account of external morphology of head, thorax and abdomen; Classification and development (metamorphosis) of insects; Salient features (up to order) and economic important of Thysanura, Orthoptera, Odonata, Thysanoptera, Isoptera, Coleoptera, Lepidoptera, Hemiptera, Diptera, Hymenoptera, Dermaptera
(15L)

UNIT II
Productive insects
Sericulture- Types of Silkworm, Life cycle and rearing of mulberry silkworm, *Bombyxmori*; Economic importance of silkworms
Apiculture – Types of honey bees, Life cycle and culture methods, bee product and its economic importance
Lac culture – Lac insect, *Lacciferlacca*- Life cycle, Lac processing, Lac products and Economic importance.
(15L)

UNIT III
Beneficial insects
Biological control agents – Characters and different between parasitoids and predators (common Indian insects); General characters and beneficial role of scavengers, pollinators, weed killers; Medicinal and Aesthetic value of insects; Insect as human food (general account only)..
(15L)

UNIT IV
Insects of medical importance
General account on Personal Pests(Lice, Fleas, Bedbugs, Ticks, Scabies mites), Housefly, Cockroach, Biting insects(Mosquitoes, Biting Midges, Sand flies, Black flies, Horse flies, Stable flies).Major insect-born disease and their management; Recent development in Forensic entomology..
(15L)

UNIT V

Pest management

Components of Pest control – physical, mechanical, cultural, chemical and biological control; Pesticide applicators; Pesticide poisoning and first aids; Banned pesticides; General Principles, advantages and disadvantages of Integrated Pest Management; Recent advances in pest control – sterilization techniques, liquid vaporizers, pheromones, RNA interferences, kairomones.

(15L)

(TOTAL: 75L)

REFERENCES BOOKS

1. Abhishek Shkula, 2009. A Handbook on Economic Entomology, Daya Publishing House, India
2. Ganga, G. &SulochanaChetty, J. 1997. An introduction to Sericulture. Oxford & IBH Publ. Co. pvt. Ltd., India.
3. David,B.V.& Ramamurthy, V.V. 2016. Elements of Economic Entomology, 8th Edition, Brillion Publishing, India.

PRACTICALS:

1. Head sclerites, thoracic segments, abdominal segments of cockroach
2. Types of antennae. Filiform, Moniliform, Aristate, Capitate, Clavate, Clubbed, Plumose, Pilose, Pectinate, Bipectinate, Setaceous and Geniculate, Lamellate, Serrate. (Any two mountings and rest for study with photo/permanent slides) (Preferablypests)
3. Halter and wings of housefly
4. Types of legs- Typical, Cursorial, Fossorial, Saltatory, Natatorial and Scansorial (Mountings of any two and rest for study with photo/permanentslides).
5. Abdominal appendages- styles, cerci of cockroach.
6. Mouthparts of Cockroach.
7. Malpighian tubules (Cockroach).
8. Collection, preservationanddisplayof5insecttypes (collection and preservation of insects other than pests be discouraged).
9. Common Insecticide formulations (display of samples).
10. Field visit / Assignment / Play and ponder. Give actual handling of bees/ silk moth / lac insect or visit to any one of these units.

SEMESTER VI
MAJOR   ELECTIVE
ELECTIVE PAPER: 6.4 C- DAIRY   FARMING

5 Hrs/Week   **Credits-4**

OBJECTIVES:

To introduce various breeds of Indian cows

To describe construction, maintenance of sheds and also introduce the growing and maintenance of dairy animals

To describe how to prevent and manage various diseases of airy animals

OUTCOME :

Students learned about selection, growing and maintenance of dairy animals

UNIT I

Importance of the study: Live stock in India – Live stock reproduction – Organs – Fertilization – Artificial Insemination – Inheritance – Hybrids – Hybrid Vigor – Grading – Pure breeds – Inbreeding. **(15L)**

UNIT II

Nutrition – Nutritive values of common feeds – Commercial and mixed feeds – Balance ration. **(15L)**

UNIT III

Dairy animals – Cattle – Cow – Buffaloes – Goat – Their economic importance – Productivity. **(15L)**

UNIT IV

Live stock diseases – Common parasites in India – Treatment. **(15L)**

UNIT V

Marketing the dairy products – Milk and other dairy products – Nutritive values of fresh and preserved products – Combating spoilage of milk – Souring – Gassy Curdling – Robiness – Sweet curdling – Pasteurization. **(15L)**

(TOTAL:75L)

REFERENCE BOOKS:

1.   Principles of Dairy Chemistry. Janness, Robert and Sturte Patton; WielyEastern.

2.   Artificial Insemination in Farm animals: Perry Enos (Eds.) Oxford &IBH.

3.   Breeding and Improvement of Farm animals: Rice, Victor, Arthur; Tata MCGraw Hill.

4.   Livestock and Poultry Production: Singh, Herbans and Earl Moore; Prentice Hallin India.

PRACTICALS:

1.   Visit to Pasteurization plant and reporting.
2.   On the spot tests of pure milk – Specific gravity, total solids and adulteration of milk.
3.   Demonstration of Dairy products – Cream, Butter, Ghee, Khoa, and Ice cream.
4.   Identification of cattle diseases – Prevention and Cure-Method of taking temperature in cows.
5.   Preparation of Cattle Feed-Balanced food – Identification of different feed plants.
6.   Artificial Insemination – Common Surgical Instruments and their uses.
7.   Periodical visit to a Good Dairy Farm and Reporting.

MAJOR ELECTIVE (GROUP B)
(ANY ONE)
ELECTIVE PAPER: 6.5A -APICULTURE

4 Hrs. / Week   **Credits-4**

OBJECTIVES:

        To examine the scope for self employment opportunities after their graduation account of the rural based and welfare oriented nature of this vocation.

OUTCOME:

        Students learned about selection, rearing and maintenance of apiary.

UNIT I

Definition, Scope, Classification of bees, Rock bee, Indian bee, Little bee and Dammer bee- their identification and habits, choice of species in Apiculture.

Bee colony-Distinctive features, Identification and Functions of queen, drones and workers, Structure and functions of Legs, mouth parts and sting of worker bee.

Development of Honey bee-egg, larva and pupa- time taken for the development of queen, drone and worker. Food of the bee- honey and pollen-royal jelly.

Artificial feeding. Behaviour of bees-dances.

(12L)

UNIT II

Principles of Apiculture: Arranging an Apiary- position-space- direction- acquiring bees-care of newly captured colonies-handling the bees.

Bee keeping: Primitive methods and their advantages and disadvantages.

Different types of Modern hives – Architecture - Parts of artificial hive and its advantages –
other appliances used in apiaries.

The bee comb and its architecture-Different kinds of cells-Burr comb.

(12L)

UNIT III

Honey bee products:

Honey- Collection and Extraction, Preservation and storage –Physical properties, Chemical composition, nutritive value, medicinal values-honey as daily food.

Bee wax- Production - method of extraction-characteristics and uses.

Bee venom-method of collection - composition of venom- its uses.

(12L)

<u>**UNIT IV**</u>

Enemies of bees-Greater wax moth, lesser wax moth, ants, wasps, lice, beetles, birds and their management.

Diseases of bees-adult and brood diseases- Bacterial, Fungal, Viral & Protozoan- Prevention and Control measures.

(12L)

UNIT V

Swarming-Prevention and control.

Robbing and Fighting-Prevention and control. Uniting stocks-Different methods. Queen rearing.

Supersedure.

Foraging, inter-relationships of plants and bees.

(12L)

 (TOTAL: 60L)

REFERENCE BOOKS:

1. Mishra,R.C. and R. Garg. Perspectives in Indian Apiculture. Agrobios (India)behind Nasrani Cinema, Chopasani Road, Jodhpur-342002.
2. Abrol,D.P. Bee Keeping in India. Kalyani Publishers, B-1/1292, Rajinder Nagar,Ludhiana-141 008.
3. Cherian, M.C. and Ramachandran. Bee Keeping in SouthIndia.
4. Philips, E.F. Bee Keeping,Agrobios (India) behind NasraniCinema,Chopasani Road,Jodhpur-342 002.
5. Sadar Singh, Bee Keeping in India KarDelhi.
6. Sharma P.L and Singh, S.(controller) Hand Book of bee Keeping, printingandStationery,Chandigarh.
7. Webb,A. Bee Keeping for profit and Pleasure, Agrobios (India), Behind Nasrani Cinema, Chopasani Road, Jodhpur-342002

PRACTICALS

1. Mountings of Legs, mouth parts and sting.
2. Specimen, Model, Slide and Appliances
   Queen, worker, Drone, Artificial hive, Queen excluder, smoker, honey extractor, honey,
   Bee comb and Comb foundation sheet.
3. Report on field visit to Apiary farm/ unit.

SEMESTER VI
MAJOR ELECTIVE
ELECTIVE PAPER: 6.5B - FOOD AND FOOD PROCESSINGTECHNOLOGY
4Hrs/ week   **Credits-4**

OBJECTIVES:
        To understand the physical and chemical properties of food stuff, the methods of preparation of palatable diets and the techniques employed to increase their shelf – life.
OUTCOME
        Understood various value added food products and their marketing strategies

UNIT I: FOOD CHEMISTRY
        Food chemistry: Definition and importance, water in food, water activity and shelf life of food. Carbohydrates: Chemical reactions, functional properties of sugars and polysaccharides in foods. Lipids: Classification and use of lipids in foods, physical and chemical properties, effects of processing on functional properties and nutritive value. Protein and amino acids: physical and chemical properties, distribution, amount and functions of proteins in foods, functional properties. Effects of processing- Losses of vitamins and minerals due to processing. Pigments in food, food flavours, browning reaction in foods. Enzymes in foods and food industry, Bio-deterioration of foods, food contaminants, additives and toxicants.
(12L)
UNIT II: PRINCIPLES OF FOODPROCESSING
Scope and importance food processing – National and International perspectives.
Principles and methods of food preservation – freezing, heating, dehydration, canning, additives, fermentation, irradiation, extrusion cooking, hydrostatic pressure-cooking, dielectric heating, microwave processing, aseptic processing, hurdle technology.
Storage of food, modified atmosphere packaging. Refrigeration , freezing and drying of food,
Minimal processing, Radiation processing.
(12L)
UNIT III: MILK PROCESSING TECHNOLOGY
        Definition of milk, composition, physical and chemical properties of milk Constituents and nutritive value of milk, Factors affecting composition of milk, Types of milk.Fluid Milk
Processing. Receiving, Filtration Clarification, Straining, Standardization, Homogenization and its
Effects, Pasteurization and various systems of pasteurization ; LTLT, HTST , UHT methods, Pasteurizes(Heating and Cooling systems ,Flow controller regenerator,Flow division valve) sterilization, packaging of fluid milk. Coagulated Milk Products.
Channa, Paneer, Classification and manufacturing process of cheese, butter and ghee and its storage.
Condensed Milk - Types and factors affecting the quality of Condensed Milk , Storage of condensed milk - Methods of drying milk.(Drum and Spray drying) factors affecting the quality of dry milk. Introduction to instant non-fat dry milk, packaging of dry milk products.
(12L)

UNIT IV: FRUITS AND VEGETABLESTECHNOLOGY

Cleaning, sorting, grading, peeling, and blanching methods and their Equipments, Ingredients and Processes for the manufactures of jam, jellies, marmalade, preserves, pickles and chutneys. Defects and factors affecting the quality of above. Thermal Processing of Fruits and Vegetables: History, definition, various techniques of thermal processing and their effects on the quality of fruits and vegetable products, thermal process time, introduction to concept of thermal process calculations, types of containers and their selection, spoilage of canned food. Dehydration of fruits and vegetables, equipment and process for dehydration of plums, apricot, apple, fig, grapes, peach, cauliflower, potato, mushroom, tomato. Freezing process of selected fruits and vegetables: Peas, beans, cauliflower, apricot and mushroom.

(12L)

UNIT V : TECHNOLOGY OF MEAT,FISH AND POULTRY PRODUCTS

Slaughter of meat animals, different cuts of lamb and their uses, post-mortem inspection – post mortem changes- Loss of homeostasis, post-mortem glycolysis and pH decline, Rigor mortis. Preparatory operations of meats and meat products: Abattior- definition and construction, Basic preparatory procedures (commintion, emulsification, preblending). Cured and smoked meats, sausage products- classifications, processing steps and canned meat, meat pickles.

Handling and Dressing of poultry: Inspection of poultry birds, dressing and preparation of ready to cook poultry, factors affecting the quality- Egg and Egg products- structure, chemical composition and nutritive value, spoilage of eggs and preservation of whole eggs and egg products, preparation of egg powder. Fish and fish products: Types of fish, composition and nutritive value, judging and freshness of fish, fish grading and cooking of fish, smoking, pickling, salting and dehydration , preservation of fish and processed fish products. Frozen storage of fresh and processed meat, fish and poultry. Byproducts of fresh and processed meat, fish, poultry and egg industry.

(12 L)

(TOTAL: 60L)

REFERENCE BOOKS:

1. Food processing and nutrition – Bender A.E. – 1978 Academic Press, London.
2. Food processing technology: Principles and Practices. Fellows, P. and Ellis, A.1990,New York.
3. Introduction to food processing – Jelen,P.-1985.Prentice Hall, Reston Virginia, USA.
4. Food Chemistry – Awrand. W andWoods, A.E.1973.AVI,Westport.
5. Food Chemistry – Meyer, L.H.-1973.East West Press Pvt. Ltd, New Delhi.
6. Outlines of Dietary technology –Woarnes.
7. Preservation of fruits and Vegetables – Vijayakhaderkalyani.
8. Preservation of fruits and Vegetables Srivastava, IBD Co. Lucknow.
9. Fish Preservation – S.K. Kulsherestha.
10. Fish Processing and Preservation –C.L.Cutting.
11. Processed Meat- Pearson and Glite – CBS publishes.
12. Poultry, Meat and Egg Products – Parkursht and Mountney.CBS Publishers

PRACTICALS:

1. Determination of Protein, Starch, Sugar, Amino acids, Crude fibers, Total minerals, Crude fat in food stuff.
2. Estimation of Vitamins – Ascorbic acid, Thiamine.
3. Browning reaction in food, Analysis of lipid-saponification value, acid value & Iodine Value.
4. Determination of Tannins-chemical residues and Aflatoxins, Estimation of Preservative and Antioxidants.
5. Platform test of Milk.
6. Determination of SNF, Specific gravity and total solids of milk.
7. Determination of moisture and fat content of milk powder.
8. Determination of adulterants in milk like Water, Urea, Neutralizes, Preservatives and Starch.
9. Preparation of Channa and Paneer.
10. Preparation of different types of milk products and their evaluations.
11. Preparation of fish, Meat, Egg and Vegetable pickles –Demonstration.
12. Estimation of iron sulphide formation in cooked egg.
13. Visit to a Dairy Unit, Different fruit and vegetables processing unit, Slaughter house and observation of different types of cuts made and demonstration of slaughtering, fish processing unit and submit are port.
14. Equipmentsand appliances used in various food processing industries-observation.

SEMESTER VI
MAJOR ELECTIVE
ELECTIVE PAPER: 6.5C – POULTRYSCIENCE

4Hrs/Week   **Credits 4**

OBJECTIVES:

To introduce various breeds of chicks, layers and broilers

To describe construction, maintenance of poultry keeping and also introduce the rearing and maintenance of poultry

To describe how to prevent and manage various diseases of poultry

OUTCOME :

Students can get self employed after their graduation. To know about poultry farming and to get deep knowledge about poultry manure, nutrition and various diseases

UNIT I

Poultry industry in India – a brief introduction.

Choosing a commercial laying stock –sexing in one day old chicks. Poultry housing – General principles of building poultry house.

Deep litter system – Droppings pit – Feeders , Waters – Nest boxes. Laying cages – Californian cages – Management of cage birds.

(12L)

UNIT II

Poultry manure – Volume, Composition and values.

Nutritional content of eggs.

Management of Chicks, Growers, Layers and Broilers.

Lighting for Chicks, Growers, Layers and Broilers.

Summer and winter management.

Debeaking.

Forced moulting.

(12L)

UNIT III

Poultry nutrition : Protein and Amino acid requirements for chicks , growers ,layers and broilers – Symptoms of excessive dietary levels and deficiency.

Carbohydrates and Fat requirements for Chicks, Growers, Layers and Broilers– Symptoms of excessive dietary levels and deficiency.

Fibre requirement for poultry feeds.

Requirements of vitamins and inorganic minerals for Chicks, Growers and Layers – Deficiency Symptoms.

(12L)

UNIT IV

Importance of feed additives in a poultry feed.

Preparation of supplementary feed for poultry- South Indian feed ingredients in relation to M.E level, Protein level, Amino acid, Minerals (Ca & P) and Fiber content.
 (12L)

UNIT V

Poltry diseases – Causes, Symptoms, Transmission, Treatment, Prevention and Control of the following diseases : Viral diseases - Ranikhit disease, Fowl pox,. Bronchitis and Gumboro disease.Infection and control; Bacterial diseases – Fowl typhoid, Paratyphoid, Pullorum, Fowlcholera, Coryza and

Mycoplasmosis; Fungal diseases – Aspergillosis and Aflatoxicosis; Parasitic disease- Coccidiosis.

Nematode infections- Tape worm infections; External parasites of chicks – ticks, mites and lice.
 (12L)
 (TOTAL: 60L)

REFERENCES :

• Poultry keeping – M.R. Gnanamani
• The Rearing of pullets – Bulletin No. 54, Her majesty"s stationary office, London
• Intensive Poultry management for egg production. Bulleting No. 152. Her majesty „s stationary office ,London.
• Nutrition of Chicken - M.L Scott et al.,
  Disease of Poultry – Biester Oxford &IBH , Himalaya Publishing House

PRACTICALS :

1. Identification of Ectoparasites of poultry studied in the theory.
2. Identification of Endoparasites.
3. Feeders – Different types.
4. Waterers – Different types.
5. Cage house –Model
6. New Castle disease, Fowl pox, Coryza, Coccidiosis - Diagrams or models
7. Debeaking
8. Visit to a Poultry farm and reporting.

.

MANONMANIUM SUNDARANAR UNIVERSITY, TIRUNELVELI-12

B. Sc ZOOLOGY PROGRAMME
CHOICE BASED CREDIT SYSTEM – CBCS
Syllabus for Affiliated Colleges
with effect from the academic year 2021- 2022 onwards
(incorporated with Learning Outcome based Curriculum Framework- LOCF)

Sem	Part I/ II/III IV/V	Course Status	Course title	Contact Hrs/ Week	Credits	Marks				
						Maximum			Passing minimum	
						Int	Ext	Total	Ext	Total
III	I	Language	Tamil/Other Language	6	4	25	75	100	30	40
	II	Language	English	6	4	25	75	100	30	40
	III	Core	Cell Biology and Biochemistry	4	4	25	75	100	30	40
	III	Core Practical-III	Cell Biology and Biochemistry	2	1	25	75	100	30	40
	III	Allied	Cell Biology, Genetics and Biotechnology/ Industrial Fish and Fisheries-Biology of Fish	4	3	25	75	100	30	40
	III	Allied Practical -I	Cell Biology, Genetics and Biotechnology/ Industrial Fish and Fisheries-Biology of Fish	2	1	50	50	100	20	40
	III	Skill Based-Core	(Any one) 1. Home Aquarium 2. Nutrition and Dietetics	4	4	25	75	100	30	40

	IV	Non-Major Elective	(Any one) 1. Bee Keeping 2. Clinical Biology	2	2	25	75	100	30	40
	IV	Common	YOGA*	2	2	25	75	100	30	40
			Sub total	**30**	**25**					
IV	I	Language	Tamil/Other Language	6	4	25	75	100	30	40
	II	Language	English	6	4	25	75	100	30	40
	III	Core	Genetics	4	4	25	75	100	30	40
	III	Core Practical-IV	Genetics	2	1	50	50	100	20	40
	III	Allied	Developmental Zoology, Ecology, Animal Physiology and Evolution/ Industrial Fish and Fisheries- Capture Fisheries	4	3	25	75	100	30	40
	III	Allied Practical-II	Developmental Zoology, Ecology, Animal Physiology and Evolution / Industrial Fish and Fisheries- Capture Fisheries	2	1	50	50	100	20	40
	III	Skill Based -Core	(Any one) 1.Biophysics and Bioinstrumentation 2.Vermitechnology	4	4	25	75	100	30	40
	IV	Non-Major Elective	(Any one) 1.Public Health and Hygiene 2.Community and Social Preventive Medicine.	2	2	25	75	100	30	40
	V	Extension Activity	NCC/NSS/YRC/YW/ PE		1	25	75	100	30	40
	IV	Common	Computer for Digital Era*		2	25	75	100	30	40

Sem	Part	Type	Title	Hrs	Cr	Int	Ext	Total		
			Sub total	**30**	**26**					
V	III	Core	Developmental Zoology	5	4	25	75	100	30	40
	III	Core	Microbiology and Immunology	5	4	25	75	100	30	40
	III	Core	Animal Physiology	6	4	25	75	100	30	40
	III	Core	Ecology	5	4	25	75	100	30	40
	III	Core Practical-V	Developmental Zoology & Microbiology and Immunology	3	2	50	50	100	20	40
	III	Core Practical-VI	Animal Physiology	2	1	50	50	100	20	40
	III	Core Practical-VII	Ecology	2	1	50	50	100	20	40
	IV	Skill Based Common	Personality Development/ Effective Communication/ Youth Leadership	2	2	25	75	100	30	40
			Sub total	**30**	**22**					
VI	III	Core	Evolution	5	4	25	75	100	30	40
	III	Core	Animal Biotechnology	5	4	25	75	100	30	40
	III	Core	Biostatistics, Computer Applications and Bioinformatics	5	4	25	75	100	30	40
	III	Core Elective- I	Group A (Any one) 1. Sericulture 2. Aquaculture 3. Dairy Production Technology	5	4	25	75	100	30	40
	III	Core Elective-II	Group B (Any one) 1. Apiculture 2. Food and Food Processing Technology	4	4	25	75	100	30	40

		3. Poultry Science							
III	Core Practical-VIII	Evolution & Animal Biotechnology	2	2	50	50	100	20	40
III	Core Practical-IX	Biostatistics, Computer Applications and Bioinformatics	2	1	50	50	100	20	40
III	Core Elective Practical-X	Corresponding Core Electives- I & II	2	1	50	50	100	20	40
		Sub total	**30**	**24**					

All practical examinations are at the end of each semester

*Extra credit for extra hours

Total number of hours: **180**

Total number of Credits: **143**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The B. Sc Programme will enable the students to

PEO1: acquire knowledge of current trends and practices in

all aspects of Science

PEO2: equip and fulfil the demands of various competitive examinations and

career developments..

PEO3: inculcate the temperament of research on recent developments

at interdisciplinary level

PEO4: get easy access to references with available e-Learning programmes.

PEO5: raise the standard of the students of our state on par with international standards.

PEO6: promote the overall development of each student in the educational,

(SKILL BASED CORE COURSE)- Any one
SKB- CORE: 3.2A- HOME AQUARIUM

L	T	P	C
4	--	--	4

LEARNING OBJECTIVES (LOs)

The objectives of the course are enabling the student to

➢ understand the construction of home aquarium.
➢ know the setting and maintenance of aquarium.
➢ acquire knowledge on selection, culture and breeding techniques.
➢ gain knowledge on reproduction of fishes, diseases control and prevention.

COURSE OUTCOMES (COs)

On successful completion of the course the student will be able to

CO1: find the prerequisites for the construction of standard home aquarium.

CO2: demonstrate setting up an aquarium and culture practices.

CO3: choose suitable species to culture and develop protocol for maintenance.

CO4: perceive knowledge on reproductive aspects and disease management.

CO5: propose plan to keep aquarium as a small scale industry

UNIT I

BASICS OF CONSTRUCTION

Construction of Home Aquarium: Materials needed – Wooden and metal frames – Frameless tanks – Sealants and Gums. Design and Construction of Public Freshwater and Marine Aquaria. Aerators and Filters – Hand net and other equipment. Water quality requirements – Temperature control and Lighting.

(13L)
UNIT II
AQUARIUM SETTING

Setting up an aquarium: gravel/ pebbles – Plants – Ornamental objects and fishes – Selection. of species – Introducing fishes to the aquarium. Nutritional requirements of aquarium fishes. Different kinds of feeds, Culture of food organisms. Preparation of dry feeds. Feeding methods

(11L)
UNIT III
CULTURABLE SPECIES

Species of ornamental fishes: Taxonomy and biology of Gold fish, Guppies, Sword tails, Marine fishes – Angels and Butterfly fishes. Fresh water species – live bearers and egg layers, one example each – Common Community fishes – Freshwater and marine, any two examples each.

(12L)
UNIT IV
REPRODUCTION

Reproductive biology of gold fish and angel fish: Maturation, Secondary sexual characters, Breeding habits, Spawning, Parental care, Fertilization and Development of eggs. Common diseases of freshwater and marine aquarium fishes: Parasitic, Fungal, Bacterial- Symptoms – Treatment – Prevention and control.

(13L)
UNIT V
FRESH WATER PLANTS & ORNAMENTAL ANIMALS

Taxonomy and morphology, any three of aquarium plants – provision of nutrient and optimum environmental condition for their growth. Other Ornamental organisms – Anemones, Lobsters, Shrimps, Octopus, Star fish etc.,

(11L)

 (TOTAL: 60L)

Books for reference

1. Guide to tropical fish keeping, 1967, Braymer, J.H.P.ILiffe.
2. Tropical Marine aquaria, 1974. Cox, J.F.Hamlyn.
3. Tropical Fish: Setting up and maintaining fresh water and Marine aquaria,1972.
        Dussa Octopus Book Ltd.
4. Aquarium systems, 1981. Hawkins, A.S. (Ed.) Academicpress.

5. Living Aquarium, 1981. Hunnam, P. Ward Lock.
6. Aquarium Fishes and Plants, 1971, Rataj, K. and R. Zukal –Hamlyn.
7. Ornamental Fish for Garden and Home Aquariums, 1956, R and
       C.P. Home Aquariums.
8. Sea Water Aquariums, 1979. Spotte, S. JohnWiley.
9. Collins Guide to Aquarium Fishes and Plants, 1969.Schiotz,
       A.Collins. Complete Aquarium, 1963.Vogt, D. and H. Wermuth Thames.

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-1 Remember	1	3	-	-	-	2	-	1	1	-	3	2	-	2	3
CO2	K-2 Understand	3	3	2	2	-	2	2	3	3	2	3	2	2	3	3
CO3	K-3 Apply	3	3	2	3	-	3	2	3	3	2	3	2	2	3	3
CO4	K-4 Analyse	3	3	2	3	-	2	3	3	3	2	3	2	2	3	3
CO5	K-5 Evaluate	2	3	2	2	1	2	3	3	3	2	3	1	-	3	3
CO6	K-6 Create	2	3	2	2	1	2	3	-	3	-	3	1	-	3	3

Table header: SEMESTER: III / PART III: SKILL BASED CORE COURSE : 3.2A- HOME AQUARIUM

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -III /SKB- Core

(SKILL BASED CORE COURSE)- Any one
SKB- CORE : 3.2B -NUTRITION AND DIETETICS

L	T	P	C
4	--	--	4

LEARNING OBJECTIVES (LOs)

The objectives of the course are enabling the student to

  ➢ recall the types of nutrients and their food value.
➢ understand the role of metabolism of various food stuffs.
➢ realize the importance of balanced diets and BMR.
➢ study of malnutrition, Nutrition related diseases.
➢ recommend special therapeutic diets for persons suffering from various diseases.

COURSE OUTCOMES (COs)

On successful completion of the course the student will be able to

CO1: recollect the classification and types of nutrients and food stuffs.

CO2: understand the nutritive value and metabolism of food materials.

CO3: determine the energy value and BMR and limitations.

CO4: perceive knowledge on balanced diet and its application and importance.
            to avoid deficiency diseases.

CO5: evaluate therapeutic diets and prepare diets to control and overcome diseases.

UNIT I
NUTRIENTS
Macronutrients and their function- Carbohydrates – Fats – Proteins -Water.

Micronutrients and their function: Vitamins and Minerals.

Nutritive value of the food stuffs: Cereals – Pulses – Vegetables – Fruits – Milk – Egg – Meat – Fish.

(11L)

UNIT II
ENRICHMENT OF FOOD
Parboiling of rice – process of parboiling and its uses.

Germination of cereals – process of germination,uses of sprouts & its nutritive value.

Metabolism of foodstuffs – protein, carbohydrate and lipid.

Food choice and preparation methods- Effect of cooking on protein, carbohydrate and fat content. Role of fibres in nutrition

Menu planning and meal pattern – vegetarian and non – vegetarian..

(13L)

UNIT III
 BMR
Determination of energy contents of food – Bomb calorimeter.

BMR – Determination of BMR – using direct calorimeter and Benedict Methods, Roth basal metabolic apparatus – Factors affecting BMR.

(11L)

UNIT IV
BALANCED DIET & DEFICIENCY

Nutritional requirements of different age groups: Pre schoolers- Schoolers – Adolescents – Pregnant, lactating women and aged people.

Nutritional diseases – causes and prevention and dietary management of malnutrition, under nutrition and obesity.

Common nutritional deficiency diseases in India – Kwashiorkor – Marasmas –Anaemia-Goitre.

(15L

UNIT V
THERAPEUTIC DIET

Importance, Diet planning. Symptoms, causes, prevention and dietary management for Diabetes mellitus, Ulcer, Renal diseases, Hepatitis, Hypertension, aAherosclerosis, Gastro-intestinal disorders and Constipation.

(10L)

(TOTAL: 60L)

 Books for reference
1. Poggy, S., Stanfield.   Nutrition and Diettherapy.   Ann Louise Gittleman. The Fat Flush Plan. Tata Mc Graw Hill Publishing Company Limited,444/1,Sri Embara Naicker Industrial Estate, Alapakkam, Porur,Chenn
2. Hellen Kowtaluk. Food for Today, Tata Mc Graw Hill Publishing Company Limited,

   444/1,Sri EmbaraNaicker Industrial Estate, Alapakkam, Porur, Chennai

   3.Shubhangini A. Joshi, Nutrition and Dietetics.T Tata Mc Graw Hill Publishing

   Company Limited, 444/1,Sri EmbaraNaicker Industrial Estate, Alapakkam, Porur, Chennai.
   4. Swaminathan, M. Food Science, Chemistry and Experiment.
   5. Swaminathan, M. Principles of Nutrition and Dietetics.
    6.You and Your food and its utilization, Manuscript.IGNOU.
    7. Rajalakshmi, R. Applied Nutrition.
    8. Sumathi, R. Mudambi and M.V. Rajagopal. Fundamentals of Food and Nutrition.
   9. Stanley Davidson, Passmore, R. Nutrition and Dietetics
    10. Fergos Clydesdate, M.. Food Nutrition and Health.

b.Explain the nutritive value of cereals and pulses

17.a. Examine the source of carbohydrates and their function (Or)   **(CO2)**   **K4**

 b. Compare the vegetarian and non vegetarian meal pattern.

18.a.How will you determine the BMR using direct calorimeter (Or)   **(CO3)**   **K5**

  b. Detemine the energy content of carbohydrate.

19.a. Define obesity. Explain the prevention and dietary management for it (Or)

  b.Write an essay on common nutritional deficiencies in India   **(CO5)**   **K5**

20.a. Explain about the therapeutic diet and its importance (Or)   **(CO6)**   **K4**

 b. Describe the symptoms, causes, prevention and dietary management for diabetes

MSU/2021-22/UG-Colleges/Part-IV (B.Sc. ZOOLOGY) SEMESTER -III /NME
(NON- MAJOR ELECTIVE) - Any one
NME COURSE: 3.3A- BEE KEEPING

L	T	P	C
2	--	--	1

LEARNING OBJECTIVES (LOs)

 The objectives of the course are enabling the student to

  ➢ know the knowledge of the types and life history of bees.
  ➢ understand the supply of food and arrangement of apiary.
  ➢ practice the capture of colony and maintenance.
  ➢ acquire the knowledge of modern bee keeping.
  ➢ insist the hygienic honey extraction and value of honey.

COURSE OUTCOMES (COs)

 On successful completion of the course the student will be able to

 CO1: recall the types of bees and identify the members of the colony.

 CO2: acquire the knowledge of food of bees and relation with plants and

   apiary location and arrangement.

CO3: apply the principles on acquiring the bees and their behaviour

and maintenance.

CO4: compare the primitive rearing methods and adopt modern methods in

bee keeping and extraction of honey.

CO5: evaluate the properties and economic value of honey and marketing.

CO6: promote bee keeping as effective entrepreneur programme.

UNIT I
TYPES OF BEES

Comparative study of Rock bee, Indian bee, Little bee and Dammer bee – Life history of *Apis indica*. Queen, Drones and Workers – Identification, Salient features and Functions.

(6L)

UNIT II

FOOD OF THE BEES

Honey and pollen. Relationship of plants and bees. Arranging an apiary position – space – direction. Routine management- Seasonal management- Migratory bee keeping.

(6L)

UNIT III
ACQUIRING BEES

Care of newly captured colonies. Different kinds of cells- architecture of honey comb- Swarming - Supersedure. Diseases and enemies of bees and colony – Protection of the colony.

(6L)

UNIT IV
TYPES OF HIVES

Primitive hives – Different types. Advantages and disadvantages of primitive hives. Modern hives- Newton's bee hive and its architecture. Appliances used in Apiaries.

(6L)
UNIT V
HARVESTING AND MARKETING BEE PRODUCTS

Collection and Extraction of honey, preservation, storage, physical properties, chemical composition, nutritive value, medicinal values- Honey as Daily Food. Bee wax & Venom and Royal Jelly.

(6L) (TOTAL: 30L)

 Books for reference

1. Bee Keeping in India – Sardar Singh- K.A.R, Delhi.
2. Bee keeping in South India – Cherian M.C. & Ramachandran, Govt.Press,Chennai.
3. Handbook of bee keeping – Sharma P.L. & Singh S.,Chandigarh.
4. Apiculture – Johnson J. & Jeyachandra, Marthandam, Tamil Nadu.

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-1 Remember	3	3	2	1	2	2	2	3	2	-	2	2	3	2	2
CO2	K-2 Understand	2	3	3	1	2	2	3	3	3	-	2	3	3	3	3
CO3	K-3 Apply	2	3	3	2	2	1	3	3	3	2	2	3	3	3	3
CO4	K-4 Analyse	3	3	3	1	3	1	2	3	3	2	2	3	3	3	3
CO5	K-5 Evaluate	3	3	2	2	3	2	2	3	3	-	2	3	3	3	3
CO6	K-6 Create	2	3	2	2	3	1	3	2	3	-	3	3	2	2	3

The table spans SEMESTER: III / NON - MAJOR ELECTIVE COURSE : PART IV- COURSE: 3.3A- BEE KEEPING

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

MSU/2021-22/UG-Colleges/Part-IV (B.Sc. ZOOLOGY) SEMESTER -III /NME

PART IV- (NON-MAJOR ELECTIVE)- Any one

NME COURSE: 3. 3B- CLINICAL BIOLOGY

L	T	P	C
2	--	--	1

LEARNING OBJECTIVES (LOs)

The objectives of the course are enabling the student to

➢	know the normal and abnormal condition of the body.
➢	understand the safety methodology on collection of samples.
➢	identify the correct procedure for analyzing the various samples.
➢	know how to apply the right and specific test for diseases.

COURSE OUTCOMES (COs)

On successful completion of the course the student will be able to

CO1: recall the difference between normal and abnormal conditions of the patients.

CO2: recognize the importance of testing and adopt suitable safety methods

for sample collection.

CO3: apply the principles and correct procedure for analysis and collection of samples

for diagnosis.

CO4: compare and interpret the results and observations of the reports.

CO5: encourage to provide community service by keeping clinical laboratory.

UNIT I
INTRODUCTION
Normal and Abnormal conditions of body – Symptoms – Samples to be collected for analysis – diagnosis – Instruments used in the analysis - Sterilization.
(6L)

UNIT II
URINE ANALYSIS
Collection and preservation of sample and chemical estimation. Protein, Urea, Glycemia, sediments and casts, impaired renal function and clearance test..
(6L)

UNIT III
ESTIMATION OF GASTRO INTESTINAL CONTENTS

Saliva constituents, Collection and estimation of Gastric juice, Secretion of liver, Duodenal contents and Pancreatic function tests.

(6L)

UNIT IV

CLINICAL HAEMATOLOGY

Ways of obtaining blood- Haemoglobin estimation. Cell counting (DC/ TC), Estimation of Erythrocyte sedimentation test (ESR), pathological, physiological and hereditary disorders, Blood banking, Blood grouping, and typing, Glucose Tolerance Test (GTT), Impaired Glucose Tolerance Test, ELISA test.

(7L)

UNIT-V
FERTILITY TEST

Semen analysis and pregnancy test, RIA test- Agglutination test- Morphological variations –
Types- Count and Abnormalities.

(5L)

(TOTAL: 30L)

Books for reference

1.Medical laboratory techniques- R. Sood
2.Text book of preventive medicine-J.E Park, Benansidar Bhalot
3. Introduction of medical laboratory technology-Baker, F.J.Silverton

 4. Medical laboratory technology- Lynch.

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
	SEMESTER: III **PART IV: NON-MAJOR ELECTIVE COURSE : 3. 3B- CLINICAL BIOLOGY**															
		1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1	**K-1 Remember**	3	3	1	2	2	1	-	3	2	2	1	-	-	1	-
CO2	**K-2 Understand**	3	3	2	2	3	2	1	3	3	2	2	2	3	2	2
CO3	**K-3 Apply**	3	3	2	2	3	2	2	3	3	2	3	2	2	2	2
CO4	**K-4 Analyse**	3	3	3	2	3	2	1	3	3	3	3	2	3	2	3
CO5	**K-5 Evaluate**	1	3	3	2	3	3	2	3	3	3	3	2	2	2	3
CO6	**K-6 Create**	1	1	2	2	2	3	2	2	3	3	2	2	3	3	3

**Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No
Correlation (0)**

16. (a) Explain Mendel's dihybrid cross (or)   **(CO1)**   **K2**
    (b) Write a detailed account on interactions of non - allelic genes.
17. (a) Explain in detail about the mechanism of crossing over. (or)   **(CO3)**   **K4**
    (b) Describe in detail about construction of chromosome map .
18. (a) Discuss about chromosomal variations due to non - disjunction. (or)   **(CO4)**   **K4**
    (b) Examine the genetics of cytoplasmic inheritance with suitable examples.
19. (a) Enlist the essence of eugenics in human welfare. (or)   **(CO3)**   **K5**
    (b) Explain about Hardy-Weinberg equilibrium.
20. (a) Elucidate the methods of gene transfer in Bacterial genome. (or)   **(CO5)**   **K6**
    (b) Discuss in detail about the Lac operon concept.

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -IV /SKB- Core

(SKILL BASED CORE SUBJECTS) -Any one
SKB- CORE COURSE : 4.2A
BIOPHYSICS AND BIOINSTRUMENTATION

L	T	P	C
4	--	--	4

LEARNING OBJECTIVES (LOs)

    The objectives of the course are enabling the student to

- ➢ know the basic concepts of atoms, molecules, chemical bonds and thermodynamicsstudy the role of bioenergetics.
- ➢ understand the methods of various instrumentations related to biological systems and functions.
- ➢ learn the concepts of photobiology in biology.
- ➢ study the working principle and applications of instruments used in the biological field.

COURSE OUTCOMES (COs)

On successful completion of the course the student will be able to

CO1: remember the basic concepts of biophysics.

CO2: understand the energy formation and bioenergetics.

CO3: apply the principles of photobiology on bioluminescence.

CO4: assess the importance of various instruments on bio assay.

CO5: evaluate the applications of radiography in biological study.

CO6: gain confidence to establish a well equipped biological laboratory for bioassay.

UNIT   I

BIOPHYSICS

 Scope and Method – Atoms – Molecules – Molecular Interactions – Chemical   bonds – Primary chemical bonds – Secondary chemical bonds. Principles of Thermodynamics – Laws of Thermodynamics – Enthalpy – Entropy – Living systems and energy changes.

(12L)
UNIT   II
BIOENERGETICS

 Energy and Work – Energy Transformation – ATP – Bioenergetics – Structure of ATP – Formation of ATP – NADP – Structure – NADP / NADPH   Redox couple – Mitochondrial bioenergetics – Chloroplast bioenergetics. Membrane conductivity – Diffusion – Active transport – Osmosis – Electric conductivity.

(12L)
UNIT   III
PHOTOBIOLOGY

 Nature of light and its properties – Absorption and Emission Spectra – action spectrum, Refractive index – Huyge's Principle – Polarized light – Solar radiation – UV – Infrared – De-excitation- Bioluminescence – Fluorescence – Phosphorescence.

(11L)
UNIT IV
INSTRUMENTATION

 Microscopy – Principle and application of Electron Microscope. Basic Instruments – Principle and applications of pH meter and Colorimeter- Centrifugation – Principle and Types – Chromatography – Principle – Types – Paper, Ion exchange, HPLC and applications

 (11L)

UNIT   V

 LABELLING TECHNIQUES

 Isotopes, Radioactivity, Radioactive decay, half – life, autoradiography, biological use of radioactivity, Radioactivity Counter – Principle – Types – Geiger Muller – Scintillation Counter.

Electrophoresis: Principle – Types – Agarose Gel electrophoresis, Polyacrylamide gel – Sodium Dodecyl Sulphate Polyacrylamide gelelectrophoresis – Applications

PCR Technology: Working mechanism of PCR- applications

Gel Doc: Principle – Working mechanism. Lyophiliser – Principle – Working mechanism – applications.

(14L)
 (TOTAL 60L)

Books for Reference
1. Saleel Bose: Elements of Biophysics.
2. Casey: Biophysics – Concepts & Mechanism.
3. Vasanthapattabhi N. Gautham: (Narosa publishing House) – Biophysics.
4. Jeyaraman, K. : Laboratoy Manual in Biochemistry. New Age International publishers.
5. Kalaichelvan, P.T: A Laboratory Manual, MJP Publishers,47, Nallathambi Street, Triplicane, Chennai 600 005.
6. Gurumani, N: Research Methodology for Biological Sciences.MJP 47, Nallathambi Street, Triplicane, Chennai 600 005.
7. Palanivelu, P.Analytical Biochemistry and Separation Techniques. A Laboratory Manual for B.SC and M.SC Students.Department of Molecular Biology, M.K.University, Madurai-625 021.
8. L.Veerakumari, Bioinstrumentation MJP Publishers,47, Nallathambi Street, Triplicane,Chennai 600 005

COs at Cognitive level and mapping with POs and PSOs

| SEMESTER: IV |||||||||||||||
| PART III: SKILL BASED CORE COURSE: 4.2A BIOPHYSICS AND BIOINSTRUMENTATION |||||||||||||||

CO	COGNITIVE LEVEL	PO								PSO						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-1 Remember	3	3	2	2	3	-	1	3	3	2	2	3	3	2	2
CO2	K-2 Understand	3	3	3	2	2	-	3	3	3	2	2	3	2	3	2
CO3	K-3 Apply	3	3	3	2	2	-	3	2	3	3	3	3	2	3	3
CO4	K-4 Analyse	2	3	3	2	1	-	2	2	3	3	2	3	2	3	3
CO5	K-5 Evaluate	2	2	2	1	1	-	3	3	3	3	3	3	-	3	3
CO6	K-6 Create	-	2	2	1	2	1	3	2	3	1	3	3	-	3	3

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -IV /SKB -Core

(SKILL BASED CORE COURSE) -Any one

SKB- CORE COURSE: 4.2B-VERMITECHNOLOGY

L	T	P	C
4	--	--	4

LEARNING OBJECTIVES (LOs)

The objectives of the course are enabling the student to

- ➢ gain knowledge of agro based small scale industries using vermicompost preparation.
- ➢ understand the environmental conservation process and its importance, pollution control, biodiversity and protection of earthworms through vermiculture.
- ➢ assure that Vermitechnology is used to control environmental pollution and global warming.
- ➢ contribute their knowledge to develop organic fertilizer with rural and urban biodegradable wastes using the Earthworms.

COURSE OUTCOMES (COs)

On successful completion of the course the student will be able to

CO1: find out Vermicomposting is an eco-friendly, economically and socially

acceptable technology.

CO2: illustrate that Vermitechnology is useful for stabilization and recycling

of both industrial and domestic organic waste.

CO3: utilize Vermitechnology to improve the soil texture, soil aeration, improve

the water retention capacity in the soil.

CO4: apply Vermitechnology to conver rural and urban garbage into nutrient rich

ecofriendly organic manure.

CO5: apply the ethical principles and commit to pledge responsibilities to protect

and save environment.

CO6: improve Vemitechnology to manufacture the vermicompost in small scale

industry by which the economy of the farmer is improved. It provides the

employment opportunity in rural and urban areas.

CO7: justify and prove that the Earthworms are having the capacity to observe heavy

metals into their body tissues and converting the soil without heavy metals.

UNIT I

TAXONOMY OF EARTHWORM

Morphological and anatomical – Classification of earthworms – Food habits – Digestive system – Excretion – Reproduction and Life cycle – Earthworm as farmer's friend.

(11L)
UNIT II
TYPES OF EARTHWORM

Exotic and native species – South Indian and North Indian species used in Vermicomposting – Collection and Preservation of earthworms for vermicomposting – Culture techniques of earthworms.

(11L)
UNIT III
VERMICOMPOST PRODUCTION

Requirements – Different methods of Vermicomposting – Heap method – Pot method and Tray method – changes during Vemicomposting.

(11L)
UNIT IV
ROLE OF EARTHWORMS IN SOIL FERTILITY

Use of Vermicompost for crop production – Use of earthworms in land improvement and land reclamation – Economics of Vermicompost and Vermiwash production. Earthworms as animal feed – Medicinal value of earthworm meal – Roles of Earthworms in Solid Waste, Sewage and faecal waste management and Vermifilters. Earthworms as bioreactor.

(15L)

UNIT V

INTERACTIONS OF EARTHWORMS WITH OTHER ORGANISMS

Influence of chemical inputs on earthworm activities – Large scale manufacture of Vermicompost, packaging of vermicompost and its marketing – Financial supporting – Government and NGOs for vermiculture work.

(12L)
(TOTAL 60)

Books for Reference

1. Invertebrate Zoology – Ekambaranatha Ayyar.
2. Earthworm in Agriculture – S.C. Talashikar and Dosani, Agrobios Publications, Near Nasarani Cinema, Jodhpur, 342 002.
3. Vermicompost for sustainable Agriculture – P.K. Gupta Agrobios 2nd Edition.
4. Organic Farming for sustainable Agriculture – A.K.Dahama,Agrobios. 5.A Hand book of Organic farming – A.K.Sharma.Agrobios publication.
6. Earthworm ecology – Clive A. Edwards St. Lucie press – CRC Press Washington DC.
7. Biology of Earthworm - Edward and Lofti – Chapman and Hall Publication.
8. Vermicology – Sultan A. Ismail – Orient Longman Press.
9. Vermiculture Biotechnology – U.S. Bhawalkar BERI, PUNE

COs at Cognitive level and mapping with POs and PSOs

SEMESTER IV
PART III: SKILL BASED CORE COURSE - 4.2B: VERMITECHNOLOGY

CO	COGNITIVE LEVEL	PO							POS							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	**K1 Remember**	3	3	3	3	2	3	1	3	3	3	3	3	3	2	1
CO2	**K2 Understand**	3	3	3	2	2	3	3	3	3	3	3	2	3	3	3
CO3	**K3 Apply**	3	2	3	3	3	2	2	3	3	3	2	3	2	3	2
CO4	**K3 Apply**	3	3	3	2	3	2	3	2	3	3	1	3	3	3	1
CO5	**K3 Apply**	3	2	3	3	3	3	2	3	2	2	3	3	3	2	1
CO6	**K4 Analyse**	2	3	3	2	3	3	1	3	3	3	2	2	3	1	1
CO7	**K5 Evaluate**	3	3	2	3	1	3	2	2	3	2	3	3	2	3	1

MSU/2021-22/UG-Colleges/Part-IV (B.Sc. ZOOLOGY) SEMESTER -IV /NME

(NON -MAJOR ELECTIVE COURSE) –Any one

NME COURSE : 4.3A - PUBLIC HEALTH AND HYGIENE

L	T	P	C
2	--	--	1

LEARNING OBJECTIVES (LOs)
The objectives of the course are enabling the student to

- ➢ understand the physical, mental and social health.
- ➢ know the safer disposal of various wastes.
- ➢ create awareness about first aid and accede.nts
- ➢ improve the awareness about healthy and hygienic practices.
- ➢ instruct the health standard and status and schemes.

COURSE OUTCOMES (COs)
On successful completion of the course the student will be able to

CO1: relate the concepts, definition and principles
of health and hygiene in our daily life.

CO2: illustrates the hygienic uses of water and make use of

standard housing recommendations.

CO3: identify the safety disposal of excreta and practise it.

CO4: classify the diseases as communicable and parasitic diseases.

CO5: assesses the safety procedures for health and hygiene.

CO6: propose solution for the health related problems/issues in the light of

eradication schemes of government and the involvement of NGOs.

UNIT I

DEFINITION AND BASICS

Physical, Mental, Social and Positive health – Quality of life Index. Nutrition and Health – Food hygiene – Food toxicants. Population explosion in India – Birth control measures. **(6L)**

UNIT II

ENVIRONMENT AND HEALTH

Water – Sources of water – Uses of water. Water borne diseases – Cholera – Ascariasis. Standards of Housing – Ventilation. **(6L)**

UNIT III
EXCRETA DISPOSAL & FIRST AID

Importance – Methods of excreta disposal. Sanitary health measures during fares and festivals. First aid with reference to accident. **(6L)**

UNIT IV
COMMUNICABLE DISEASE

Viral diseases: AIDS, Rabies. Bacterial diseases: Tuberculosis, Typhoid. Protozoan diseases: Amoebiasis. Helminth diseases: Filariasis.

(6L)

UNIT V
HEALTH   SITUATION   IN   INDIA
Health problems – Primary health care in India – PHC – National Programmes – National AIDS control – National Malaria Eradication Programme – National Tuberculosis Control Programme.
(6L)
(TOTAL 30L)

Books for Reference
1. Anderson R.Cliford. Your Guide to Health.
2. Basu, S.C. Preventive and Social Medicine.
3. Goel, S.O.L. Public Health Administration.

4. Harold Shoryock and Hubert O. Swartout. You and Your Health illustratedDealing   with Diseases.

5. Park, K. & Park. S. Text Book of Preventive and Social Medicine.BanarsidasBhanot Publishers,1167 PremNager, Jabalpur – 482001.

6. Ramarao, V.First Aid in accidents. Sri Krishna brothers, Thambu Chetty Street, Chennai.

7. Sanitarians Hand Book. Theory and Administrative Practice. Pearles Publications, New

COs at Cognitive level and Orleans, USA.**mapping with POs and PSOs**

(NON- MAJOR ELECTIVE) –Any one
NME COURSE: 4.3B - COMMUNITYAND SOCIAL PREVENTIVE MEDICINE

L	T	P	C
2	--	--	1

LEARNING OBJECTIVES (LOs)
The objectives of the course are enabling the student to
➢   know the meaning and concept of community health and medicine.
➢   educate the cause and effects of drug abuse and alcoholism.
➢   aware about the sexually transmitted diseases.
➢   understand the dangers of child labour.
➢   realize the problems of old age.

COURSE OUTCOMES (COs)

 On successful completion of the course the student will be able to

CO1: relate the meaning and concept of the community health and medicine in practical life.

CO2: explain the causes and impact of drug addiction and alcoholism.

CO3: apply the knowledge of sexually transmitted disease to prevent and control.

CO4: analyse the root cause of child labour and adopt strategies to abolish.

CO5: evaluate the problems of old age.

CO6: design a model project to analyze the local situation.

   UNIT I
COMMUNITY AND HEALTH
Meaning and concept- Biomedical, Ecological, Psychological, Social and Holistic. Determinants of health & Indicators of health. Concept of community health, Role of primary health centers.

(6L)

UNIT II

DRUG ADDICTION
In India today –incidence among college students-common drugs in vogue- their side effects, control and management of drug addiction.

ALCOHOLISM

Its effect on various organs like heart, lungs, liver, pancreas, brain and intestine-chronic alcoholism – alcoholic withdrawal syndrome - its control and treatment.

(6L)

UNIT III
SEXUALLY TRANSMITTED DISEASES

Gonorrhoea- Syphilils – AIDS - Causative agent, causes - symptoms-diagnosis - treatment and control measures.**(6L)**

UNIT IV
CHILD ABUSE

Definition-causes-effects-Legal measures for eradication. **(6L)**

UNIT V
PROBLEMS OF OLD AGE

Concept of ageing. Housing and health care of the aged. Problems – Cardiovascular - alimentary –Locomotion and joints-welfare service provided to the aged by the Government.

(6L)

(TOTAL 30L)
Books for Reference
        1. Social Problems in India – Ram Akuja.
        2. Social Preventive Medicine – Park & Park.
        3. Ageing and Aged – Paul Chowthry.
        4. Indian Social Problem –G.R. Madan

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-1 Remember	3	3	2	-	1	2	1	3	2	2	2	1	2	3	2
CO2	K-2 Understand	2	3	2	2	2	3	1	3	3	2	2	1	3	3	2
CO3	K-3 Apply	2	3	2	2	1	3	2	3	3	3	2	2	3	3	3
CO4	K-4 Analyse	2	3	3	2	2	3	2	3	3	3	3	2	3	2	3
CO5	K-5 Evaluate	-	1	1	-	2	2	1	2	3	2	3	2	3	2	3
CO6	K-6 Create	-	-	1	-	3	2	1	2	3	2	2	2	2	2	2

SEMESTER: IV
PART IV: NON-MAJOR ELECTIVE COURSE
NME COURSE :4.3B - COMMUNITYAND SOCIAL PREVENTIVE MEDICINE

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

bioinformatics

20.a. Describe the structure of protein sequence database. (or)　　　　**(CO5)　　K4**

　　b**.** Write down the details of query DNA and protein sequences obtained from nucleotide and protein databases

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -VI /Core Elective

CORE ELECTIVE (GROUP- A)

(Any one)

CORE ELECTIVE COURSE: 6.4A -SERICULTURE

L	T	P	C
5	--	--	4

LEARNING OBJECTIVES (LOs)

The objectives of the courses are enabling the student to
➢ study the scope and importance of Sericulture for betterment of human welfare.
➢ introduce the concepts of sericulture and mulberry cultivation.
➢ get deep knowledge on diseases of silk worm and pests of mulberry plants.
➢ understand the methods of harvesting, and cocoon marketing.
➢ adopt sericulture as a vocation as it is a rural agro based cottage industry.

COURSE OUTCOMES (COs):

On successful completion of the course the student will be able to

CO1: understand the scope sericulture and mulberry cultivation practices.

CO2: gain knowledge on diseases of silkworms and pests of mulberry.

CO3. understand the classification, life cycle and physiology of silkworm.

CO4. apply the rearing methods, harvesting of cocoon and cocoon marketing.

CO5: examine process of reeling, producing raw silk and marketing.

CO6: decide to start sericulture unit/reeling unit in the local area and become

　　　notable entrepreneur.

UNIT I

IMPORTANCE OF SERICULTURE

Sericulture industry in India: Sericulture as cottage industry, role of Central Silk Board, Moriculture: Morphology of Mulberry plant- High yielding varieties –methods of propagation-irrigation. Manuring: Biofertilizers – Green manuring – Triacontanol for increased mulberry productivity – Seriboost. Pruning- Harvesting and storing of mulberry leaves-Package of practices for mulberry cultivation.

(15L)

UNIT II

DISEASES AND PESTS OF MULBERRY

Fungal diseases: fungal root, shoot and leaf diseases; Bacterial diseases: leaf blight disease, rot disease; Viral diseases: mulberry leaf mosaic disease, dawn disease; Dwarf disease, Nematode diseases: root knot disease; Deficiency diseases: nitrogen deficiency, phosphorus deficiency, potassium deficiency, magnesium deficiency and calcium deficiency diseases; Pests of mulberry: leaf eating insect pests and stem borer pests one example each.

(15L)

UNIT III

BIOLOGY OF SILKWORM

Classification of Mulberry silkworm- habit and habitats; Voltinism- races of silkworms; Life cycle- Structure of egg- larva- pupa and adult- Sexual dimorphism. Digestive system-circulatory system- excretory system- respiratory system, nervous system and reproductive system, endocrine and other glands of Silkworm.

(15L)

UNIT IV

REARING OF SILKWORM COCOON MARKETING

Rearing house (CSB model) - Rearing appliances. Rearing operation: Disinfection – Brushing – Maintenance of optimum conditions, Feeding – Bed cleaning – Spacing. Methods of Rearing; Young age worms – Chawki rearing - Rearing of late age larva-Types: Shelf rearing. Floor rearing, Shoot rearing- Application of Sampoorna. Mounting: Mountages- Methods – Precautions. Cocoon marketing: Characteristics of cocoon- – defective cocoons – methods of harvesting. – Shell ratio and rate fixation.

(15L)

UNIT V

DISEASES AND PESTS OF SILKWORM & REELING

Protozoan disease: Pebrine; Viral diseases: Flacherie, Gattine, Grasserie; Bacterial diseases: Flacherie, Septicemia, Sotto, Court; Fungal diseases : Muscardine; Pests: Uzy fly, Dermistid beetle of silkworm. Silk reeling: Cocoon stifling – types- storage of stifled cocoons- sorting-cocoon boiling and deflossing – brushing, Process of reeling: Different methods- silk waste and byproducts of silk reeling- Raw silk and marketing.

(15L)

(TOTAL: 75L)

Books for reference

1. Ganga, G. and I. Sulochana Chetty, An introduction to Sericulture. Oxford & IBH Publishing Company Private Limited, S -155,Panchshila Park, New Delhi.

2.   Ganga,G. Comprehensive Sericulture, Volume – 2 Silkworm Rearing and Silk Realing. Oxford & IBH Publishing Company Private Limited, S -155, Panchshila Park,New Delhi.

3. Dandin, S.B, Jayant Jayaswal and K. Giridhas, Hand Book of Sericultural Technologies, Central Silk Board, Madivala, Bangalore –68.

4. Kamile Afifa. S and Masoodi M. Amin, Principles of Temperate Sericulture,Kalyani Publishers, B – 1/1292,Rajinder Nagar, Ludhians.

5. Kesary, M and M.Johnson, Sericulture, Department of Zoology, N.M.. Christian College, Marthandam.

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-1 Remember	3	3	3	2	3	2	2	3	3	2	2	1	1	3	3
CO2	K-2 Understand	3	3	3	2	3	3	3	3	3	2	2	1	1	3	3
CO3	K-3 Apply	3	3	3	2	3	3	3	3	3	2	2	1	1	3	3
CO4	K-4 Analyse	3	3	3	2	3	3	3	3	3	2	2	1	1	3	3
CO5	K-5 Evaluate	3	3	3	2	3	3	3	3	3	2	2	1	1	3	3
CO6	K-6 Create	3	3	3	2	2	3	3	3	3	2	2	1	2	3	3

Table title above the header: SEMESTER: VI — PART III: CORE ELECTIVE COURSE:6.4A- SERICULTURE

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0).

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -VI /Core Elective
                                                                                    Practical

CORE ELECTIVE PRACTICAL- X (Any two)
6.4A   SERICULTURE

L	T	P	C
--	--	2	1

LEARNING OBJECTIVES (LOs)

The objectives of the practical course are enabling the student to

- ➢ observe and analyse the features of silk gland, digestive and nervous system of silkworm.
- ➢ realize the importance selection of leaves for feeding.
- ➢ examine and analyse the stages development.
- ➢ assess the mulberry varieties, rearing and mounting appliances and marketing of cocoons.
- ➢ promote sericulture industry in rural area.

COURSE OUTCOMES (COs)

On successful completion of the practical course the student will be able to

CO1: understand the biological importance systems of the silkworm.

CO2: appreciate the importance of feeding and rearing appliances

CO3: enhance the production by applying scientific knowledge and training.

CO4: decide to have a sericulture unit with less input.

PRACTICALS

1. Dissection of silk glands, digestive and nervous systems- Silk worm
2. Dissection of male and female reproductive system- Silk worm
3. Selection of mulberry leaves according to different stages of the larva.
4. Life history Silk worm – egg, larva, pupa and adult.
5. Sexual dimorphism in larva, pupa and adult- Silk worm
6. Mulberry varieties such as MR2, S30, S36, V2. (any four)
7. Chandrika and Netrika
8. Rearing tray and rearing stand.
9. Raw silk and silk waste
10. Cocoon- Bivoltine/ Multivoltine

11. Report on field visit to Sericulture farm/ unit. (Mandatory)

COs at Cognitive level and mapping with POs and PSOs

SEMESTER: VI																
PART III: CORE ELECTIVE PRACTICAL X: SERICULTURE																
CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8

b. Describe about reeling operation.

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -VI /Core Elective

CORE ELECTIVE (GROUP- A)

CORE ELECTIVE COURSE: 6.4B AQUACULTURE

L	T	P	C
5	--	--	4

LEARNING OBJECTIVES (LOs)

The objectives of the course are enabling the student to

➢ familiarize the aquaculture potential and practices in India.

➢ impart knowledge on fish culture techniques to augment food production from aquatic resources.

➢ impart knowledge on health management, feed formulation and fish preservation.

COURSE OUTCOMES (COs):

On successful completion of the course the student will be able to

CO 1: understand the biology and culture techniques of commercially important food fishes.

CO 2: analyse the basic culture methodologies of culturable species and

integrated fish farming.

CO 3: acquire knowledge on feed organisms and feed formulations.

CO 4: identify common diseases, manipulation of condition factors and to apply health

management measures.

CO 5: interpret different techniques of processing, preservation and marketing of fish.

CO 6: apply principles to handle the problems encountered in commercial

production if self employed with aquaculture unit.

UNIT I

INTRODUCTION

Definition, scope of aquaculture, cultural techniques, Aquaculture in India – Freshwater, Coastal and marine aquaculture – Culturable organisms – Fin fishes, Shell fishes and their qualities.

(15L)

UNIT II

PREPARATION OF POND

Types of fish ponds: Nursery pond, rearing pond and culture pond. Fin fish culture : Culture of Indian major carp – Bundh breeding, Induced breeding, Transport of fish seeds. Shell fish culture: Culture of marine prawn – Induced breeding – Types of prawn culture in India. Edible Oyster culture and Pearl Oyster culture.

(15L)

UNIT III

TYPES OF CULTURE PRACTICES

Extensive, Semi-intensive and Intensive culture, Monoculture, Monosex culture, Polyculture, Cage culture, Pen culture. Integrated fish farming – Paddy cum fish culture. Animal husbandry cum fish culture, Sewage fed fish culture.

(15L)

UNIT IV

FISH FEED AND DISEASES

Artificial feed: feed formulation, feed ingredients, pellets. Live feeds and their culture: Artemia, Diatoms, Rotifers, Micro Algae. Parasites and Diseases of aquaculture organisms: Ectoparasites and Endoparasites; Bacterial, Viral and Fungal diseases – Nutritional deficiency diseases.

(15L)

UNIT: V

GOVERNMENT BOARDS AND MARKETING

CMFRI, CIFRI, MPEDA, FFDA. Post harvest technology in fishes – Rigor mortis, fish spoilage, fish preservation techniques – freezing, canning, drying. Fish marketing; Co-operative marketing in fisheries. Craft and gears. Water quality management.

(15L)

(Total: 75L)

Books for reference

1. Beavan, R. Handbook of Freshwater Fisherries on India. Narendra Publishing House,1417, Kishan Dutt street, Maliwara, Delhi – 110 006.

2. Biswas, K.P. Prevention and control of fish and prawn diseases, Narendra Publishing House,1417, Kishan Dutt street, Maliwara, Delhi – 110 006.

3. Dash, M.C. & P.N. Patnik, Brackish Water Prawn Culture, Palani Paramount Publications,69-D.,Anna Nager, Palani – 624602.

4. Dick Mills, Tropical Aquarium Fishes, Chencellor Press, Michelin House,81,Fulham Road, London SW3 6RB.

5. Jhingaran, V.G. Fish and Fisheries of India, Hindustan Publishing Corporation (India), Delhi.

6. Khanna, S.S. Introduction of fishes, Central Book dept, Allahabad.

7. Latha Shenoy, Course Manual in Fishing Technology Central Institute of Fisheries Education (Indian Council of Agricultural Research), Versova, Bombay – 400061`.

8. Mary Chandy, Fishes. National Book trust.A-5,Green Park, New Delhi – 110 016.

9. Pandian, T.J., Sustainable India Fisheries. National Academy of Agricultural Sciences. ICAR, Ministry of Agriculture, New Delhi.

10. Parihar, R.P. A Text Book of Fish Biology and Indian Fisheries. Central Publishing House, Allahabad.

11. Rath, R. K. Freshwater Aquaculture. Scientific Publishers.5A.New Pali Road, Jodhpur, 342001.

12. Santhanakumar, G & A.M. Selvaraj. Concepts of Aquaculture. Meenam Publications. Nagercoil Lekshmi Papers, Thirumal Complex, Opp. Chakkaravarthi theatre. Chettikulam Jn., Nagercoil – 629 002.

13. Sebastian. CD. A Manual on seed production and Farming of gaint Freshwater prawn Macrobrachium Rosenbergii. The Marine Product Export Development Authority MPEDA House, Panampilly Avenue, Kochi – 682 036.

14. Srivastava, C.B.L. A Text Book of Fishery Science and Indian Fisheries. Kitab Mahal Distributors,28,Netaji Subash Marg, New Delhi – 110 002.

15. Sundararaj, V. & B. Srikrishnadhas, Cultivable Aquatic Organisms, Narendra Publishing House,1417, Kishan Dutt street, Maliwara, Delhi – 110 006

COs at Cognitive level and mapping with POs and PSOs

<table>
<tr><th colspan="18">SEMESTER: VI
PART III: CORE ELECTIVE COURSE – 6.4B AQUACULTURE</th></tr>
<tr><th rowspan="2">CO</th><th rowspan="2">COGNITIVE LEVEL</th><th colspan="7">PO</th><th colspan="8">PSO</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>CO1</td><td>K-1 Remember
K-2 Understand</td><td>3</td><td>2</td><td>2</td><td>2</td><td>1</td><td>3</td><td>2</td><td>3</td><td>2</td><td>2</td><td>3</td><td>1</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td>CO2</td><td>K-4 Analyse</td><td>3</td><td>2</td><td>3</td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>3</td><td>2</td><td>1</td><td>3</td><td>3</td></tr>
<tr><td>CO3</td><td>K-2 Understand</td><td>3</td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>3</td><td>3</td></tr>
<tr><td>CO4</td><td>K-4 Analyse
K-3 Apply</td><td>3</td><td>3</td><td>3</td><td>2</td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>3</td><td>2</td><td>1</td><td>3</td><td>3</td></tr>
<tr><td>CO5</td><td>k-3 Apply
K-5 Evaluate</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>2</td><td>3</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>3</td><td>3</td></tr>
<tr><td>CO6</td><td>k- Apply
K-6 Create</td><td>3</td><td>3</td><td>3</td><td>2</td><td>3</td><td>3</td><td>3</td><td>2</td><td>3</td><td>2</td><td>3</td><td>2</td><td>2</td><td>3</td><td>3</td></tr>
</table>

Strongly correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -VI /Core Elective Practical

CORE ELECTIVE PRACTICAL : PRACTICAL- X

6.4B AQUACULTURE

L	T	P	C
--	--	2	1

LEARNING OBJECTIVES (LOs)

The objectives of the practical course are enabling the students to

➢ know the procedure for the estimation of physicochemical parameters of fish pond.

➢ understand the different species of culturable organisms.

> gain knowledge about the maintenance and management of fish farm from field visit.

COURSE OUTCOMES (COs)

On successful completion of the practical course the student will be able to

CO1: test the parameters relevant to establish a fish farm.

CO2: asses the qualities of culturable species.

CO3: appreciate the adoptable qualities for selection.

CO4: solve the encountered problems scientifically and reasonably.

PRACTICALS

1. Determination of pH in two water samples using pH meter.

2. Estimation of Salinity, Dissolved Oxygen and Alkalinity in two water samples.

3. Mounting- Placoid, Cycloid and Ctenoid scales.

4. Museum specimens, slides, models and charts:

Catla, Rogu, Mrigal, Channa, Penaeus, Crossostrea, Raft culture, Pinctada, Argulus, Lernaea.

5. Field Visit to Aquaculture unit/ Fish farm- Report (Mandatory)

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-3 Apply	3	2	3	2	2	3	2	2	3	3	2	3	2	3	3
CO2	K-5 Evaluate	3	3	3	2	1	3	2	2	3	3	2	3	2	3	3
CO3	K-4 Analyse	2	3	3	1	2	3	3	3	3	2	2	2	2	3	3
CO4	K-6 Create	2	3	3	1	2	3	3	2	3	2	2	2	3	2	3

Table spanning "SEMESTER: VI / PART III: CORE ELECTIVE PRACTICAL X: AQUACULTURE"

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

CORE ELECTIVE (Any one)
(GROUP- A)
6.4 C- DAIRY PRODUCTION TECHNOLOGY

L	T	P	C
5	--	--	4

LEARNING OBJECTIVES (LOs)
The objectives of the course are enabling the student to
➢   give an account on different breeds of dairy cattle.
➢   study their characteristics and performance, the factors affecting their health.
➢   describe construction, maintenance of sheds.
➢   introduce the growing and maintenance and disease managements of dairy animals.
➢   know the technologies that help artificial insecure ELECTIVE COURSEmination and genomic testing.

COURSE OUTCOMES (COs)
On successful completion of the course the student will be able to
CO1: remember the importance, breed types and breeding technologies for future usage.
CO2: understand the selection, growing and maintenance of dairy animals.{
CO3: apply the knowledge of nutrient on feeding lactating cow.
CO4: acquire the skill to manage a dairy farm or to start one with adequate input.
CO5: identify the disease and adopt correct treatment.
CO6: evaluate and formulate marketing technique for dairy products in a profitable way.

UNIT I
IMPORTANCE OF THE STUDY

History and future of Live stock in India – Live stock reproduction – Organs – Fertilization – Artificial Insemination – Inheritance – Hybrids – Hybrid Vigor – Grading – Pure breeds – Inbreeding.

(15L)

UNIT II

NUTRITION

Source of feed- Feed composition- Nutrient for milk production- water, energy, protein, fibre, vitamins and digestibility. Nutritive values of common feeds – Commercial and mixed feeds – Balance ration.

(15L)

UNIT III
DAIRY ANIMALS AND MANAGEMENT

Milching breeds- Cattle: Cow – Buffaloes – Goat – Their economic importance – Productivity. Managing dairy cattle- Breed selection- Indian native and exotic breeds.

(15L)
UNIT IV
HOUSING AND DISEASE MANAGEMENT

Dairy shed design, Cooling strategies- Animal sign management, Cow compost management, Calf management, Dairy herd management, Growth, Cow health and reproductive management, Breeding, Maternity management. Lactation cycle management and Common management.

Live stock diseases – Common parasites in India – Treatment. Vaccination, Deworming, Weaning etc.,

(15L)
UNIT V
MILKING AND MARKETING MILK PRODUCTS

Milking Management: Gathering cow for milking; Milking machines for smallholders; cleaning and sanitizing dairy equipment; Milking procedure. Dry cow therapy; Milk filtration Management. Milking Hygiene; Post-harvest milk quality.

Milk and other dairy products –Milk, cheese, ghee, butter, yoghurt, gluten, milk powder etc., Nutritive values of fresh and preserved products – Combating spoilage of milk – Souring – Gassy Curdling – Robiness – Sweet curdling – Pasteurization.

(15L)
 (TOTAL 75L)
Books for reference
1. Principles of Dairy Chemistry. Janness, Robert and Sturte Patton; WielyEastern.
2. Artificial Insemination in Farm animals: Perry Enos (Eds.) Oxford &IBH.
3. Breeding and Improvement of Farm animals: Rice, Victor, Arthur; Tata MCGraw Hill.
4. Livestock and Poultry Production: Singh, Herbans and Earl Moore; Prentice Hallin India.
5. Klaus, A. J. (2015). Dairy Farming: The Beautiful Way
6. Leitch, A. (2018). The Dairy Farm: Dairy Cattle Methods, and Dairy Farm Management

COs at Cognitive level and mapping with POs and PSOs

SEMESTER: VI															
PART III: CORE ELECTIVE COURSE : 6.4C- DAIRY PRODUCTION TECHNOLOGY															

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-1 Remember	2	3	3	2	2	-	1	3	2	1	2	2	1	1	2
CO2	K-2 Understand	3	3	3	2	2	3	2	3	3	3	4	3	3	2	3
CO3	K-3 Apply	2	3	3	2	3	2	3	3	3	3	3	3	3	3	2
CO4	K-4 Analyse	2	3	3	2	3	1	3	3	2	3	2	3	3	2	3
CO5	K-5 Evaluate	2	2	2	-	2	3	3	3	2	3	2	3	2	3	3
CO6	K-6 Create	2	-	3	-	2	2	3	3	2	2	2	3	3	3	3

Strongly Correlated (3); Moderately Corr1elated (2); Weakly Correlated (1); No Correlation (0)

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -VI /Core Elective Practical

CORE ELECTIVE PRACTICALS- X

6.4C DAIRY PRODUCTION TECHNOLOGY

L	T	P	C
--	--	2	1

LEARNING OBJECTIVES (LOs)

The objectives of the practical courses are enabling the students to

➢ know the various tests to find the quality of milk.

➢ identify the cattle breeds by their distinguishing characters with examples.

➢ study the methods of preservation methods of milk and milk products.

➢ get an idea for starting dairy farm by periodical visits.

COURSE OUTCOMES (COs):

On successful completion of the practical course the student will be able to

CO1: understand dairy production technology is the need based industry and realizes

the demand of milk supply.

CO2: apply the knowledge on the selection of feed types and their nutritional status.

CO3: analyze and evaluate the safety and profitable way to start dairy unit.

CO4: set a goal to open dairy processing unit and marketing the dairy products. **PRACTICALS**

1. Visit to Pasteurization plant and reporting.
2. On the spot tests of pure milk – Specific gravity, total solids and adulteration of milk.
3. Demonstration of Dairy products – Cream, Butter, Ghee, Khoa, and Ice cream.
4. Identification of cattle diseases – Prevention and Cure-Method of taking temperature in cows.
5. Preparation of Cattle Feed-Balanced food – Identification of different feed plants.
6. Artificial Insemination – Common Surgical Instruments and their uses.
7. Periodical visit to a Good Dairy Farm and Reporting. (Mandatory)

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-3 Apply	3	2	3	2	2	3	2	2	3	3	2	3	2	3	2
CO2	K-4 Analyse	3	3	3	-	2	3	2	2	3	3	2	3	2	3	2
CO3	K-5 Evaluate	2	3	3	-	2	3	3	2	3	2	2	2	2	3	3
CO4	K-6 Create	2	3	3	1	2	3	3	2	3	2	2	2	3	2	3

The table above is titled: SEMESTER: VI / PART III: ELECTIVE PRACTICAL X : DAIRY PRODUCTION TECHNOLOGY

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

CORE ELECTIVE (GROUP B)- Any one

CORE ELECTIVE COURSE: 6.5A -APICULTURE

L	T	P	C
4	--	--	4

LEARNING OBJECTIVES (LOs)
The objectives of the course are enabling the student to
  ➢ familiarize the organization of bee colony
  ➢ know the systematic planning of apiary unit.
  ➢ get knowledge about the value of honey and harvesting techniques.
  ➢ understand the disease and enemies and behaviour of honey bees.
  ➢ examine the scope for self employment opportunities. give self-employment
    opportunities after their graduation
  ➢ provide rural based and welfare oriented knowledge.

COURSE OUTCOMES (COS)

On successful completion of the course the student will be able to

CO1: classify the honey bees and categorize its developmental stages and explain
    the principles of Apiculture and methods of Bee keeping.

CO2: construct modern hives and rear and recommeds apiary as a less expensive
    but profitable self employment.

CO3: make use of Honey bee products and marketing.

CO4: distinguish the enemies of bees and protect the bees from various diseases.
    and identify swarming, robbing and foraging behaviour of bees in an apiary.

CO5: trust the less expensive but profitable self employment.

CO6: gain confidence to establish an apiary after their graduation as a rural based
    and welfare oriented venture.

UNIT I
INTRODUCTION

Definition, Scope, Classification of bees: Rock bee, Indian bee, Little bee and Dammer bee- their identification and habits, choice of species in Apiculture.

Bee colony: Distinctive features, Identification and Functions of queen, drones and workers, Structure and functions of legs, mouth parts and sting of worker bee. Development of Honey bee: egg, larva and pupa- time taken for the development of queen, drone and worker. Food of the bee: bee bread, honey and pollen- royal jelly- propolis. Artificial feeding.

(12L)

UNIT II
PRINCIPLES OF APICULTURE

Arranging an Apiary: position- space- direction. Acquiring bees: care of newly captured colonies- handling the bees. Bee keeping: Primitive methods - their advantages and disadvantages. Different types of Modern hives: Architecture - Parts of artificial hive and its advantages – other appliances used in apiary The bee comb and its architecture-Different kinds of cells-Burr comb.

(12L)

UNIT III
HONEY BEE PRODUCTS

Honey: Collection and Extraction, Preservation and storage –Physical properties, Chemical composition, nutritive value, medicinal values- honey as daily food.

Bee wax- Production - method of extraction- characteristics and uses.

Bee venom- method of collection - composition of venom- its uses.

(12L)
UNIT IV
ENEMIES AND DISEASES OF BEES

Enemies: Greater wax moth, lesser wax moth, ants, wasps, lice, beetles, birds and their management.

Diseases of bees: adult and brood diseases- Bacterial, Fungal, Viral & Protozoan- Prevention and Control measures.

(12L)

UNIT V
SWARMING AND OTHER BEHAVIOURS

Swarming- Prevention and control. Robbing and Fighting- Prevention and control. Uniting stocks- Different methods. Queen rearing. Supersedure. Foraging, inter-relationships of plants and bees. Behaviour of bees- bee dances.

(12L)
(TOTAL: 60L)

Books for reference

1. Mishra,R.C. &R. Garg. Perspectives in Indian Apiculture. Agrobios (India)behind Nasrani Cinema, Chopasani Road, Jodhpur-342002.
2. Abrol,D.P. Bee Keeping in India. Kalyani Publishers, B-1/1292, Rajinder Nagar,Ludhiana-141 008.
3. Cherian, M.C. &Ramachandran. Bee Keeping in SouthIndia.
4. Philips, E.F. Bee Keeping,Agrobios (India) behind NasraniCinema,Chopasani Road,Jodhpur-342 002.
5. Sadar Singh, Bee Keeping in India Kar Delhi.
6. Sharma P.L and Singh, S.(controller) Hand Book of bee Keeping, printing and Stationery,Chandigarh.
7. Webb,A. Bee Keeping for profit and Pleasure, Agrobios (India), Behind Nasrani Cinema, Chopasani Road, Jodhpur-342002 .

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-1 Remember	3	3	2	2	3	2	2	3	2	2	2	2	3	2	2
CO2	K-2 Understand	2	3	3	2	3	2	3	3	3	3	2	2	3	2	2
CO3	K-3 Apply	2	3	3	2	3	2	3	3	3	3	2	3	3	2	2
CO4	K-4 Analyse	2	3	3	2	3	3	3	3	2	3	2	3	3	3	3
CO5	K-5 Evaluate	1	2	2	2	2	3	3	2	2	3	3	3	3	3	3
CO6	K-6 Create	1	1	2	1	2	2	3	2	2	3	1	2	2	3	3

Table title: SEMESTER: VI — PART III : CORE ELECTIVE COURSE – 6.5A: APICULTURE

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

CORE ELECTIVE PRACTICALS- X
6.5A APICULTURE

L	T	P	C
---	--	2	1

LEARNING OBJECTIVES (LOs)
The objectives of the practical course are enabling the student to

- ➢ observe and mount legs, mouth parts and sting of workers to appreciate their diversified functions.
- ➢ compare the features of the colony members.
- ➢ relate the structural modifications with the functions
- ➢ practice the procedures for handling the bees and hygienic extraction of honey/
- ➢ motivate to start an apiary unit.

COURSE OUTCOMES (COs)
On successful completion of the practical course the student will be able to
CO1: identify and characterize the members of the colony.
CO2: describe the structure and management of the colony.
CO3: adopt suitable methods to handle the bees safely.
CO4: plan to develop a modern apiary and marketing honey with self involvement
and interest.
PRACTICALS
1.   Mountings of legs, mouth parts and sting of worker bees.
2.   **Specimen**, **Model**, **Slide and Appliances**:
     Queen, Worker, Drone, Artificial hive (Newton hive), Queen excluder,

     smoker, honey extractor, honey, scraffing knife, Bee comb, Bee veil

     and Comb foundation sheet.

3. Report on field visit to Apiary farm/ unit. (Mandatory)

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-2 Understand	3	3	3	2	2	1	2	3	2	2	2	3	2	2	3
CO2	K-3 Apply	3	3	2	2	2	2	3	3	3	2	2	3	3	3	3
CO3	K-4 Analyse	3	3	2	2	2	3	3	3	3	3	2	3	3	3	3
CO4	K-6 Create	2	3	2	2	2	3	3	3	2	2	2	3	2	3	3

The table title spans: **SEMESTER: VI** / **PART III: CORE ELECTIVE PRACTICAL X : APICULTURE**

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -VI /Core   Elective

CORE ELECTIVE COURSE (GROUP B)- Any one
6.5B-FOOD AND FOOD PROCESSING TECHNOLOGY

L	T	P	C
4	--	--	4

LEARNING OBJECTIVES (LOs)
The objectives of the course are enabling the student to

➢ know the physical and chemical properties of food stuff.
➢ study the principles and methods of food processing.
➢ familiarize the safe methods of preparation of palatable diets.
➢ apply the techniques employed to increase their shelf – life.
➢ practice the various methods of processing for different types of food.

COURSE OUTCOMES (COs)
On successful completion of the course the student will be able to
CO1: recall the physicochemical properties of different types of food stuff.
CO2: understand and describe the procedure of processing and preservation of food.
CO3: test and practice the milk processing technology.
CO4: adopt the strategies for fruits and vegetable preservation.
CO5: evaluate the value of preservation of food from animal sources.
CO6: make a firm decision to establish a food processing unit based on the locally
available food resource.

UNIT I
FOOD CHEMISTRY

Definition- importance of water in food, water activCOURSE OUT COMESity and shelf life of food. Carbohydrates: Chemical reactions, functional properties of sugars and polysaccharides i Lipids: Classification and use of lipids in foods, physical and chemical properties, effects of processing on functional properties and nutritive value. Protein and amino acids: physical and chemical properties, distribution, amount and functions of proteins in foods. Effects of processing- Losses of vitamins and minerals due to processing. Pigments in food, food flavours, browning reaction in foods. Enzymes in foods and food industry, Bio-deterioration of foods, food contaminants, additives and toxicants.

(12L)

UNIT II
PRINCIPLES OF FOOD PROCESSING

Scope and importance food processing – National and International perspectives. Principles and methods of food preservation – freezing, heating, dehydration, canning, additives, fermentation, irradiation, extrusion cooking, hydrostatic pressure-cooking, dielectric heating, microwave processing, aseptic processing, hurdle technology. Storage of food, modified atmosphere packaging. Refrigeration , freezing and drying of food, Minimal processing, Radiation processing.

 (12L)

UNIT III
MILK PROCESSING TECHNOLOGY

Definition of milk, composition, physical and chemical properties of milk Constituents and nutritive value of milk, Factors affecting composition of milk, Types of milk. Fluid Milk. Processing- Receiving, Filtration Clarification, Straining, Standardization, Homogenization and its effects. Pasteurization and various systems of pasteurization ; LTLT, HTST, UHT methods, Pasteurizes (Heating and Cooling systems, Flow controller regenerator, Flow division valve)- sterilization, packaging of fluid milk.

Coagulated Milk Products. Channa, Paneer, Classification and manufacturing process of cheese, butter and ghee and its storage.

Condensed Milk - Types and factors affecting the quality of Condensed Milk, Storage of condensed milk - Methods of drying milk (Drum and Spray drying) - factors affecting the quality of dry milk- introduction to instant non-fat dry milk- packaging of dry milk products.

(12L)

UNIT IV
FRUITS AND VEGETABLES TECHNOLOGY
Cleaning, sorting, grading, peeling, and blanching methods and their equipments, ingredients and processes for the manufactures of jam, jellies, marmalade, preserves, pickles and chutneys. Defects and factors affecting the quality of above.

Thermal Processing of Fruits and Vegetables: History, definition, various techniques of thermal processing and their effects on the quality of fruits and vegetable products, thermal process time, introduction the concept of thermal process calculations, types of containers and their selection, spoilage of canned food.

Dehydration of fruits and vegetables: equipment and process for dehydration of plums, apricot, apple, fig, grapes, peach, cauliflower, potato, mushroom, tomato. Freezing process of selected fruits and vegetables: peas, beans, cauliflower, apricot and mushroom.

 (10L)

UNIT V
TECHNOLOGY OF MEAT, FISH AND POULTRY PRODUCTS
Slaughter of meat animals, different cuts of lamb and their uses, post-mortem inspection – post mortem changes- Loss of homeostasis, post-mortem glycolysis and pH decline, Rigor mortis. Preparatory operations of meats and meat products: Abattior- definition and construction, Basic preparatory procedures (commintion, emulsification, preblending). Cured and smoked meats, sausage products- classifications, processing steps and canned meat, meat pickles.

Handling and Dressing of poultry: Inspection of poultry birds, dressing and preparation of ready to cook poultry, factors affecting the quality- Egg and Egg products- structure, chemical composition and nutritive value, spoilage of eggs and preservation of whole eggs and egg products, preparation of egg powder. Fish and fish products: Types of fish, composition and nutritive value, judging and freshness of fish, fish grading and cooking of fish, smoking, pickling, salting and dehydration, preservation of fish and processed fish products. Frozen storage of fresh and processed meat, fish and poultry. Byproducts of fresh and processed meat, fish, poultry and egg industry.
      (14L)
 (TOTAL: 60L)
Books for reference

1.   Food processing and nutrition – Bender A.E. – 1978 Academic Press, London.
2.   Food processing technology: Principles and Practices. Fellows, P. and Ellis, A.1990,New York.
3.   Introduction to food processing – Jelen,P.-1985.Prentice Hall, Reston Virginia, USA.
4.   Food Chemistry – Awrand. W. & Woods, A.E.1973.AVI,Westport.

5. Food Chemistry – Meyer, L.H.-1973. East West Press. Ltd, New Delhi.
6. Outlines of Dietary technology –Woarnes.
7. Preservation of fruits and Vegetables – Vijayakhaderkalyani.
8. Preservation of fruits and Vegetables Srivastava, IBD Co. Lucknow.
9. Fish Preservation – S.K. Kulsherestha.
10. Fish Processing and Preservation –C.L.Cutting.
11. Processed Meat- Pearson and Glite – CBS publishes.
12. Poultry, Meat and Egg Products – Parkursht and Mountney.CBS Publishers

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-1 Remember	3	3	3	1	-	2	1	3	2	2	2	2	2	2	2
CO2	K-2 Understand	3	3	3	2	2	2	1	3	2	2	3	2	2	3	2
CO3	K-3 Apply	3	3	3	2	2	2	2	3	3	2	3	2	2	3	3
CO4	K-4 Analyse	2	3	3	2	2	3	3	3	3	2	3	3	2	3	3
CO5	K-5 Evaluate	2	3	3	3	2	3	3	3	3	2	3	3	2	3	3
CO6	K-6 Create	2	2	3	2	1	3	3	2	2	2	3	3	-	3	3

Title of the table header: SEMESTER: VI / PART III: CORE ELECTIVE COURSE / 6.5B-FOOD AND FOOD PROCESSING TECHNOLOGY

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

CORE ELECTIVE PRACTICALS – X
6.5B FOOD AND FOOD PROCESSING TECHNOLOGY

L	T	P	C
--	--	2	1

LEARNING OBJECTIVES (LOs)

The objectives of the practical course are enabling the student to
  ➢ determine the nutrient content of the milk and milk products.
  ➢ know the procedure for qualitative analysis.
  ➢ identify the adulteration of milk.
  ➢ acquire knowledge of equipments used in dairy industry.
  ➢ enhance the skill to start dairy farm united with milk processing unit.

COURSE OUTCOMES (COs)

On successful completion of the practical course the student will be able to

CO1: adopt the protocols to test the nutrients in milk.

CO2: describe the analytical results**.**

CO3: ingulgate healthy practices.

CO4: start a well equipped dairy/meat/fish/ fruit and vegetable processing unit in
        their locality.

PRACTICALS

1.   Determination of Protein, Starch, Sugar, Amino acids, Crude fibers, Total minerals, Crude fat in food stuff.
2.   Estimation of Vitamins – Ascorbic acid, Thiamine.
3.   Browning reaction in food, Analysis of lipid- saponification value, acid value & Iodine Value.
4.   Determination of Tannins-chemical residues and Aflatoxins, Estimation of Preservative and Antioxidants.
5.   Platform test of Milk.
6.   Determination of SNF, Specific gravity and total solids of milk.
7.   Determination of moisture and fat content of milk powder.
8.   Determination of adulterants in milk like Water, Urea, Neutralizes, Preservatives and Starch.
9.   Preparation of Channa and Paneer.
10. Preparation of different types of milk products and their evaluations.
11. Preparation of fish, Meat, Egg and Vegetable pickles –Demonstration.
12. Estimation of iron sulphide formation in cooked egg.

13. Visit to a Dairy Unit, Different fruit and vegetables processing unit, Slaughter house and observation of different types of cuts made and demonstration of slaughtering, fish processing unit and submit a report.(Mandatory).
14. Equipments and appliances used in various food processing industries- Observation

COs at Cognitive level and mapping with POs and PSOs

CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-3 Apply	3	3	3	2	3	3	2	3	3	2	3	1	1	-	2
CO2	K-4 Analyse	3	3	2	2	3	3	2	3	3	2	2	2	2	-	3
CO3	K-5 Evaluate	3	3	2	2	2	3	3	3	3	2	2	3	2	2	3
CO4	K-6 Create	2	3	2	2	2	3	3	3	3	3	2	3	3	2	3

Strongly Correlated (3); Moderately Correlated (2);Weakly Correlated (1); No Correlation (0).

B.Sc., ZOOLOGY

SEMESTER VI

Core Elective 6.5B   Food and Food Processing Technology

Time: 3 Hrs   **Max. Marks:75**

PART A (10 X 1 =10 marks)

Answer All Questions

1. The period for which food can be used while maintaining the food quality.

    A)Shelf life B) Quality C) Carrying capacity   D) Equilibrium   **(CO1)**   **K1**

2. Sensory impressions experienced when consuming foods are called
    A) flavour B) texture   C) heat D) colour   **(CO1)**   **K1**

3. Method of food preservation in which food is processed and sealed in an airtight container
A) Canning B) Heating C) Freezing D) Sterilization   **(CO2)**   **K2**
4. Process of reducing moisture of food to low levels
A) Heating   B) Cooking   C) Dehydration D) Straining   **(CO2)**   **K2**

5. Removal of coarse particles from milk is called   **(CO3)**   **K1**
A) Straining   B) Filtration C) Clarification   D) Cooling
6. Channa is a   **(CO3)**   **K1**
A) milk product B) canned food   C) meat   D) fruit

16.b) Classify lipids and their uses in foods

17.a) Evaluate the scope and importance of food processing. (OR)   **(CO2)**   **K4**

17.b) Describe the methods of food preservation.

18.a) Explain the methods of processing of milk. (OR)   **(CO3)**   **K3**

18.b) Describe the types and factors affecting the quality of condensed milk.

19.a) Assess the various techniques of thermal processing of fruits. (OR)   **(CO4)**   **K5**

19.b) Discuss the equipment and process for dehydration of vegetables

 20.a) Briefly explain the post-mortem inspection and changes during the slaughter of

meat animals. (OR)   **(CO5)**   **K3**

 20.b) Write an essay on fish and fish products

<div align="center">****************</div>

MSU/2021-22/UG-Colleges/Part-III (B.Sc. ZOOLOGY) SEMESTER -VI /Core   Elective

<div align="center">

CORE ELECTIVE COURSE (GROUP B)
6.5C POULTRY SCIENCE

</div>

L	T	P	C
4	--	--	4

LEARNING OBJECTIVES (LOs)

The objectives of the course are enabling the student to
➢ study the scope and importance of Poultry for the betterment of human livelihood.
➢ introduce on poultry housing, and various commercial breeds of layers and broilers.
➢ get deep knowledge on poultry management and vaccination schedule.
➢ know about poultry nutrition, deficiency symptoms, and feed formulation.
➢ study the causes, symptoms, transmission, treatment, and control of diseas
 COURSE OUTCOMES (COs):

On successful completion of the course the student will be able to

CO1: understand the concepts of chicken breeds and principles of poultry housing.

CO2: gain knowledge on brooding equipments and management of chicken.

CO3. understand poultry nutrition, need formulation and deficiency symptoms

CO4. analyse poultry diseases, Causes, Symptoms, Transmission, Treatment, and Control

CO5: identify, prevent and treat various endoparasites and ectoparasites.

CO6: promote poultry housing and confidence to mange a farm and become a

successful entrepreneur.

UNIT I
POULTRY HOUSING
Scope of Poultry industry in India – Role of egg in human nutrition. Choosing commercial layers and broilers –sexing in one-day old chicks. Poultry housing: general principles of construction of poultry house. Deep litter system – Feeders and Waterers. Cage rearing: Californian cages.
(12L)

UNIT II
POULTRY MANAGEMENT
Rearing of Layer and Broiler chicks – brooding and brooding equipment. Management of Growers, Layers and Broilers. Management of cage birds. Lighting for growers and layers. Summer and winter management. Debeaking – Forced moulting – Poultry manure - Vaccination schedule.
(12L)

UNIT III
POULTRY NUTRITION
Energy metabolism –energy requirements –carbohydrates, protein, amino acids and fat requirements for Chicks, Growers, Layers and Broilers. Symptoms and signs of deficiency: Fibre requirement, requirements of vitamins and essential inorganic minerals – mineral mixture – Deficiency symptoms – non-nutritive feed additives -Feed formulation.
(12L)

UNIT IV
POULTRY DISEASES
Causes, Symptoms, Transmission, Treatment and Control of the following diseases. Viral disease: Ranikhet disease, Fowl pox, Infectious bronchitis and Gumboro disease. Bacterial disease: Salmonellosis, Fowl typhoid, Pullorum, Fowl cholera, Coryza, Botulism and Mycoplasmosis. Fungal diseases: Aspergillosis and Aflatoxicosis.
(12L)

UNIT V
PARASITIC DISEASES
Coccidiosis- Nematode infections- round worms - tape worm - caecal worms – capillary worms – infections. Prevention and treatments by deworming. External parasites of chicks: ticks, mites and lice.
(12L)

(TOTAL 60L)

CORE ELECTIVE PRACTICAL- X
6.5C POULTRY SCIENCE

L	T	P	C
--	--	2	1

LEARNING OBJECTIVES (LOs)

The objectives of the practical course are enabling the student to

➢ know the different types of poultry breeds and their management.

➢ gain knowledge on vaccination schedule.

➢ understand proper disease management.

➢ get an awareness about keeping a poultry farm.

COURSE OUTCOMES (COs)

On successful completion of the practical course the student will be able to

CO1: remember the types of poultry breeds and its management strategies.

CO2: practice proper vaccination schedule.

CO3: adopt novel and healthy method of feeding and watering procedure.

CO4: analyse the causes of diseases and methods of treatment.

CO5: decide to start a poultry farm in their locality.

PRACTICALS

1. Identification of common breeds of chicken.

2. Poultry housing - Cage house Model.

3. Incubation – collection and storage of eggs – incubation period – hatching - sexing

4. Vaccination and medication programme.

5. Feeders and Waterers.

6. Culling of layers.

7. Identification of Ectoparasites.

8. Identification of Endoparasites.

9. Ranikhet disease, Fowl pox, Coryza, Coccidiosis - Diagrams or models..

10. Debeaking, deworming and delicing

11. Internship or Visit to a poultry farm and reporting. (Mandatory)

MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc. PHYSICAL EDUCATION
(Choice Based Credit System)
(With effect from the academic year 2017 -2018)

<u>Eligibility for Admission to the Course</u>
B.Sc Physical Education, Health Education and Sports
(3 Years course)

a) Applicants should have passed the +2 examination of the Government of Tamil Nadu or any other equivalent examination recognized by the Government of Tam I Nadu or approved by the concerned University.

b) School representation in any game or sports is preferred for the applicants. The procedure followed for the selection of B.P.Ed degree should be followed for B Sc., Physical Education, Health Education and Sports Degree candidates.

c) The candidates should not have completed 21 years of age as on 1st July. However, relaxation of 3 years may be given for SC/ST

d) Admission shall be made on the basis of ranking for a total of 150 marks as detailed below.

1. Qualifying Examination	25 marks
2. Participation in Sports and Games	25 marks
3. Games skill test	50 marks
4. Track and Field Skill test	50 marks

Games and Sports participation:　　　　　(Maximum Marks:25)

1. Representation for the Country/National placing	25 marks
2. State Representation (Form II/IV in games/Sports)	20 marks
3. Inter Division (Participation) BDS/RDS Inter District (participation)/CBSC CLUSTER	15 marks
4. District (BDS/RDS)	10 marks
5. Inter-School Representation	05 marks

All other quota system and rule of reservation of the Government of Tamil Nadu shall be followed.

MANONMANIAM SUNDARANAR UNIVERSITY TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc. PHYSICAL EDUCATION

(Choice Based Credit System)
(With effect from the academic year 2017 -2018)

III Semester

	Core/Allied	Title	Hours	Credits
Part I	Language	Tamil	6	4
Part II	Language	English	6	4
Part III	Core V	Methods in Physical Education	5	4
Part III	Allied III	Theories of Games-I Kabaddi, Kho-Kho, Handball	3	3
Part III	Skill Based Core I	Sports Medicine	4	4
Part III	Major Practical III	Kabaddi, Kho-Kho, Handball	3+1*	2
Part IV	Non Major Elective I	Fitness and Wellness	2	2
Part IV	Common	Yoga	2	2
		Total	**32**	**25**

- Preparatory hours for students

IV Semester

	Core/Allied	Title	Hours	Credits
Part I	Language	Tamil	6	4
Part II	Language	English	6	4
Part III	Core VI	Organization and Administration in Physical Education	5	4
Part III	Major Practical IV	Teaching Practice	3+1*	2
Part III	Non Major Elective II	The Olympic Movement	2	2
	Skill Based Core II	Psychology and Sociology in Physical Education	4	4
Part III	Allied IV	Applied Kinesiology & Bio-mechanics	3	3
Part IV	Common	Computers for Digital era	2	2
Part V	Extension Activity	NSS/NCC/YRC/YWF/PE	0	1
		Total	**32**	**26**

- Preparatory hours for students

V Semester

	Core/Allied	Title	Hours	Credits
Part III	Core VII	Exercise Physiology	6	4
	Core VIII	Test, Measurement and Evaluation	6	4
Part III	Core IX	Theories of Track and Field	4	4
Part III	Major Elective I	a. Sports Nutrition b. Sports Journalism	4	4
Part III	Major Practical V	Track Events	4	2
Part III	Major Practical VI	Human Performance Analysis	4	2
Part IV	Skill Based Common	Personality Development/Effective Communication/Youth Leadership	2	2
	Total		**30**	**24**

VI Semester

	Core/Allied	Title	Hours	Credits
Part III	Core X	Principles of Sports Training	6	4
	Core XI	Theories of Games (Basketball, Football, Hockey, Cricket, Volleyball)	5	4
Part III	Major Elective II	a. Sports Physiotherapy b. Sports Technology	4	4
Part III	Major Practical VII	Field events	4	2
Part III	Major Practical VIII	Games of specialization (Cricket, Basketball, Volleyball, Hockey, Football)	4	2
Part III	Major Project	Competitions/Training/Survey/Schemes	7	7
	Total		**30**	**23**

Total Number of Hours **180**   Total Number of Credits **146**

Part	Core/Allied	Title	Hours	Credits
IV	NME	**Fitness and Wellness**	2	2

Preamble

Understand the concept of fitness learn the Health and Wellness learn the Principles of Exercise. To create awareness about fitness & its importance in life. To choose appropriate activities for development of specific fitness components.

UNIT – I

Components of Physical fitness – Definition of Strength, Speed, Endurance, Flexibility and Coordination – Health and Wellness .

(5 hours)

Unit II

Prevalence of Physical activity – Barriers to a physically active life style – Medical Evaluation – Fitness Appraisal – Stages of Program Development for Fitness Participants.

(5 hours)

UNIT-III

Principles of Exercise: Ideal Exercise Program – Fitness Concepts – Exercise Guidelines for Children, Adolescence, Adults and Special Groups — Exercise under difficult conditions: Traveling, limited space, injury, busy and visitors.

(10 hours)

UNIT-IV

Fitness Activities: Aerobics, Aquatics, Dance, Brain training, SAQ training, isometric training, cycling, stair climbing, treadmill, walking – Health benefits of physical activity.

(5 hours)

UNIT-V

Home exercise equipment–fitness according to age- Making the right exercise program – Maintaining fitness program - Programme for weight management- personal hygiene

(5 hours)
Total (30 hours)

References

1. Allen W. Jackson et al, Physical Activity for Health and Fitness, USA: Human Kinetics, 1999.

2. Jerrold S. Greenberg et al., Physical Fitness and Wellness (3rd Ed,), USA: Human Kinetics, 2004.

3. Joseph P. Winnick and Francis X. Short, Physical Fitness Training Guide, USA: Human Kinetics, 1999.

4. Edmund R. Burke, Home Fitness: Handbook, USA: Human Kinetics, 1996. Lynne Brick, Fitness Aerobics, USA: Human Kinetics, 1996.

5. Martha White, Water Exercise, USA: Human Kinetics, 1996.

6. Debi Pillarella and Scott O. Roberts, Fitness Stepping, USA: Human Kinetics, 1996.

7. Gudrun Paul, Aerobic Training, Meyer and Meyer sports: Uk, 2000.

8. Bettina M. Jasper, Train your Brain, Meyer and Meyer sports: UK, 1999

Part	Core/Allied	Title	Hours	Credits
IV	Non Major Elective I	**Olympic Movement**	2	2

Preamble

Understand the origin and modern Olympic movement. Study about the Olympic rings and flag. Describe the Different Olympic Games analyse the Committees of Olympic Games.

Unit – I
Origin of Olympic Movement - Philosophy of Olympic movement - The early history of the Olympic movement - The significant stages in the development of the modern Olympic movement - Educational and cultural values of Olympic movement

(10 hours)

Unit – II
Modern Olympic Games - Significance of Olympic Ideals, Olympic Rings, Olympic Flag

(5 hours)

Unit – III
Olympic Protocol for member countries - Olympic Code of Ethics - Olympism in action - Sports for All

(5 hours)

Unit – IV
Different Olympic Games - Para Olympic Games - Summer Olympics - Winter Olympics - Youth Olympic Games

(5 hours)

Unit – V
Committees of Olympic Games - International Olympic Committee - Structure and Functions - National Olympic committees and their role in Olympic movement - Olympic commission and their functions - Olympic medal winners of India

(5 hours)

Total (30 hours)

Reference:

Osborne, M. P. (2004). Magictree house fact tracker: ancient greece and the olympics: a nonfiction companion to magic tree house: hour of the Olympics. New York: Random House Books for Young Readers.

 Burbank, J. M., Andranovich, G. D. &Heying Boulder, C. H. (2001). Olympic dreams: the impact of mega-events on local politics: Lynne Rienner

Part	Core/Allied	Title	Hours	Credits
III	Major Elective	**Sports Nutrition /** **Sports Journalism**	4	4

Preamble

Recognize special physiological demands of various levels of physical activity. Determine energy needs for specific types of physical activity. Analyze fluid intake required for various levels and types of physical activity. Understand the nutritional requirements for physical activity. Understand the relationships between diet and training for optimum performance. Plan diets for achievement of optimum weight and peak performance. Discuss current theories related to weight gain/loss and control issues. Outline goals for nutrition management of athletic teams. Identify current controversies in sport nutrition. Discuss human nutrition research and application with other health professionals.

Unit I   Meaning Need, Nature and Importance of Nutrition Role of Nutrition on Higher Performance in sports

(10 hours)

Unit II   Basics of Nutrition, Carbohydrates, Fats, Proteins, Vitamins, Minerals, Water, Balanced diet, Nutritive value of Food stuffs.

(10 hours)

Unit III   Nutrition for Athletes and players, Energy requirements in Sports, Carbohydrate in loading.

(15 hours)

Unit IV   Percentage of energy derived from foods, Glycemic Index of food, Dietary fiber of food. Nutritive value of food stuffs.

(15 hours)

Unit V   Principles of weight control, Exercise. The Key to successful weight loss management designing weight loss programme. Tips for control body weight.

(10 hours)
Total (60 hours)

References:-

1. Pande P.K. and L.C. Gupta, Putline of Sports Medicine : Jaypee Brothers, New Delhi, 1987.
2. Hoeger W.K. Werner and Sharon A. Hoeger, Fitness and Welness : Mortor Publishing Company, Englewood, 1990.
3. Goswami Shashikant, Nutrition for sports, SAINSNIS, Patiala, 1996

SPORTS JOURNALISM

Preamble

This class is the introduction to the best practices of sports journalism and more broadly, sports media. Journalism is no longer only the production of ink onto paper, and sports journalism is no exception in that dynamic. The moniker 'toy department' of journalism, which is how some would prefer to think of sports and sports coverage, belies the financial commitment made to sports and sports coverage.

Unit I   Sports Journalism - Meaning, Need, Nature and Scope, Aim and Objectives of Mass Communication. Purpose of mass media for the propagation of sports and games Growth of sports communication and periodicals Sports coverage Sports coverage on AIR, T.V and Films

(10 hours)

Unit II   Basic Principles of sports reporting. Difference between general news reporting and Sport reporting Source of sports news, Sports spot news Advanced story and flash back Follow up story Basic of Athletic reporting, Basics of Games Reporting, Interviews, Photos, News, Tit-bits.

(10 hours)

Unit III   Editing - Techniques Editor - Sub Editors Copy reading and handling sports news Design and makeup of the sports page Typography and various process of printing News paper styles and slant News Structure

(15 hours)

Unit IV   Radio & TV Commentary. Differences between Radio & TV Commentary. Experts comments Sports reviews for the radio and T.V

(15 hours)

Unit V   Advertising and Newspaper Management. Radio and T.V Advertising News paper organization and management of news paper circulation Ethics and Responsibilities of Sport Journalists.

(10 hours)

Total(60hours)

References :-

1. Gurusamy, Ithazial Kalai, Dindigual : Guru - Themozhi, 2001.
2. Ahuja A.N., Theory and Practice of Journalism, Subject Publication, New Delhi, 1984.
3. Kamath, M.V., Professional Journalism, Vikas Publishing House Ltd., New Delhi, 1981.
4. Puri G.K., 'Journalism, Sudha Publication, Pvt., Ltd., New Delhi.

Part	Core/Allied	Title	Hours	Credits
III	Major Elective II	**Sports Physiotherapy / Sports Technology**	4	4

Preamble

  Understand the Massage Therapy Rheumatic Conditions, acquire knowledge on Technology in Physical Education And Sports learn about Use of ICT in Physical Education learn about rehabilitation of sports injuries.

  To understand nature, scope and importance of IT as a school subject. To understand the objectives of teaching IT To apply various methods of teaching IT effectively. To develop adequate skills in the preparation and use of teaching aids. To use various tools of evaluation. To correlate IT with other school subjects

Unit I Meaning, Nature, Need and Importance of Physiotherapy

(10 hours)

Unit II   Electricity and Conductor, Short wave diathermy, Microwave diathermy, Diapulse Diathermy, Ultra Sound Waves, Infra red rays, Ultra violent rays - Sources - Effect and uses - Techniques for infra red and ultra violet irradiation.

(10 hours)

Unit III   Massage Therapy - Brief History of Massage, Points to be considered in giving massage, classification of the Manupulations used in massage. The Technique, the Effect, uses, Indication and contra- Indications of all manupulations.

(15 hours)

Unit IV   Rheumatic Conditions - Classification – Rhumatoid Arthritis – Spondylytis - Acute respiratory conditions - Chronic respiratory conditions -Conditions of the Nervous System. Introduction, Sign and Symptoms of neurological dis-orders like Paraplegia, Hemiplegia, Cerebral Palsy. Various infections of the Nervous System-Meningites, Poliomyetetis, cerebral palsy.

(15 hours)

Unit V   Conditions of the cardio vascular system - Introduction, heart failure, classification carelitis.-Sign and symptoms and prevention-Chronic vascular disorders, coronary occlusion and Efforts requiring hypertension- Dis-orders of the blood vessels- Atherosilerosis, cold extremities, various thrombosis - Fracture of the upper extremity and lower extremity - Dislocation

(10 hours)

References:

1) Joan, N. Laan, "Physitharaphy in Medical Conditions"
2) Thorndike, "Atheletic Injuries"
3) Joan, "Physiotharaphy in Surgical conditions"
4) Henry, C. Kondal and Fiorence P. Kondal, Muscle and Funtions.
5) I.B. Clayton, "Text Book of Electroherephy" and Actiontheraphy
6) Branda Savage, "Preliminary electricity for the Physiotharapist"
7) Edwin M. Prasnet, "Manual of Massage and Movements"
8) R. Foracks, "Exercise Theraphy"
9) M.V.Locs, "Manual of Massages"
10) Adish Luchwald, "Physical Rehabilitation for Daily Living"

Sports Technology

UNIT-I
Technology In Physical Education And Sports - Initiating technology - Use of Audio/Video technology - Image analysis

(10 Hours)

Unit II
Technological devices used in Physical activity and sports (underwater camera, various measuring tools, wind gauges, foul indicators, electronic gadgets, adobe Photoshop, Microsoft animation, laser beam technology, LCD display)

(15 Hours)

UNIT-III
Use of ICT in Physical Education - Computer analysis instructional software - Using technology to improve instructional process

(10 Hours)

Unit IV
Use of World Wide Web - Power point presentation - Assessing student learning.

(10 Hours)

UNIT-V
Meaning, types and importance of Teaching methods; Factors effecting Teaching Methods;
Presentation Techniques – Personal and Technical preparation;
Meaning and importance of Audio-visual Aids in Physical Education;
Meaning and types of command; Steps/stages in teaching Motor Skill;

(15 Hours)

Total (60 hours)

REFERENCES
1. Brar, R.S. et al. Teaching Methodology and Educational Technology in Physical Education, Kalyani Publisher: New Delhi, 2008.
2. Hoover, Kenneth H. The Professional Teacher's Handbook, Boston, Allyn and Bacoon, 1972.
3. Krik, David. Physical Education and Curriculum Study, Kent, Croom Helm, 1988.
4. Mohanty, J. Educational Technology, New Delhi, 1992.
5. Wessel Janet A, and Kelly Luke. Achievement-Based Curriculum Development in Physical Education, Philadepia, Lea and Febiger, 1986

Vision of the University

To provide quality education to reach the un-reached

Mission of the University

To conduct research, teaching and outreach programmes to improve conditions of human living.

To create an academic environment that honours women and men of all races, caste, creed, cultures and an atmosphere that values intellectual curiosity, pursuit of knowledge, academic freedom and integrity.

To offer a wide variety of off-campus educational and training programs, including the use of information technology, to individuals and groups.

To develop partnership with industries and government so as to improve the quality of the workplace and to serve as catalyst for economic and cultural development.

To provide quality / inclusive education, especially for the rural and un-reached segments of economically downtrodden students including women, socially oppressed and differently abled.

Vision of the Department

Creating a sporty and fit nation through Physical Education and Sports

Mission of the Department

To conduct research, teaching and outreach programmes to improve health conditions and sports performance of human being.

To collaborate with stakeholders to improve the standard of living and to serve as catalyst for fitness and wellness.

To provide quality / inclusive physical education.

To provide opportunities to develop the knowledge, skills, and personalities necessary to meet their personal and professional goals.

To move towards a more physically active lifestyle by changing behavioural patterns.

To create the sports culture at the grass-root level.

Preamble

Physical Education is a form of one of the most effective means of education imparted through physical exercises, recreational activities and sports. It is an integral part of education. Which by mere participation in it gives the outcomes. These outcomes are both instant as well as have strong carry over values in the life. The children as well as the adults and the old enjoy physical activities & sports and gets benefit in the form of stronger muscles and bones, increased energy, coordination level and most importantly the decreased risk of developing chronic diseases.

The UNESCO in its General Conference in 1978 was convinced that, everyone should be free to develop and preserve his or her physical, intellectual and moral powers. Physical Education, Health Education and Sports should consequently be assured and guaranteed for all human beings. Physical Education is now a regular feature in the primary and secondary schools as well as it is gaining popularity in the higher education. The course opted for this is elective as well as the core at the college and the university level in India.

The graduate level course in Physical Education, Health Education and Sports contains subjects varying from foundation of Physical Education to Anatomy, Physiology, Kinesiology, Test & Measurement, Nutrition, Rehabilitation, Psychology, Sports Training, Sports Biomechanics, Methods of Teachings etc. which are aimed to give thorough knowledge and skills to the students. Students perusing physical education courses are fit to join the jobs as physical trainers, coaches, game officials, referees, umpires, curators, gym trainers, life guards, personal trainers etc. During their course of education the students also develops the expertise to establish their own business as entrepreneurs in the field of sports, fitness, recreation, adventure sports, camping, event management etc.

Learning Outcomes-Based Curriculum Framework
The learning outcomes-based curriculum framework for a B.Sc degree in Physical Education is intended to provide a broad framework within which Physical Education programme responds to the needs of students and requirements. The framework is expected to assist in the maintenance of standard and uniformity of Physical Education degrees across the country. This will also help in periodic programme review within a broad framework of agreed expected graduate attributes, qualification descriptors, programme learning outcomes and course-level learning outcomes. The framework does seek to bring about uniformity in syllabi for a programme of study in Physical Education, teaching-learning process as well as learning assessment procedures. However, the framework is also intended to allow flexibility and innovation in programme design.

Nature and extent of the B.Sc. degree programme
Physical Education is normally referred to as the science that aims to developall-inclusive aspects of human personality through physical and sports activities. Physical education is a multidisciplinary subject that cannot be studied in seclusion under the scope of one or two subjects. The scope of Physical Education as a subject is very broad. It caters to the need for developing capability of the students on physical, mental and social aspects. Physical education also aims to develop activity as an alternate and prophylactic medicine. The key areas of study within the Physical Education are *'Exercise Physiology, Sports Psychology, Sports Sociology, Sports Management, Sports Journalism, Kinesiology- Biomechanics, Sports Training, Sports Medicine, Kinanthropometry* etc.

Degree program in Physical Education covers topics that overlap with the areas outlined above and that address the interfaces of Physical Education with other subjects such as Physiology, Bio-Chemistry, Physics, Physiotherapy, Psychology, Management, Sociology along with training pedagogy employed for enhancing the functional status of individuals with varied needs. As a part of the effort, to enhance the employability of graduates of Physical Education, programs include learning experiences that offer opportunities in various spheres of human existence.

Program SpecificOutcomes (PSOs)
This would lead the students to understand historical concept of physical education and relationship between Philosophy, Education and Physical Education. The student would further understand the theoretical implications of philosophies of physical education with modern development and social aspects of Physical Education.

1. The curriculum would enable the pass out to select the inherited talented children for various sports activities.
2. The pass out shall be able to orient children in schools with the fundamental skills of selected sports as per their inherited potential.
3. The pass out shall be able to devise training program for athletes engaged in different sports activities
4. The curriculum shall enable them to officiate, supervise various sports tournaments and orient them in organizing sports events at all levels.
A. The curriculum would enable the pass out students to be entrepreneur (to start their own fitness centre, gym, spa etc) and device appropriate fitness program for different genders and age groups of people.
5. The curriculum would enable the pass out to devise training program for physically challenged peoples.

Eligibility for Admission to the programme B.Sc Physical Education, Health Education and Sports (3 Years)
A. Applicants should have passed the +2 examination of the Government of Tamil Nadu or any other equivalent examination recognized by the Government of Tam I Nadu or approved by the concerned University.
B. School representation in any game or sports is preferred for the applicants. The procedure followed for the selection of B.P.Ed degree should be followed for B Sc., Physical Education, Health Education and Sports Degree candidates.
C. The candidates should not have completed 21 years of age as on 1st July. However, relaxation of 3 years may be given for SC/ST.

Admission shall be made on the basis of ranking for a total of 150 marks as detailed below

1.	Qualifying Examination	25 marks
2.	Participation in Sports and Games	25 marks
3.	Games skill test	50 marks
4.	Track and Field Skill test	50 marks

Games and Sports participation: **(Maximum Marks:25)**

1.	Representation for the Country/National placing	25 marks
2.	State Representation (Form II/IV in games/Sports)	20 marks
3.	Inter Division (Participation) BDS/RDS	15 marks
	Inter District (Participation)/CBSC CLUSTER	
4.	District (BDS/RDS)	10 marks
5.	Inter-School Representation	05 marks

All other quota system and rule of reservation of the Government of Tamil Nadu shall be followed.

Course-level learning outcomes
The undergraduate degree program of Physical education will be of three years with six semesters. The Course-level learning outcomes for each course within B.Sc degree programme in Physical Education are given below with content matter (detail syllabus of five units) to be taught in each unit and semester for three years

Scheme of Examination 2021-22(Semester I-VI)

PART	Core/Allied	Title	Hours	Credits
SEMESTER I				
Part I	Language	Tamil	6	4
Part II	Language	English	6	4
Part III	Core I	Foundation of Physical Education and Gymnastics	5	4
Part III	Core II	Professional English	4	4
Part III	Major Practical-I	Gymnastics	2	2
Part III	Allied I	Basic Anatomy and Physiology	3	3
Part III	Allied Practical - I	Kinanthropometry	2	2
Part IV		Environmental Studies	2	2
		Total	**30**	**25**
SEMESTER II				
PART	Core/Allied	Title	Hours	Credits
Part I	Language	Tamil	6	4
Part II	Language	English	6	4
Part III	Core III	Theories of Games-I (Kabaddi, Kho-Kho, Handball)	5	4
Part III	Core IV	Professional English	4	4
Part III	Major Practical II	Kabaddi, Kho-Kho & Handball	4	2
Part III	Allied II	Health Education, Safety Education and First aid	3	3
Part IV		Value Based Education	2	2
		Total	**30**	**23**
SEMESTER III				
PART	Core/Allied	Title	Hrs	Credits
Part I	Language	Tamil	6	4
Part II	Language	English	6	4
Part III	Core V	Methods in Physical Education	5	4
Part III	Allied III	Theories of Games-II (Badminton, Ball Badminton & Tennis)	3	3
Part III	Skill Based Core I	Principles of Sports Training	4	4
Part III	Core Practical III	Badminton, Ball Badminton & Tennis	4	2
Part IV	Non Major Elective I	Principles of Physical Literacy	2	2
Part IV	Common	Yoga	2	2
		Total	**32**	**25**
SEMESTER IV				
PART	Core/Allied	Title	Hrs	Credits
Part I	Language	Tamil	6	4
Part II	Language	English	6	4
Part III	Core VI	Organization and Administration in Physical Education	5	4

Part III	Core Practical IV	Teaching Practice	4	2
Part III	Non Major Elective II	Fitness and Wellness	2	2
Part III	Skill Based Core II	Sports Psychology and Sociology	4	4
Part III	Allied IV	Sports Biomechanics and Kinesiology	3	3
Part IV	Common	Computers for Digital era	2	2
Part V	Extension Activity	NSS/NCC/YRC/YWF/PE	0	1
		Total	**32**	**26**

SEMESTER V				
PART	**Core/Allied**	**Title**	**Hrs**	**Credits**
Part III	Core VII	Exercise Physiology	5	4
	Core VIII	Test, Measurement and Evaluation in Physical Education and Sports	5	4
Part III	Core IX	Theories of Track and Field	5	4
Part III	Core Elective I	a. Principles of Motor Development	5	4
		b. Adapted Physical Education		
Part III	Core Practical V	Track and Field Events	4	2
Part III	Core Practical VI	Measurement and Evaluation in Human Performance	4	2
Part IV	Skill Based Common	Personality Development / Effective Communication / Youth Leadership	2	2
		Total	**30**	**22**

SEMESTER VI				
PART	**Core/Allied**	**Title**	**Hrs**	**Credits**
Part III	Core X	Athletic Care, Sports Injuries and Rehabilitation	5	4
Part III	Core XI	Theory of Games – III (Basketball, Football, Hockey, Cricket, Volleyball)	5	4
Part III	Core XII	Elementary Statistics in Physical Education	5	4
Part III	Core Elective II	a. Sports Nutrition	5	4
		b. Sports Journalism		
Part III	Project & Viva	Project & Viva - State/National Level Tournament (Or) Study Tour	5	2
Part III	Core Practical VII	Games of Specialization (Basketball, Football, Hockey, Cricket, Volleyball)	5	2
	Total		**30**	**20**

****

On completion of the course, the students will be able to

CO. No.	Allied - III - Theories of Games - II (Badminton, Ball Badminton & Tennis)	Cognitive Level
CO 1	developtheunderstandingandknowledgeregardingtheRacketparts,racketgrips,shuttlegrips, Thebasic stances	
CO 2	developtheunderstandingandknowledgeofThebasicstrokes-serveforehand-overheadandunderarm,backhand-overheadandunderarm	
CO 3	gainknowledgeofDrillsandleadupgames,Typesofgames-singles,doubles,includingmixed doubles	
CO 4	gainknowledgeofRulesandtheirinterpretationsanddutiesofofficials	
CO 5	learntherulesandregulationsandcurrentinterpretationofnewchangesin thegames.	

Remember (K1); Understand (K2); Apply (K3); Analyze (K4); Evaluate (K5); Create (K6)

Mapping COs with Pos and PSOs

COs	POs						PSOs					
	1	2	3	4	5	6	1	2	3	4	5	6
1	H	M	M	M	L	H	L	M	H	M	H	L
2	H	M	M	M	H	H	M	H	H	M	H	L
3	H	M	L	L	M	L	M	H	H	M	H	L
4	H	M	L	L	H	L	M	M	H	M	H	L
5	H	M	L	L	H	L	L	M	H	M	H	M

Highly Correlated (H); Moderately Correlated (M); Weakly Correlated (L)

*****
MSU/ 2021-22 / UG-Colleges /Part-IV (B.Sc. Physical Education) /
Semester – III / Non Major Elective I

Part IV	Non Major Elective I	Principles of Physical Literacy	2 hrs	2 Credits

Learningoutcomes:
6. Understand the basic concept of Movement Education and Physical Literacy
7. Know about motor skills and movement pattern
8. Learn about the movement concepts
9. Understand and apply the concept of participation in Physical Activity

UNIT-1: Introduction (6 hours)
Definition, Meaning & Importance of Movement Education- Definition, Meaning & Importance of Physical Literacy- Concept of developmentally Appropriate Physical Activities.

UNIT 2 - Motor Skill & Movement Pattern (6 hours)
Classification of Motor Skills: Fundamental (Locomotor, Non-locomotor, Manipulative Skill), Specialized (Manipulative, Rhythmic Movement, Game & Sport Skills).

UNIT III – Movement Concepts (6 hours)

Introduction to Movement Concepts, Development of Movement Concepts: Space Awareness, Effort Concepts, Relationships- Long Term Athlete Development (LTAD)

UNIT IV Personal & Social Development (6 hours)

Personal Development: Self-concept, Cognitive Functioning and Motivational outcomes - Social Development: Altruism, Controlling Aggression, Cooperation, Group development.

UNIT V – Sports for Development (6 hours)

Sport for Development: Sport for Education, Economic, Gender, Health and Peace.

TeachingLearningStrategies: Theclasswillbetaughtbyusinglecturesanddemonstration,seminars,classroom discussion, videos, charts andpresentations method.
Activities: Lecture/ProjectWork/ Seminars/TermPapers/Assignments/Studyetc.
AssessmentRubrics: ClassroomTest,ProjectWork,Assignments,Presentations
References:

1. Abels, K. & Bridges, J. M. (2010) Teaching Movement Education: Foundations for Active Lifestyles. Champaign, IL: Human Kinetics Publishers.
2. Graham, G., Holt, Shirley & Parker, Melissa. (1993). Children Moving A Reflective Approach to Teaching Physical Education. New York: McGraw Hill Education.
3. Lund, J., Tannehill& Lund, Jacalyn. (2010). Standards-Based Physical Education Curriculum Development, 2nd Edition.Jones&Barlett Learning.
4. Frank, A. M (2003). Sports and Education: A Reference Handbook (Contemporary Education Issues), ABC-CLIO.
5. Ciccomascolo, L. E. & Sullivan, E. C. (2013). The Dimensions of Physical Education. Jones &Barlett Learning.
6. Pangrazi, R. P. (1998). Dynamic of Physical Education for Elementary School Children 12th Ed). Allyn& Bacon.
7. Griffin, L. & Butler, J. (2005). Teaching Games for Understanding: Theory, Research, and Practice. Champaign, IL: Human Kinetics Publishers.

****

Course Outcomes

On completion of the course, the students will be able to

CO. No.	Non Major Elective I - Principles of Physical Literacy	Cognitive Level
CO1	Develop the motivation and ability to understand, communicate, apply and analyse various forms of movement	
CO2	Demonstrate a variety of movements confidently and competently across a wide range of physical activities	
CO3	Make healthy, active choices that are both beneficial to and respectful of their selves, others and environment.	
CO4		
CO5		

Remember (K1); Understand (K2); Apply (K3); Analyze (K4); Evaluate (K5); Create (K6)

Part IV	Non Major Elective II	Fitness and Wellness	2 hrs	2 Credits

Learningoutcomes:
Enable students to
1. Understand the essentials of lifelongwellness
2. Understand the essentials of Physical fitness
3. Overcome fitness barriers and involve in physical activity
4. Know the procedure to assess the fitness

Unit I – Introduction (6 Hours)
Definition, Meaning, Concept of Fitness and Wellness – Need for and importance of Fitness and Wellness.

Unit II - Aging Process (6 Hours)
Aging – Factors influence Aging – Healthy aging – Wellness – Sports as a hobby and Stress management through exercise.

Unit III - Types of Fitness and Wellness (6 Hours)
Physical fitness – Physiological fitness - Functional fitness – Mental fitness – Social Fitness

Unit IV –Management of Obesity and Diabetes (6 Hours)
Obesity-Causes of Obesity-Weight Management – Diabetes – causes of diabetes

Unit V – Assessment of Fitness (6 Hours)
Test for Endurance, Strength, Flexibility and Speed (Only one test from each category)

TeachingLearningStrategies: Theclasswillbetaughtbyusinglecturesanddemonstration,seminars,classroom discussion, videos, charts andpresentations method.
Activities: Lecture/ProjectWork/ Seminars/TermPapers/Assignments/Studyetc.
AssessmentRubrics: ClassroomTest,ProjectWork,Assignments,Presentations

References:-
1. Hoeger, Werner, W. K., &Hoeger, Sharon, A. (1990). Fitness and Wellness. Englewood: Morton publishing Company.
2. Hazedine, (1985). Fitness for Sports. Ramsburg: The CrowoodRess Ltd.
3. James & Hart, L., (1983). 100% Fitness, New Delhi: Goodwill Publishing House.
4. Anspaugh, D. J., Hamrick, M. H., &Rosato, F. D. (1991). Wellness: Concepts and applications. New York: McGraw-Hill.
5. Arumugam, S., & Sivagnanam, P. (2019). Fitness and Wellness. Madurai: Shanlax Publications.

Course Outcomes
On completion of the course, the students will be able to

CO. No.	Non Major Elective II - Fitness and Wellness	Cognitive Level

Mapping COs with Pos and PSOs

COs	POs						PSOs					
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
1	H	L	M	M	L	H	L	M	H	H	L	M
2	H	L	M	M	H	H	L	M	H	H	L	M
3	H	L	M	L	M	H	L	M	H	H	L	M
4	H	L	M	H	L	H	L	M	H	H	L	M
5	H	L	M	H	H	H	L	M	H	H	L	M

Highly Correlated (H); Moderately Correlated (M); Weakly Correlated (L)

****
MSU/ 2021-22 / UG-Colleges /Part-III (B.Sc. Physical Education) /
Semester – V / Core Elective I

Part III	Core Elective I	Principles of Motor Development	4 hrs	4 Credits

Learningoutcomes:
1. Understand the basic Motor development
2. Know about physical growth, maturation and aging
3. Understand and study the motor skills and movement concepts
4. Understanding the concept of Constraints in Motor Development.

Unit I - Introduction (12 Hours)
Definition: Motor Development, Motor Learning, Motor Control–Theoreticalperspectivesof Motor Development- Concept of Physical Literacy -Age classification.

Unit II - Physical GrowthandAging (12 Hours)
Physicalgrowth, maturation and Aging – Types of Motor Skills – Movement milestones in children, Long Term Athlete Development (LTAD)

Unit III –MotorSkills (12 Hours)
Classification of Motor Skills: Fundamental (Locomotor, Non-locomotor, Manipulative Skill), Specialized (Manipulative, Rhythmic Movement, Game & Sport Skills

Unit IV – Movement Concepts (12 Hours)
Development of Movement Concepts: Space Awareness, Effort Concepts, Relationships – Posturalcontrolandbalance

Unit V – Perceptual MotorDevelopment and Constraints (12 Hours)
Sensory-perceptualdevelopment – Perceptionin Motor development – SocialandPsychosocialconstraints -

TeachingLearningStrategies: Theclasswillbetaughtbyusinglecturesanddemonstration,seminars,classroom discussion, videos, charts andpresentations method.
Activities: Lecture/ProjectWork/ Seminars/TermPapers/Assignments/Studyetc.
AssessmentRubrics: ClassroomTest,ProjectWork,Assignments,Presentations

References:

1. Kathleen M.Haywood., & Nancy Getchell., (2009). *Life Span motor Development*(5th Ed.,), Champaign, IL: Human Kinetics,
2. Robert M. Malina., Claude Bouchard &oded Bar-Or., (2004). *Growth, Maturity and Physical Activity*(2nd Ed.,), Champaign, IL: Human Kinetics.
3. NAPSE., (2005). *Physical Education for Lifelong Fitness*(2nd Ed.,), Champaign, IL: Human Kinetics.
4. Allen W. Jackson., James R. Morrow., Jr.David W. Hill & Rod K. Dishman., (2004). *Physical Activity for Health and Fitness*, Champaign, IL: Human Kinetics.
5. Cratty Bryant, J. (1975). *Movement Behaviour and Motor Learning*. Philadelphia Lea &Febiger.

*****

Course Outcomes

On completion of the course, the students will be able to

CO. No.	Core Elective I - Principles of Motor Development	Cognitive Level
CO1	Define motor learning and its relationship to other related disciplines	K1
CO2	Define motor control, motor development, motor behaviors, and motor performance	K3
CO3	Understand how learned motor learning principles can be applied to various professions such as physical education, exercise and sports science, sports coaching, physical therapy, the military, police and special forces, ballet and other dance forms, recreational activities, etc.	K3
CO4	Understand the importance of using new technology or training methods for the enhancement of the motor learning process	K3
CO5	Understand the factors contributing to motor learning performance	K3

Remember (K1); Understand (K2); Apply (K3); Analyze (K4); Evaluate (K5); Create (K6

Mapping COs with Pos and PSOs

COs	POs						PSOs					
	1	2	3	4	5	6	1	2	3	4	5	6
1	H	L	M	M	L	H	L	M	H	H	L	M
2	H	L	M	M	H	H	L	M	H	H	L	M
3	H	L	M	L	M	H	L	M	H	H	L	M
4	H	L	M	H	L	H	L	M	H	H	L	M
5	H	L	M	H	H	H	L	M	H	H	L	M

Highly Correlated (H); Moderately Correlated (M); Weakly Correlated (L)

*****

Part III	Core Elective I	Adapted Physical Education	4 hrs	4 Credits

Learningoutcomes:
1. The knowledge would enable the students to understand the activity requirements of various levels of physically challenged persons.
2. The knowledge would thus enable the students to prepare and organize worthwhile activity programs for various levels of physically challenged persons.

Unit I Introduction   **(12 Hours)**
Meaning, Definition and Importance of Adapted Physical Education and Sports - Purpose, Aims and Objectives of Adapted Physical Education and Sports - Program organization of Adapted Physical Education and Sports - Organizations addressing and giving opportunities to people with disabilities. - Adapted Sports- Para Olympics and other Opportunities

Unit II - Development of Individual Education Program (IEP)   **(12 Hours)**
The student with a disability - Components and Development of IEP - Principles of Adapted Physical Education and Sports - Role of Physical Education teacher

Unit III – Motor Developmental Considerations   **(12 Hours)**
Motor development - Perceptual Motor development - Early childhood and Adapted Physical Education - Teaching style, method and approach in teaching Adapted Physical Education

Unit-IV - Individual with unique need and activities   **(12 Hours)**
Behavioral and Special learning disability - Visual Impaired and Deafness

Unit-IV – PE for Special Children   **(12 Hours)**
Health Impaired students and Physical Education - HRPF and its development for Individual with unique need - Role of games and sports in Adapted Physical Education

TeachingLearningStrategies: Theclasswillbetaughtbyusinglecturesanddemonstration,seminars,classroom discussion, videos, charts andpresentations method.
Activities: Lecture/ProjectWork/ Seminars/TermPapers/Assignments/Studyetc.
AssessmentRubrics: ClassroomTest,ProjectWork,Assignments,Presentations
References:
1. Beverly, N. (1986). Moving and Learning. Times Mirror/Mosby College Publishing.
2. Cratty, B.J. (2005). Adapted Physical Education in the Mainstream (4th ed.,). Love Publishing Company.
3. Winnick .J & David L. Porretta (2021). Adapted Physical Education and Sports (6th ed.,). Champaign, IL: Human Kinetics.
4. Martin. E. B., (2021). A Teacher's Guide to Adapted Physical Education: Including Students with Disabilities in Sports and Recreation. Champaign, IL: Human Kinetics.
5. Michael Horvat, Luke E. Kelly, Martin E. Block, Ron Croce. (2018). Developmental and Adapted Physical Activity Assessment. Champaign, IL: Human Kinetics

Course Outcomes

On completion of the course, the students will be able to

CO. No.	Core XII - Elementary Statistics in Physical Education	Cognitive Level
CO1	understandtheimportanceofstatisticsinphysicaleducation.	K4
CO2	Understandandapplythestatisticsinresearch.	K4
CO3	Understandandapplythebasicsofstatisticsinresearch	K2
CO4	learnthebasicandadvancedstatistics.	K3
CO5	knowthegraphicalrepresentation ofstatistics.	K2

Remember (K1); Understand (K2); Apply (K3); Analyze (K4); Evaluate (K5); Create (K6

Mapping COs with Pos and PSOs

COs	POs						PSOs					
	1	2	3	4	5	6	1	2	3	4	5	6
1	H	L	M	M	L	H	L	M	H	H	L	M
2	H	L	M	M	H	H	L	M	H	H	L	M
3	H	L	M	L	M	H	L	M	H	H	L	M
4	H	L	M	H	L	H	L	M	H	H	L	M
5	H	L	M	H	H	H	L	M	H	H	L	M

Highly Correlated (H); Moderately Correlated (M); Weakly Correlated (L)

*****

MSU/ 2021-22 / UG-Colleges /Part-III (B.Sc. Physical Education) /
Semester – VI / Core Elective II

Part III	Core Elective II	Sports Nutrition	5 hrs	4 Credits

Learningoutcomes:

1. Develop skillsto establishdailycaloricrequirement andto designthedietplan.
2. Acquaintstudentwithprinciplesofsportsnutrition.
3. Orientthestudenttotherole offoodon physicalperformance.
4. Understand andprepareweightmanagementplans.

Unit I - Introduction (15 Hours)
MeaningandDefinition ofSportsNutrition - Basic componentsofNutrition Factortoconsiderfordevelopingnutritionplan – Balancedietanditscomponents,Nutritionaldeficiencies – Understandingof malnutrition andnutritional supplements.

Unit II - Nutrients:Ingestionto energy metabolism (15 Hours)
Basics of Nutrition, Carbohydrates, Fats, Proteins, Vitamins, Minerals, Water, Nutritive value of Food stuffs.

Unit III – NutritionandWeightManagement (15 Hours)

Nutrition for Athletes and players - Energy requirements in Sports - Percentage of energy derived from foods - Glycemic Index of food - Nutritive value of food stuffs.

Unit IV – Ergogenic aids (15 Hours)

Meaning of ergogenic aids – advantages and disadvantages of ergogenic aids - Types of ergogenic agents – Carbohydrate loading.

Unit V – StepsofPlanningofWeightManagement (15 Hours)

Principles of weight control, Exercise. The Key to successful weight loss management designing weight loss programme. Tips for control body weight.

TeachingLearningStrategies: Theclasswillbetaughtbyusinglecturesanddemonstration,seminars,classroom discussion, videos, charts andpresentations method.

Activities: Lecture/ProjectWork/ Seminars/TermPapers/Assignments/Studyetc.

AssessmentRubrics: ClassroomTest,ProjectWork,Assignments,Presentations

References:

1. Bessesen,D.H.(2008).Updateonobesity. J Clin Endocrinol Metab. 93(6),2027-2034.
2. Butryn, M.L., Phelan, S., & Hill, J. O. (2007). Consistent self-monitoring of weight: a keycomponent of successful weight loss maintenance. Obesity (Silver Spring). 15(12), 3091-3096.
3. Chu, S.Y. & Kim, L. J. (2007). Maternal obesity and risk of stillbirth: a meta analysis. Am JObstetGynecol,197(3), 223-228.
4. BatesM.(2008).Health FitnessManagement(2nd ed.)Champaign, IL:HumanKinetics.
5. Shashikant, G., (1996). Nutrition for sports, SAINSNIS, Patiala.

Course Outcomes

On completion of the course, the students will be able to

CO. No.	Core Elective II - Sports Nutrition	Cognitive Level
CO1	understandtherole ofnutrition andweightmanagement onsports.	K2
CO2	learntheimportanceofcarbohydrates,fatandproteinduring	K3
CO3	learnthehealthrisksandsolutionsforovercomingobesity.	K3
CO4	knowto designdiet planforweightgain and weight loss.	K4
CO5	understandtheroleofphysicalactivityinweightmanagement.	K4

Remember (K1); Understand (K2); Apply (K3); Analyze (K4); Evaluate (K5); Create (K6

Mapping COs with Pos and PSOs

COs	POs						PSOs					
	1	2	3	4	5	6	1	2	3	4	5	6
1	H	L	M	M	L	H	L	M	H	H	L	M
2	H	L	M	M	H	H	L	M	H	H	L	M
3	H	L	M	L	M	H	L	M	H	H	L	M
4	H	L	M	H	L	H	L	M	H	H	L	M
5	H	L	M	H	H	H	L	M	H	H	L	M

Highly Correlated (H); Moderately Correlated (M); Weakly Correlated (L)

*****

Part III	Core Elective II	Sports Journalism	5 hrs	4 Credits

Learningoutcomes:
The students will be oriented in basic art of mass communication and reporting of sports events through various mediums.

UnitI – Introduction   (15 Hours)
Meaning and Definition of Journalism - Ethics of Journalism - Sports Ethics and Sportsmanship - Reporting Sports Events - National and International Sports News Agencies.

UnitII - Sports Bulletin   (15 Hours)
Concept of Sports Bulletin - Types of bulletin - Journalism and sports education - Structure of sports bulletin – Compiling a bulletin - General news reporting and sports reporting.

UnitIII - Mass Media   (15 Hours)
Mass Media in Journalism: Radio and T.V - Commentary – Running commentary on the radio – Sports expert's comments - Role of Advertisement in Journalism - Sports Photography - Editing and Publishing.

UnitIV - Report Writing on Sports   (15 Hours)
Brief review of Olympic Games, Asian Games, Common Wealth Games World Cup, National Games and Indian Traditional Games - Preparing report of an Annual Sports Meet for Publication in Newspaper.

UnitV – Press Meet   (15 Hours)
Organization of Press Meet - Practical assignments to observe the matches and prepare report and news of the same - Visit to News Paper office and TV Centre to know various departments and their working

TeachingLearningStrategies: Theclasswillbetaughtbyusinglecturesanddemonstration,seminars,classroom discussion, videos, charts andpresentations method.
Activities: Lecture/ProjectWork/ Seminars/TermPapers/Assignments/Studyetc.
AssessmentRubrics: ClassroomTest,ProjectWork,Assignments,Presentations
References:
   1. Ahiya B.N. (1988). Theory and Practice of Journalism. Delhi: Surjeet Publications
   2. Ahiya B.N., &Chobra S.S.A. (1990). Concise Course in Reporting. New Delhi: Surjeet Publication.
   3. Bhatt S.C. (1993). Broadcast Journalism Basic Principles. New Delhi. Haranand Publication.
   4. Joshi, D., (2010). Value Education in Globjal Perspective. New Delhi: Lotus Press.
   5. Kannan, K., (2009). Soft Skills, Madurai: Madurai: Yadava College Publication
   6. Chakrabarti, M., (2008). Value Education: Changing Perspective, New Delhi: Kanishka Publication.

CHOICE BASED CREDIT SYSTEM

BACHELOR OF BUSINESS ADMINISTRATION
(With effect from the Academic Year 2022-2023 onwards)
A bachelor degree programme in Business Administration to provide courses which enable students to pursue professional careers. The Programme aims to prepare the students for positions in management of complex and diversified organizations by providing them with a broad, fundamental and specialized education, thereby enabling them to perform successfully, ethically, and professionally in a rapidly changing, interdependent, competitive business globe.

Departmental Vision:
To help students achieve pinnacle of success and groom them to become successful management professionals and entrepreneurs through imparting continuous learning and attitude development.

Departmental Mission:
To impart quality education in diverse management domain, reinforce business ethics and social values among students, fine tune the students to be dynamic to the changing world and provide the platform to have smooth take-off to the corporate world.

Bachelor of Business Administration is one of the most popular bachelor degree program after class XII. The BBA course is the gateway to numerous job opportunities in a plethora of sectors like Marketing, Education, Finance, Sales, and Government. The 3-year undergraduate course in Business Administration is open to students

from all the three streams of education namely Commerce, Arts and Science. The BBA course offers knowledge and training in management and leadership skills to prepare them for managerial roles and entrepreneurship. During the tenure of the course, candidates learn various aspects of business administration and management through class room lectures, Games, Seminars and practical projects. The overall objectives of this academic Bachelor's program is to develop the students' intellectual capacity, executive personality, and managerial skills in a way that enables them assume entry-level managerial positions in business and industry, public sector organizations, consultancy companies and other organizations. Graduates of the program may also choose to start their own entrepreneurial business ventures

ELIGIBILITY FOR Any candidate who has passed the Plus Two of the Higher Secondary Board of Tamilnadu or that of any other university or Board of Examinations in any state recognized as equivalent to the Plus Two of the Higher Secondary Board in Tamilnadu.

DURATION OF THE COURSE The duration of the course shall be three academic years comprising **six semesters** into with two semesters for each academic year. There shall be at least 90 working days in a semester and a minimum 450 hours of instructions in a semester.

REGISTRATION Each student shall register for the courses in the prescribed registration form in consultation with the Faculty Advisor within two weeks from the commencement of each semester.

Revised Programme Structure
(With effect from September 2022)

Sem (1)	Part I/ II/III/IV (2)	Subject number (3)	Subject Status(4)	Subject Title (5)	L	T	P	T	C	Maximum Marks		
										Internal	External	Total
I	I	1	Language	Tamil/other language				6	4	25	75	100
	II	2	Language	Communicative English -I				6	4	25	75	100
	III	3	Core-1	Professional English for Commerce and Management-I	3	0	2	5	4	25	75	100
	III	4	Core-2	Principles of Management	3	2	0	5	4	25	75	100
	III	5	Allied -1	Business Statistics	2	2	2	6	3	25	75	100
	IV	6	Common	Environmental Studies	2	0	0	2	2	25	75	100
	Sub Total							30	21			
II	I	7	Language	Tamil / Other language				6	4	25	75	100
	II	8	Language	Communicative English -II				6	4	25	75	100
	III	9	Core-3	Professional English for Commerce and Management-II	3	0	2	5	4	25	75	100
	III	10	Core-4	Managerial Economics	3	2	0	5	4	25	75	100
	III	11	Allied-2	Business Mathematics	2	2	2	6	3	25	75	100
	IV	12	Common	Value Based Education / Mana VazharKalai	2	0	0	2	2	25	75	100
	Sub Total							30	21			
III	I	13	Language	Tamil / Other language				6	4	25	75	100
	II	14	Language	Communicative English -III				6	4	25	75	100

Sem	Part	No	Category	Course Title	L	T	P	T	C			
III		15	Core-5	Financial Accounting	4	0	0	4	4	25	75	100
III		16	Core-6	Organizational Behaviour	4	0	0	4	4	25	75	100
III		17	Allied-3	Business Law	2	2	0	4	3	25	75	100
IV		18	Skill based Practical -I	Computer Applications in Business-I	0	0	4	4	2	50	50	100
V		19	Non-Major Elective-I	Advertising	2	0	0	2	2	25	75	100
		20	Common	Yoga	2	0	0	2	2	50	50	100
	Sub Total							30+2	25			
IV	I	21	Language	Tamil / Other language				6	4	25	75	100
	II	22	Language	Communicative English -IV				6	4	25	75	100
	III	23	Core-7	Cost Accounting	4	0	0	4	4	25	75	100
	III	24	Core-8	Marketing Management	4	0	0	4	4	25	75	100
	III	25	Allied-4	Human Resource Management	2	2	0	4	3	25	75	100
	IV	26	Skill based Practical -II	Computer Applications in Business-II	0	0	4	4	2	50	50	100
	IV	27	Non-Major Elective-II	Consumer behavior	2	0	0	2	2	25	75	100
		28	Common	Computer for Digital Era	2	0	0	2	2	50	50	100
	V	29	Extension Activity	NSS/NCC/YRC/Physical Education	-	-	-	-	1	-	100	100
	Sub Total							30+2	26			
V	III	30	Core-9	Management Accounting	4	0	0	4	4	25	75	100
	III	31	Core-10	Research methodology	4	0	0	4	4	25	75	100
	III	32	Core-11	Production and Operations management	4	0	0	4	4	25	75	100
	III	33	Core-12	Banking and Insurance	4	0	0	4	4	25	75	100
	III	34	Major Elective -I	Retail Management/ Services Marketing	4	0	0	4	4	25	75	100
	IV	35	Major elective-I1 (Practical)	Effective Employability Skills-I	0	0	4	4	2	50	50	100
	IV	36	Skill based Subject Common	Personality Development	2	0	0	2	2	25	75	100
	III	37		Field Study	0	0	4	4	2	50	50	100
	Sub Total				22	0	8	30	26			
VI	III	38	Core-13	Financial management	4	0	0	4	4	25	75	100
	III	39	Core-14	Strategic Management	4	0	0	4	4	25	75	100
	III	40	Core-15	Entrepreneurship Development	4	0	0	4	4	25	75	100
	III	41	Major Elective-III	Training and Development/ Financial Services	4	0	0	4	4	25	75	100
	IV	42	Major elective-IV (Practical)	Effective Employability Skills- II	0	0	4	4	2	50	50	100
	III	43		Major Project	0	0	10	10	5	50	50	100
	Sub Total				16	0	14	10	23			

L-Lecture Hours T-Tutorial Hours P-PracticalHours T- Total hours / week C- Credit

Allocationofquestionsforproblemorientedsubjects:40%theoryand60%problems

ADVERTISING

L	T	P	C
2	0	0	2

COURSE OBJECTIVES:
1.To enable the students to study the evolution of advertising
2.To study thefunctions of advertising agencies
3. to explain the process of advisement making and launching

COURSE OUTCOMES:
CO 1: Understand the origin and growth of advertising sector
CO 2: Explain types of advertising
CO 3: describe about the functions of advertising agencies
CO 4: To identify and make decisions regarding the most feasible advertising appeal and media mix
CO 5: To conduct pre-testing and post testing of advertisement to determine their effectiveness

UNIT-I:INTRODUCTION TOADVERTISING
Advertising – Meaning- Origin and Development- Objectives- Importance- Functions of advertising- Classification and Types of advertisements – merits and demerits

UNIT –II:ADVERTISING AGENCIES
Type and functions of advertising agencies-Advertisement campaign- Social, economic and legal aspects of advertisements - Misleading advertisements- Advertisement Standards council of India- Regulation of advertising in India

UNIT-III:DRAFTING ADVERTISEMENT COPY
Advertisement copy- Requisites of an effective advertisement copy-Types of copy- Elements of copy- Layout- functions of layout – Elements of layout – Principles of design and layout- Copy wring- Qualities of good Copy Writer-Copy testing and Advantages

UNIT–IV:ADVERTISING MEDIA
Media Planning and Strategy -Importance of media planning and selection- Problems in media planning- Internet as an advertisement medium-Objects of Internet advertisement – Advantages and disadvantages of internet advertising

UNIT-V:MEASURING THE EFFECTIVENESS OF ADVERTISING
Need and importance for measuring the effectiveness of advertising- Methods of Measurement: Pretesting, Concurrent testing, Post testing-DAGMAR Model

Text Books:
1. Manendra Mohan – Advertising Management – Concepts and Cases, Tata McGraw Hill
2. Sherlekar, Victor &Nirmala Prasad – Advertising Management – Himalaya Publishing House

REFERENCE BOOKS:
1. C.L. Tyagi, Arun Kumar- Advertising Management- Atlantic Publishers and Distributors
2. Wells, Moriarty & Burnett, Advertising, Principles & Practice, Pearson Education
3. Ruchi Gupta, Advertising – Scholar Tech Press
4. Rajeev Patra and john G. Myers, Advertising Management -Pearson India, New Delhi

CONSUMER BEHAVIOUR

L	T	P	C
2	0	0	2

Course objective:
1. To explain the elements constituting Human Behaviour and their relevance towards consumption and purchase
2. To describe the marketing programs and strategies while keeping in mind factors that may influence consumer behaviour
3. To identify consumer decision making models and trends.

COURSE OUTCOMES:
CO 1: understand concept of Consumer Behaviour, types of Consumers, Diversity of Consumers.
CO 2: Acquire basic knowledge about issues and dimensions of Consumer Behaviour.
CO 3: Analyzing consumer information and using it to create consumer oriented marketing strategies.
CO 4: Understand the formulation of marketing strategies based on consumer behaviour
CO 5: Describe the innovation diffusion process

UNIT- I: INTRODUCTION TO CONSUMER BEHAVIOUR
Nature, scope & application and Characteristics of consumer Behaviour– Importance of Consumer behaviour in marketing decisions.

UNIT- II: FACTORS AFFECTING CONSUMER BEHAVIOUR
External Influences – Culture, Sub Culture, Social Class, Reference Groups, Family - Internal Influences– Needs & Motivations, Perception, Personality, Lifestyle, Values, Learning, Memory, Beliefs & Attitudes.

UNIT -III: CONSUMER DECISION MAKING PROCESS
Types of consumer decisions, Consumer Decision Making Process - Problem Recognition - Information Search - Alternative Evaluation –Purchase Selection – Post purchase Evaluation, -Decision Making Models – Black Box Model - Economic model - Howard &Sheth model.

UNIT- IV: CONSUMER BEHAVIOR ANALYSIS AND MARKETING STRATEGY
Consumer Behaviour and Product Strategy - Consumer Behaviour and Pricing Strategy - Consumer Behaviour and Distribution Strategy - Consumer Behaviour and Promotion Strategy

UNIT- V:DIFFUSION OF INNOVATION
Definition of innovation, product characteristics, influencing diffusion, resistance to innovation, adoption process. Buying pattern in the new digital era.

TEXT BOOKS:
1. Hawkins, Best and Coney, Consumer Behaviour,Tata McGraw Hill, New Delhi
2. Leon G Shiffman& Leslie LazerKanuk, Consumer Behaviour –. Pearson Education publishers, Singapore

REFERENCE BOOKS:
1.John A Howard, Consumer Behaviour in Marketing Strategy, Prentice Hall New Delhi
2.Schiffman L G and Kanuk L L Consumer Behaviour, Prentice Hall New Delhi
3.Anita Ghatak, Consumer Behaviour in India, D K Agencies (P) Ltd New Delhi
4.Consumer Behaviour in Indian Perspective –Suja R. Nair,Himalaya Publishing House,

3. Dr. P. Periasamy: Principles and Practice of Insurance Himalaya Publishing House,Delhi.

4. Inderjit Singh, Rakesh Katyal & Sanjay Arora: Insurance Principles and Practices,KalyaniPublishers,Chennai.

Web Resources:

   1.cbseacademic.nic.in

2. https://ncfe.org.in
3. https://onlinejain.com
4. https://egov.uok.edu.in

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PO &PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	M	L	L	M	S	M	L	M	L
CO 2	M	S	L	S	M	S	M	M	L	L
CO3	S	M	M	L	S	S	S	M	M	L
CO4	S	M	L	L	M	S	S	L	M	L
CO5	S	M	M	L	L	S	M	M	L	L

S – Strong   M – Medium   L- Low

RETAILMANAGEMENT

L	T	P	C
4	0	0	4

CourseObjectives:
1. Togiveanoverviewoftheconceptualaspectsofretailmarketingmanagement.
2. to foster the development of the students critical and creative thinking skills
3. To prepare students for positions in the retail sector or positions in the retail divisions of consulting companies

COURSE OUTCOMES:

CO 1:Clarify the concept and related terms in retailing.

CO 2: Comprehend the ways retailers use marketing tools and techniques to interact with their customers.

CO 3: Understand various formats of retail in the industry.

CO 4:. Recognize and understand the operations-oriented policies, methods, and procedures

CO 5: Understand how to create a shopping experience that builds customer

UNIT–I:Introduction

Retailing: - Introduction - scope - Functions of retailing - Retail industry in India - types ofRetailing format –Segments of organized retailing in India- Retail as a career.

UNIT-II: Retailplanning

Retailplanningandlocation:-Introduction–Strategicretailplanningprocess-Location-Typesoflocations – Steps – SiteselectionAnalysis.

UNIT-III:Retail storeDesignandPricing

Storedesign,layoutandVisualmerchandising:Conceptsandprinciples – elements–Visualmerchandisingandatmospherics–toolsusedforvisualmerchandising-pricing.

UNIT-IV: RetailSupply ChainManagement

SupplychainmanagementandRetaillogistics:-Evolution of supply chain management–Need CPFR–Retaillogistics – concepts – Importanceofinformationinsupplychainmanagement.

UNIT-V:RetailPromotion

Retail promotion: - Retail store sales promotion - Retail promotion mix strategy – Emergingtrendsinretailing – Onlineretailing.

TEXT BOOKS:
1. Michall Levy , Barton.AWeitz, Dhruv Grewal, Retailing management – Mc Graw Hill
2. Gibson G. Vedamani – Retail management – functional principles and Practice, JaicoPublishing House, New Delhi

REFERENCE BOOKS:

1.Swapna Pradhan, Retail Managemnt, Mcgraw Hill Education

2.Harjit Singh: Retail Management, S. Chand Publication.

3.Chetan Bajaj , Nidhi.V Srinivasa and Rajneesh Tuli, Retail management –Oxford Higher Education

4.S.K. Baral, A Hand Book of Retail management- AITBS Publishers,India

WEB RESOURCES:
1. https://classcentral.com
2. https://www.skillscommons.org
3. https://www.benzinga.com
4. https://www.mindluster.com

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PO &PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	M	L	L	M	S	M	L	M	L
CO 2	M	S	L	S	M	S	M	M	L	L
CO3	S	M	M	L	S	S	S	M	M	L
CO4	S	M	L	L	M	S	S	L	M	L
CO5	S	M	M	L	L	S	M	M	L	L

S – Strong   M – Medium   L- Low

MSU/2021-22/UG-Colleges/Part-III(B.B.A.)/Semester-V/Ppr.no.35/MajorElective-1B
SERVICESMARKETING

L	T	P	C
4	0	0	4

Course Objective:
1.To give insights about the foundations of services marketing, customerexpectationsofservicesandgapexistingintheservicedeliveryprocessesandserviceQuality.
2. It emphasises the distinctive aspects of Services Marketing.
3. It aims at equipping students with concepts and techniques that help in taking decisions relating to various services marketing situations.

COURSE OUTCOMES:
CO 1: Understand the Concept of Services and intangible products
CO 2: Discuss the relevance of the services Industry to Industry
CO 3: Examine the characteristics of the services industry and the modus operandi
CO 4: Analyse the role and relevance of Quality in Services
CO 5: Visualise the strategies in the Services sector.

UNIT- I:INTRODUCTION
Introduction–Definition–Evolutionandgrowthofservicesector–NatureandScopeofServices–Differencebetweenservicesandtangibleproducts–Uniquecharacteristicsofservices–ChallengesandissuesinServicesMarketing.   (12 hrs)

UNIT –II: STPOFSERVICESMARKETING
Classification of services – Expanded marketing mix –Service marketing – Environment and trends–AssessingServiceMarketpotential-Servicemarketsegmentation,targetingandpositioning.
                                                                                                        (12hrs)

UNIT–III:SERVICEDESIGNANDDEVELOPMENT
ServiceLifeCycle–Newservicedevelopment–ServiceBluePrinting–GAPmodelofservicequality–Measuringservicequality–SERVQUAL–ServiceQualityfunctiondevelopment.
                                                                (12 hrs)

UNIT-IV:SERVICEDELIVERYANDPROMOTION

Positioning of services – Designing service delivery System, Service Channel – Pricing ofservices,methods–Servicemarketingtriangle–
Managingdemand,Managingsupply,managingDemandandSupplyofService–
IntegratedServicemarketingcommunication.

(12 hrs)

UNIT-V:SERVICE STRATEGIES

Service Marketing Strategies for Health – Hospitality – Tourism – Financial – Logistics– Educational – Marketing of Online Services– Entertainment & public utility InformationtechniqueServices.   (12hrs)

COURSE OUTCOMES:

CO 1: To appreciate the challenges faced by services marketing in comparison with the traditional commercial marketing, e-marketing and non commercial environments •

CO 2:To appreciate the differences between marketing physical products and intangible services, including dealing with the extended services marketing mix, and the four unique traits of services marketing;

CO 3: Recognise the challenges faced in services delivery as outlined in the services gap model.

TEXT BOOKS:
1. Lovelock, C.H , Service Marketing : Prentice Hall, London
2. Jha S.M, Service Marketing : Himalaya Publishing House, New Delhi.
3. R. Srinivasan , Service Marketing : The Indian Context, third edition, (PHI).

WEB RESOURCES:
1. https:// www.mooc-list.com
2. https://onlinecourses.nptel.ac.in
3. https://ebs.online.hw.ac.uk
4. https://www.classcentral.com

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PO &PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	M	L	L	M	S	M	L	M	L
CO 2	M	S	L	S	M	S	M	M	L	L
CO3	S	M	M	L	S	S	S	M	M	L
CO4	S	M	L	L	M	S	S	L	M	L
CO5	S	M	M	L	L	S	M	M	L	L

S – Strong   M – Medium   L- Low

EFFECTIVE EMPLOYABILITY SKILLS- 1
(Practical Subject)

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:
1. To identify the knowledge and skills required for obtaining and keeping employment.
2. To emphasize individual skill assessments, interpersonal communication skills, workplace responsibilities, teamwork skills,
3. To impart the knowledge and skills for enhancing the career opportunities.

COURSE OUTCOMES
CO 1: To help students explore their values and career choices through individual skill assessments.
CO 2: To make realistic employment choices and to identify the steps necessary to achieve a goal.
CO 3: To explore and practice basic communication skills
CO 4: To learn skills for discussing and resolving problems on the work site
CO 5: To assess and improve personal grooming

UNIT- 1: ENGLISH
Spotting errors-Fill in the blank Cloze Test-Idioms & Phrases-Synonyms & Antonyms---Rearranging the Sentence – One word substitution- Phrase substitution- jumpled sentences-Double blank sentences- Commonly misspelled words - Comprehensions

UNIT-II:TEST OF REASONING –I
Symbols and their relationships- Arithmetical computation – Decision making- verbal and figure classification- Analytical functions -Space visualization- Judgement- Problem Solving-Discrimination

UNIT-III: TEST OF REASONING –II
Assigning Artificial Values to Arithmetical Series -Series Completion Test – Visual memory – Observation – Arithmetical reasoning- Relationship concepts- Differences- Analysis_ Similarities-Analogies

UNIT -IV: QUANTITATIVE APTITUDE I
Number System:Decimals and Fractions- Whole numbers- Relationship between numbers-Ratio & Proportion – HCF & LCM- Simplification – Profit & Loss –Time and Work-

UNIT-V: QUANTITATIVE APTITUDE II
Average ---Simple Interest---Compound Interest– Time and Distance – Permutations & combinations- Probability- Data interpretation – Data sufficiency

Note: Examination Pattern:
➢ The Effective employability Skills IPaper   is 100 marks (**50 Continuous Internal Assessment Marks + 50 End Semester PRACTICAL Examinations marks).**
➢ For Continuous **Internal Assessment Examination ONE** test is to be conducted with **50 MCOQs**.
➢ For **End Semester PRACTICAL Examinations:Seventy five multiple choice objective type questions** are to be asked. (with one correct and three incorrect alternatives and no deduction for wrong or un-attempted questions)
➢ The paper consists of five units. 15 MCOQs are to be asked from each unit.
➢ The question paper setter is requested to set the questions strictly according to the syllabus.

TRAININGANDDEVELOPMENT

L	T	P	C
4	0	0	4

Course Objectives: Tounderstandtheconcepts,toolsandtechniquesofmanagement traininganddevelopment.

COURSE OUTCOMES:
CO1: To develop an understanding of the evolution of training & development from a tactical to a strategic function.
CO2: To provide an insight into what motivates adults to learn and the most appropriate methodologies to impart training
CO3: To understand the concept of training audit & training evaluation
CO4: To learn how design a training module and execute it
CO5: To understand the need for and concept of Performance Management

UNIT-I:LEARNING
Concept,principlesoflearning,methodsoflearning,importanceofteachingtechniques,instructiontechnology,instructorbehaviour,attentionversusinvolvement.

UNIT–II:TRAINING
Training:Concept,Importance&ObjectivesofTraining,ProcessandSignificanceofTraining,IdentificationofTrainingNeeds,EvaluationofTrainingEffectiveness.

UNIT–III: METHODSOFTRAINING
On the job training ,Off the job training, choosing optimum method ,the lecture, field trips, paneldiscussion, behavior modeling, interactive demonstrations, brain storming, case studies, actionmazes, incident process, in-baskets, team tasks, buzz-groups and syndicates, agenda setting, role-plays-reverse role plays, rotational role plays, finding metaphors, simulations, business games,clinics, critical incidents, fish bowls, T-groups, data gathering, grouping methods, transactionalanalysis,exceptionanalysis.

UNIT-IV:DESIGNINGANDCONDUCTINGTRAININGANDDEVELOPMENTPROGRAMMES
Concept - process of designing and conducting Training and development. Designing ATrainingUnit (CrossCultural,Leadership,TrainingtheTrainer,Change),BudgetingofTraining.

UNIT-V:EVALUATIONOFTRAININGANDDEVELOPMENTPROGRAMME
Concept-Definition of Training Evaluation-Types of Evaluation-Evaluation design issues,InductionversusOrientation – EvaluatingTraininganddevelopment-objectives,process,purpose,Effectivenessof training.

TEXT BOOKS:
1. Lynton R Pareek, U, Training for Development, Vistaar, New Delhi.
2. Peppar, Allan D, Managing the Training and Development Function, Gower, Aldershot
3. Buckley, R., & Caple, J The theory and practice of Training (5th ed.) London and Sterling,

WEB RESOURCES:

1. https://inflibnet.ac.in
2. https://onlinecourses.nptel.ac.in
3. https://nsdcindia.org
4. https://managementhelp.org

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PO &PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	M	L	L	M	S	M	L	M	L
CO 2	M	S	L	S	M	S	M	M	L	L
CO3	S	M	M	L	S	S	S	M	M	L
CO4	S	M	L	L	M	S	S	L	M	L
CO5	S	M	M	L	L	S	M	M	L	L

S – Strong   M – Medium   L- Low

FINANCIALSERVICES

L	T	P	C
4	0	0	4

Course Objectives:
1. To familiarize the students with the financial services industry as the growing phenomenon of Liberalization, Privatizations and Globalizations.
2. To impart knowledge about Indian financial system and Indian financial market and its assets.
3. To develop knowledge about new and innovative financial services introduced in recent years.

COURSE OUTCOMES:

CO 1: Understand the functioning of the financial system & Financial services

CO 2 Apply critical, analytical and integrative thinking while understanding the functioning for the Leasing

CO 3: Utilise factoring, forfaiting and leasing services for their enterprises.

CO 4:. Assess and make wise investments in mutual funds and also get their credit worthiness evaluated for obtaining borrowings/investments.

CO 5: Develop a critical, analytical and integrative thinking of the role played by the regulators in the smooth functioning of the markets.

UNIT-1:INTRODUCTION

FinancialServices–meaning and types–Fund based financial services and fee based financial services–Introduction to Merchant Banking Services in India–Role and functions of Merchant Bankers.

UNIT–II:VENTURE CAPITAL AND MUTUAL FUNDS

Features and types of Venture Capital – Various stages of Venture Capital €Financing - Venture Capital Exit Strategies – Venture capital firms in India – Mutual Funds – Types-structure- NAV- Mutual funds in India

UNIT–III:LEASING AND FACTORING

Leasing essentials - Operating and Financial Lease – Advantages and Limitations of Leasing – Leasing Vs hire purchase -Factoring – Parties involved and process of factoring-Functions of a Factor -Different forms of factoring services - Factoring Vs Bills discounting – Forfaiting-Mechanism of Forfaiting – Factoring VS Forfaiting.

UNIT-IV:CREDIT RATING

Meaning, types of credit Rating and Need for credit rating- Factors affecting credit Rating-Advantages and Limitations of credit rating- Rating Process and methodology - Credit Rating Agencies in India.

UNIT- V: MERGERSANDACQUISITIONS

Expansion of business firms- Internal and External expansion. Forms of combinations merger, acquisition and takeover-Reasons for merger -Types of merger-Merger VS Take over -Types of Takeover –Defense strategy against hostile takeover Mergers in India – Recent trends in financial services – Shadow banking-Angel funds- hedge funds.

TextBooks:
1. Bhole, L.M., Financial Institutions and Markets: Structure, Growth and Innovations Tata Mc-Grow Hill. New Delhi:
2. Khan, M.Y., Financial Services – Tata McGraw Hill New Delhi.
3. Gurusamy.S., Merchant Banking and Financial Services, McGraw Hill Educations India
4. VA Avadhani, Financial Services in India, Himalaya Publishing House, Mumbai

WEB RESOURCES:
1. https://www.glbimr.org
2. https://due.com
3. https://www.cipfa.org
4. https://corporatefinanceinstitute.com

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PO &PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	M	L	L	M	S	M	L	M	L
CO 2	M	S	L	S	M	S	M	M	L	L
CO3	S	M	M	L	S	S	S	M	M	L
CO4	S	M	L	L	M	S	S	L	M	L
CO5	S	M	M	L	L	S	M	M	L	L

S – Strong   M – Medium   L- Low

(Practical)
EFFECTIVE EMPLOYABILITY SKILLS- II

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:
1. To identify the knowledge and skills required for obtaining and keeping employment.
2. To emphasize individual skill assessments, interpersonal communication skills, workplace responsibilities, teamwork skills,
3. To impart the knowledge and skills for enhancing the career opportunities.

COURSE OUTCOMES
CO 1: To help students explore their values and career choices through individual skill assessments
CO 2: To make realistic employment choices and to identify the steps necessary to achieve a goal
CO 3: To explore and practice basic communication skills
CO 4: To learn skills for discussing and resolving problems on the work site
CO 5: To assess and improve personal grooming

UNIT -I: GENERAL AWARENESS- I
India and its neighboring countries especially pertaining to History, culture, geographic, economic Scene, General Policy & Scientific Research- Government schemes and policies – Banking and Insurance awareness – Financial awareness

UNIT-II: GENERAL AWARENESS- II
Current affairs –- Books and Authors – Sports - Important days in a year – Abbreviations- Portfolio – People in news

UNIT-III: Numerical ability -III

UNIT – IV:COMPUTER PROFICIENCY TEST -II
Computer Fundamentals – Computer Hardware- Computer software- Memory- Key board shortcuts- Computer Abbreviations- Microsoft Office – Networking –Internet.

UNIT -V: INTERVIEW SKILLS
Resume writing – Meaning – Features of a good resume, Model (Exercise) . Key Skills to attend the Interview, Answering interview Questions, Handling Tricks situations.

Note: Examination Pattern:
- ➢ The Effective employability Skills II Paper is 100 marks (25 Continuous Internal Assessment Marks + 75 End Semester External University Examinations marks).
- ➢ For Continuous Internal Assessment Examinations: three tests are tobe conducted with 25 MCOQs. The best two test marks are considered for awarding internal marks.
- ➢ For External University Examinations, Seventy five multiple choice questions are to be asked. (with one correct and three incorrect alternatives and no deduction for wrong or un-attempted questions)
- ➢ The paper consists of five units. 15 MCOQs are to be asked from each unit.
- ➢ The question paper setter is requested to set the questions strictly according to the syllabus.

						L	T	P	C			
V	III	29	Core 13	Financial Management	3	1	1	4	25	75	100
	III	30	Core 14	EntrepreneurshipDevelopment	4	1	0	4	25	75	100
	III	31	Core 15	Management Information System	3	1	0	4	25	75	100
	III	32	Core 16	Introduction to Business Analytics	2	1	1	4	25	75	100
	III	33	Major Elective I (CHOOSE ANY ONE)	Retail Management*Or* Financial Services*Or* Training andDevelopment (CHOOSE ANY ONE)	3	1	0	4	25	75	100
	III	34	Skill Based Subject Common	Personality Development	2	0	0	2	25	75	100
	III	35		Mini Project	0	2	4	3	50	50	100
				Sub Total	**18**	**7**	**5**	**25**			
VI	III	36	Core 17	Strategic Management	4	1	0	4	25	75	100
	III	37	Core 18	Digital Business Management	4	1	0	4	25	75	100
	III	38	Core 19	Total QualityManagement	3	1	0	4	25	75	100
	III	39	Major Elective II (CHOOSE ANY ONE)	Services Marketing*Or* Investment Management*Or* PerformanceManagement (CHOOSE ANY ONE)	3	1	0	4	25	75	100
	III	40		Major Project	0	3	9	6	50	50	100
				Sub Total	**16**	**5**	**9**	**22**			

L-Lecture T-Tutorial P- Practicals C-Credit

Allocation of questions For problem oriented subjects : 40% theory and 60% problems

Distribution of marks between External and Internal Assessment is For Theory 75 : 25 & ForPractical 50 : 50

Total Hours: 180 Total Credits: 140 (Excluding YOGA, COMPUTER FOR DIGITAL ERA AND EXTENSION ACTIVITY) Core Subjects: 19 Non-Major Elective: 02 Skill Based Core: 02 Skill Based Subject (Common): 01 Major Elective: 02 Allied: 04

RETAIL MANAGEMENT

L	T	P	C
3	1	0	4

Course Objectives: To give an overview of the conceptual aspects of retail marketing management.

UNIT –I: Introduction

Retailing: - Introduction - scope - Functions of retailing - Retail industry in India - types of Retailing format –Segments of organized retailing in India- Retail as a career   (12hrs)

UNIT- II: Retail planning

Retail planning and location: - Introduction – Strategic retail planning process- Location- Types of locations- Steps- Site selection Analysis   (12hrs)

UNIT- III: Retail store Design and Pricing

Store design, layout and Visual merchandising: Concepts and principles - elements – Visual merchandising and atmospherics – tools used for visual merchandising- pricing.   (12hrs)

UNIT- IV: Retail Supply Chain Management

Supply chain management and Retail logistics: - Evolution of supply chain management –Need – CPFR – Retail logistics - concepts - Importance of information in supply chain management.
(12hrs)

UNIT- V: Retail Promotion

Retail promotion: - Retail store sales promotion - Retail promotion mix strategy – Emerging trends in retailing - Online retailing.   (12hrs)

Reference Books:
1. Retail management- Barmen, Barry and Joel Evans
2. Retail management –SwapnaPradhan
3. Retail management- Chetan Bajaj
4. Integrated Retail Management - James.R.Ogden and Denis .T .Ogden
5. Retail Management- Suja Nair

SERVICES MARKETING

L	T	P	C
3	1	0	4

Course Objective: To give insights about the foundations of services marketing, customer expectations of services and gap existing in the service delivery processes and service Quality.

UNIT- I: INTRODUCTION

Introduction– Definition – Evolution and growth of service sector –Nature and Scope of Services –Difference between services and tangible products–Unique characteristics of services– Challenges and issues in Services Marketing.   (12 hrs)

UNIT –II: STP OF SERVICES MARKETING

Classification of services – Expanded marketing mix –Service marketing – Environment and trends –Assessing Service Market potential -Service market segmentation, targeting and positioning.   (12 hrs)

UNIT –III: SERVICE DESIGN AND DEVELOPMENT

Service Life Cycle – New service development – Service Blue Printing – GAP model of service quality – Measuring service quality – SERVQUAL – Service Quality function development.
                                                                (12 hrs)

UNIT- IV: SERVICE DELIVERY AND PROMOTION

Positioning of services – Designing service delivery System, Service Channel – Pricing of services, methods – Service marketing triangle – Managing demand, Managing supply, managing Demand and Supply of Service–Integrated Service marketing communication.
                                                                (12 hrs)

UNIT- V: SERVICE STRATEGIES

Service Marketing Strategies for Health – Hospitality – Tourism – Financial – Logistics– Educational – Marketing of Online Services– Entertainment & public utility Information technique Services.   (12 hrs)

Reference Books:
1. Services Marketing: People, Technology, strategy. - Christropher H. Lovelock and JochenWirtz
2. Services Marketing- .John.E.G.Bateson, K.Douglas Hoffman
3. Services Marketing Operation Management and Strategy - Kenneth E Clow
4. Services Marketing - Valarie Zeithaml
5. Services Management and Marketing a CRM in Service Competition - Christian Gronroos

ManonmaniamSundaranar University
Tirunelveli
Choice Based Credit System
Course Structure for B.Com – Affiliated Colleges
(With effect from the Academic Year 2021-2022 onwards)
II B.Com Semester - III

Semester	Part I/II/ III/ IV/V	Subject No.	Subject Status	Subject Title	Contact Hours Per week	Credit
III	III	15	Language	Tamil-III/Other Language	6	4
	III	16	Language	English-III	6	4
	III	17	Major Core 5	Advanced Financial Accounting	5	4
	III	18	Major Core 6	Banking Theory Law & Practice	4	4
	III	19	Allied- III	Computer Applications in Business	3	3
	IV	20	Non Major Elective I (Any one)	1. Introduction to Accountancy 2. Consumer Protection	2	2
	III	21	Skill Based I Core	Business Communication	4	4
	IV	22	Common	Yoga	2	2
				Sub Total	30*	25*

* Excluding the hours and Credit for Yoga

II B.Com Semester - IV

Semester	Part I/II/ III/ IV/V	Subject No.	Subject Status	Subject Title	Contact Hours Per week	Credit
IV	III	23	Language	Tamil-IV/Other Language	6	4
	III	24	Language	English-IV	6	4
	III	25	Major Core 7	Quantitative Techniques	5	4
	III	26	Major Core 8	Logistic Management	4	4
	III	27	Allied- IV	Application of Tally in Accounting	3	3
	IV	28	Non Major Elective II (Any one)	1. Financial Accounting 2. Human Rights	2	2
	III	29	Skill Based II – Core	Entrepreneurship Development	4	4
	V	30	Extension Activity	NCC/NSS/YRC/YWF	-	1
	IV	31	Common	Computer for Digital Era	2	2
				Sub Total	30*	26*

*Excluding the hours and Credit for Computer for Digital Era

III B.Com Semester - V

Semester	Part I/II/ III/ IV/V	Subject No.	Subject Status	Subject Title	Contact Hours Per week	Credit
	III	32	Core 9	Corporate Accounting	6	4
	III	33	Core 10	Cost Accounting	6	4
	III	34	Core 11	Business Law	6	4
	III	35	Core 12	Research Methodology	5	4
V	III	36	Major Elective I (Any one)	1. Income Tax Law & Practice 2. Human Resource Management 3. Elements of E-Commerce	5	4
	IV	37	Skill Based III Common	Personality Development/Effective Communication/Youth Leadership	2	2
				Sub Total	30	22

III B.Com Semester - VI

Semester	Part I/II/ III/ IV/V	Subject No.	Subject Status	Subject Title	Contact Hours Per week	Credit
	III	38	Core 13	Special Accounts	5	4
	III	39	Core 14	Management Accounting	5	4
	III	40	Core 15	Industrial Law	5	4
	III	41	Core 16	Auditing and Corporate Governance	4	4
VI	III	42	Major Elective II (Any one)	1. Business Taxation 2. Retail Management 3. Human Values & Business Ethics	4	4
	III	43		Major Project	7	7
				Sub Total	30	27

For Problem Papers 40 % marks for theory and 60% marks for problems.
Proportion of marks between internal evaluation and external evaluation for subjects-25:75.
Internal – 20 marks for theory and 5 marks for assignment.
Total Credits – 150 (Excluding the hours and Credit for Yoga and Computer for Digital Era)

II B. COM (IV SEMESTER) – UNDER CBCS
PART IV- NON – MAJOR ELECTIVE -II (SELECT ANY ONE) - 1
FINANCIAL ACCOUNTING

Objectives

1. To explain the concept and role of Accounting and financial reporting in the modern marketing economy.

2. To explain the regulatory frame work for the operation of fundamental accounting

Unit I:

Average Due Date- Utility of average due date- Problems.

Unit II:

Bank Reconciliation Statement – Meaning causes of difference between balance as per cash book and pass book – Need of Bank Reconciliation Statement – Preparation of Bank Reconciliation Statement.

Unit III:

Self-balancing Ledger – general ledger- debtors ledger- creditors ledger- Sectional balancing system.

Unit IV:

Depreciation – Meaning – Causes – Straight Line method and Written down value method – Simple problems only

Unit V:

Rectification of Errors- Classification of errors- suspense account- rectifying accounting entries (simple problem only)

Text Books

1. Dr.M.A.Arulanandam&K.S.Raman, Advanced Accountancy, Himalaya Publishing House, Mumbai.

2. P.Jain&K.L.Narang, Advanced Accountancy, Kalyani Publishers, New Delhi.

Reference Books

1. M.C.Shukla and T.S.Grewal, Advanced Accountancy, Sultan Chand &Co, New Delhi.

2. T.S.S. Reddy &A.Murthy, Advanced Accountancy, Margham Publications, Chennai.

3. P.C.Tulsian, Accountancy, Tata McGraw- Hill Company.

Outcomes:

1. To know the concept of average due date and its preparation.
2. To understand about the preparation of bank reconciliation statement.
3. To understand about the self balancing system and sectional balancing system and its various adjustment accounts.
4. To demonstrate and understanding of the various methods of providing depreciation.
5. To know about classification of errors and its rectification.

PART IV- NON – MAJOR ELECTIVE -II (SELECT ANY ONE) - 2

HUMAN RIGHTS

Objectives

1. To understand the basic concepts of human rights

2. To have an understanding of the relationship between individual, group, and national rights

Unit I:

Human Rights- Definition of Human Rights - Characteristics of human rights - kinds of Human Rights - Civil and political – social, economic and cultural rights. (5 hours)

Unit II:

Violation of human rights - Patterns of violations and abuses - Action against violation of human rights as per Indian law

Unit III:

Rights of the Disabled Persons - Declaration on the rights of disabled persons 1975 - International year of disabled persons 1981

Unit IV:

Bonded labour - Concepts and definitions - Constitutional and legal provisions - Salient features of bonded labour system (abolition) Act 1976 - Role of the national human rights commission

Unit V:

Minorities Rights commission & its functions - Definitions - National commission for minorities - Functions of the commissions

Text Books

1. ParasDiwan, PeerushiDewan, Human Rights and Law.

2. Dr.Giriraj Shah, IPS & K.N. Gupta, Human Rights, IPS

3. JagannathMohany, Teaching of Human Rights

Reference Books

1. C. Nirmala Devi, Human Rights.

2. Concepts, Theories and Practice of Human Rights, Praveen Vadkar, Neha Publishers.

3. Baradat Sergio and SwaranjaliGhosh, Teaching of Human Rights, Dominant Publishers and Distributors, New Delhi, 2009.

4. Roy.A.N., Human Rights Tasks, Duties and Functions: Aavishakar Publications and Distributors, Jaipur.

5. Asish Kumar Das and Prasant Kumar Mohanty, Human Rights in India: Sarup and Sons, New Delhi.

Outcomes:

1. To impart basic knowledge about human rights and its types.

2. To know about violation patterns and action against such violations by law.

3. To understand about the rights of disabled persons.

4. To know about the legal provisions of bonded labour.

5. To understand about the minority rights commission and its functions.

PART III – MAJOR ELECTIVE -1 (SELECT ANY ONE) - 1

INCOME TAX LAW & PRACTICE

Objectives:
1. To understand the basic concepts of income tax
2. To enable the students to know the provisions of the income tax law.

Unit I

Basic concepts – Definition – Previous year – Assessment year – Person – Assessee – Income – Total Income – Casual income – Capital and Revenue – Residential status and incidence of tax incomes exempt under Section – 10

Unit II

Salary – Basis of charge – Different forms of salary – allowances – gratuity – pension – perquisites and their valuation – deduction from salary – computation of taxable salary .

Unit III

House property – basis of charge – determination of GAV and NAV – income from let – out property – deductions – computation of House property income

Unit IV

Profits and gains of business and profession – basis of charge – methods of accounting – deductions – allowable expenses and disallowable expenses – computation of taxable income - Income from Capital Gains – Income from other sources

Unit V

Income of other persons included in assesses total income – Aggregation of income; Set – off or carry forward and set off of losses – Deductions from gross total income – Computation of total income and tax payable; Rebates and relief's – Provisions concerning advance tax and tax deducted at source – Provisions for filing of return of income.

Text Books:

1. Dr.VinodK.Singhania, Taxmen's Direct Taxed Law & Practice, TaxmanPublications, New Delhi.

2. Dr. A. Murthy, Income Tax Law and Practice - Vijay Nichole Publications,Chennai.

3. Dr. T.S. Reddy &Dr.Hariprasad, Income tax law and practice, Margampublications, Chennai.

Outcomes:
1. To know the residential status and tax exemptions.
2. To compute the taxable salary.
3. To calculate house property income.
4. To identify the income from other sources
5. To understand the provisions for filing the return of income

HUMAN RESOURCE MANAGEMENT

Objectives

1. To study about the importance of human resource.
2. To study the techniques of performance appraisal of employees.
3. To know the methods to redress the grievances of employees.

Unit I Introduction to Human Resource Management

HRM Concept and Functions, Role, Status and competencies of HR Manager - HR Policies - Evolution of HRM - HRM vs HRD - Evolution of HRM – Emerging Challenges of Human Resource Management - Workforce diversity; Empowerment - Human Resource Information System.

Unit II Acquisition of Human Resource

Human Resource Planning- Quantitative and Qualitative Dimensions – job analysis – job description and job specification - Recruitment And Selection – meaning – process of requirement – sources and techniques of Recruitment – Meaning and Process of Selection – Selection Tests And Interviews – placement, induction, socialization and Retention.

Unit III Training and Development

Concept and Importance -Training and development methods –Identifying Training and Development Needs - Designing Training Programmes – Role Specific and Competency Based Training - Evaluating Training Effectiveness - Training Process Outsourcing - Management Development – Career Development.

Unit IV Performance Appraisal

Nature, objectives and importance - Modern Methods and techniques of performance appraisal - potential appraisal and employee counselling – job changes - transfers and promotions -Problems in Performance Appraisal – Essentials of Effective Appraisal System – Job Evaluation – Concepts, Process and Objectives – Advantages and Limitations – Methods.

Unit V Compensation and Maintenance

Compensation - Concept and policies- wage and Salary administration - Methods of wage payments and incentive plans - Fringe benefits – Performance linked compensation - Employee health, welfare and safety social security - Employer-Employee relations- grievance handling and redressal – Grievance handling and redressal.

Text Books:

1. K. Aswathappa : Human Resource Management Text and Cases: Tata McGraw Hill, New Delhi.
2. George W Bohlander and Scott A Snell: Principles of Human resource Management: Cengage Learning, New Delhi.
3. P.G.Aqinas: Human Resource Management Principles and Practice: Vikas Publishing House Pvt. Ltd., New Delhi

Outcomes:

1. To know the system of human resource information.
2. To learn the process of selection of human resource.
3. To differentiate the management development and career development.
4. To understand the performance appraisal.
5. To identify the grievance handling and redressal.

III B. COM (V SEMESTER) – UNDER CBCS
PART III – MAJOR ELECTIVE -1 (SELECT ANY ONE) - 3
ELEMENTS OF E-COMMERCE

Objectives:

1. To enable the students to gain basic knowledge of Electronic-Commerce in the area of Business and Financing decisions

Unit I: Basics of e-Commerce

Commerce Framework -Traditional vs. Electronic BusinessApplications - The Anatomy of E-Commerce Applications

Unit II: Architectural View

Network Infrastructure for E-CommerceComponents of the I-way-Global Information Distribution Networks – PublicPolicy Issues Shaping the I-way - The Internet as a Network Infrastructure - The Business of the Internet Commercialization

Unit III: Security

Network Security and Firewalls – Client Server NetworkSecurity – Firewalls and Network Security – Data and Message Security –Encrypted Documents and Electronic -Mail.

Unit IV: Application

Electronic Commerce and World-Wide-Web, ConsumerOriented E-Commerce, Electronic Payment Systems, Electronic DataInterchange (EDI), EDI Applications in Business, EDI and E-Commerce – EDIImplementation.

Unit V: Multimedia in e-Commerce

Multimedia and Digital video- key multimediaconcepts, Digital Video and Electronic Commerce- Desktop Video processing –Desktop Video conferencing

Text Books:

1. Kalakota, R and Winston, AB 2002 Frontiers of Electronic Commerce,Addison Westey

2. David Kosiur, 2002 Uunderstanding Electronic Commerce, MicrosoftPress,

3. Saily Chan & John Wiley 2000Electronic Commerce Management, TataMcGraw Hill, New Delhi.

Outcomes:

1. To gain knowledge of e-commerce applications.
2. To know the functions of internet.
3. To identify the network security data and message security.
4. To understand the applications of EDP.
5. To differentiate the multimedia and digital video.

III B. COM (VI SEMESTER) – UNDER CBCS
PART III – MAJOR ELECTIVE – II (SELECT ANY ONE) -1
BUSINESS TAXATION

Unit I:

Indirect taxes – Meaning and Nature - Special features of Indirect Taxes- Contribution to government revenues - Taxation under the Constitution - Advantages and Disadvantages of Indirect Taxes.

Unit II Good and Service Tax Introduction

Meaning - Need for GST - Advantages of GST - Structure of GST in India – Dual concepts - SGST-CGST-IGST-UTGST Types of Rates under GST – Taxes subsumed under State Goods and Services Tax Act 2017- Taxes subsumed under Central Goods and Services Tax Act2017. Meaning of important terms: Goods, services, supplier, business,manufacture, casual taxable person, aggregate turnover, input tax and outputtax.

Unit III Levy and Collection

Levy and Collection under SGST/CGST Acts - Concept of supply – Compositeand Mixed supplies - Composition Levy - Time of supply of goods and services -Value of Taxable supply - Input Tax credit - Eligibility and conditions for takinginput credit- Reverse charge under the GST- Registration procedure underGST- Concept of e-way Bill - Filing of Returns.

Unit IV Integrated GST

Levy and Collection under The Integrated Goods and Services Tax Act 2017-Meaning of important terms: Integrated tax, intermediary, location of therecipient and supplier of services, output tax. Levy and Collection of Tax-Determination of nature of Supply- Inter-State supply and Intra-State supply-Place of Supply of Goods or Services - zero-rated supply.

Unit V Customs Laws in India

Introduction to Customs Laws in India – The Customs Act 1962 - The CustomsTariff Act 1975- Levy and Exemption from Custom duty - Taxable event -Charge of Custom duty- Exemptions from duty – Customs procedures forinport and export - Meaning of Classification of goods - Methods of valuation ofimported goods - Abatement of duty in damaged or deteriorated goods -Remission on duty on lost, destroyed or abandoned goods - Customs duty drawback.

Books for Reference:

1. Indirect Taxes- V.S.Datey. TaxmannPublication(p) Ltd.New Delhi
2. Indirect Taxes:GST and Customs Laws - R.Parameswaran andP.Viswanathan -Kavin Publications-Coimbatore
3. Glimpse of Goods and service tax -SathpalPuliana
4. Handbook of GST -Law and practice-Gaurav Gupta
5. GST Law and Practice-SS Gupta
6. Indirect Taxation - V.Balachandran. Sultan Chand & Co. New Delhi

Outcomes:

1. To understand basic concept and importance of indirect taxes.
2. To understand the various concept and types of Goods and Service Tax.
3. To understand and make use of knowledge of GST in taking managerial decision in varioustax related matters.
4. To get familiar with the Integrated Goods and Services Tax Act 2017.
5. To know the Customs procedures for import and export

III B. COM (VI SEMESTER) – UNDER CBCS
PART III – MAJOR ELECTIVE – II (SELECT ANY ONE) -2
RETAIL MANAGEMENT

Objectives

1. To explore the functionalities in the retail management

2. To understand the retail management concepts

Unit I:

Introduction to retailing- nature and importance of retailing - contemporary retailing in India and marketing challenges facing retailers - Strategic planning in retailing - owning or managing business - retailing life cycle

Unit II:

Types of retailing institutions- retailing institutions by ownership - retailing institutions by store based and non-store based - vertical marketing system - traditional retailing.

Unit III:

Strategic planning in retailing- understanding retailing environment - identifying and understanding customers, information gathering.

Unit IV:

Location and organizational decisions- Trading area analysis site selection - organizational pattern in retailing - operational management - financial decisions - use of technology

Unit V:

Merchandise Management- Buying and handling - product assortment decision - Inventory Management - Merchandise pricing - Merchandise Labelling and packing - Role of atmosphere - retail promotion mix strategy - retail store sales promotion schemes.

Text / Reference Books

1. Dr.Harjit Singh "Retail Management", Sultan Chand Publications.
2. Chetan Bajaj "Retail Management", Oxford University Press.
3. Gibson G. Vedamani, Retail Management: Functional Principles & Practices, Jaico Books.
4. SwapnaPradhan, Retailing Management, Tata McGraw-Hill Publishing Company Limited, New Delhi.
5. Michael Levy and Barton A Weot, Retail Management, McGraw-Hill Irwin.
6. Cox, Roger and Paul Brittain, Retail Management, Prentice Hall, Harlow.
7. Michael Levy, Barton A Weitz, Ajay Pandit, Retailing Management, McGraw-Hill Company.
8. Berman Barry, Evans Joel R., Retail Management: A Strategic Approach, Pentice Hall of India.

Outcomes:

1. To understand basic concept, importance and challenges facing retailers .

2. To identify the types of retailing institutions.

3. To understand Strategic planning process in retailing.

4. To identify the organizational Location and financial decisions.

5. To know the role and functions of Buying and handling of Merchandise Management

PART III – MAJOR ELECTIVE – II (SELECT ANY ONE) -3

HUMAN VALUES &BUSINESS ETHICS

Objectives

1. To understand values in business

2. To inculcate the ethical practices in business among the students

Unit I:

Introduction to Values - Values in the society, politics, inter-personal relations, economics and business- Morals - Value and Vision statements in organizations - Focusing on Innovation, Reliability, Customer satisfaction, Quality assurance, Profitability, Utility, Productivity etc. and the continuous improvement in their standards.

Unit II:

Ethics as the art of choosing between right and wrong– Interpreting the consequences and choosing the right- Ideas of freedom of choice, equality, justice, fairness in dealing with customers, society, environment - Application of Values and ethics in business - Examples from Business

Unit III:

Government interactions:Use and Misuse of government incentives, subsidies and licenses - Tax evasions. Ethics in Human Resources employment in Business: in hiring, compensating, work assignments - discrimination; Marketing: ethics in Pricing policies and strategies, misleading advertisements; Policies relating to exchange and return of goods sold.

Unit IV:

Ethics in Production: Poor quality, risky products, defective/untested products, unauthorized copies/imitations, Quality Policy: Zero defect and quality of ingredients, components, ISI, AG Marks, Hall Mark, Patents, Copy rights, post-sales services.

Unit V:

Legal and self imposed norms- for doing good business and earning goodwill - Handling customer complaints, Problems- examples from consumer goods and services oriented industries (Tourism, Travel, Telephones, Edible goods, Health etc.)

Text and Reference books

1. Colin M. Fisher and Alan Lovell, Business Ethics and Values, F.T. Prentice Hall, 2006.
2. G.P. Martin, Glenn Martin, Human Values and Ethics in the Work place, 2010.

Outcomes:

1. To understand values in business and Customer satisfaction in society.Productivity etc. and the continuous improvement in their standards

2. To gain an application of Values and ethics in business

3. To know the Government interactions and Ethics in Business pricing policies andstrategies

4. To apply and understand Ethics in Production

5. To understand how to handle customer complaints and services-oriented industries

MANONMANIAM SUNDARANAR UNIVERSITY

TIRUNELVELI

PG – COURSES - AFFILIATED COLLEGES

Course Structure for M.Com

(Choice Based Credit System)

(With effect from the Academic Year 2021 – 2022 onwards)

Sem	Sub. No.	Subject status	Subject Title	Contact Hrs./ Week	Credits
I	1	Core-1	Accounting for Management	6	4
	2	Core-2	Statistics	6	4
	3	Core-3	Management Concepts and Organisational Behaviour	6	4
	4	Core-4	Insurance and Risk Management	6	4
	5	Core-5	International Business	6	4
				30	20
II	6	Core-6	Advanced Financial Management	6	4
	7	Core-7	Quantitative Techniques	6	4
	8	Core-8	Corporate Legal Framework	4	4
	9	Core-9	Enterprise Resource Planning	5	4
	10	Core-10	Corporate Social Responsibility	5	4
	11	Elective-1	From list	4	3
				30	23
III	12	Core-11	Advanced Corporate Accounting	6	4
	13	Core-12	Taxation and Tax Planning	6	4
	14	Core-13	Computerized Accounting with Tally	5	4
	15	Core-14	Human Resource Management	5	4
	16	Core-15	Business Research Methods	4	4
	17	Elective-2	From list	4	3
				30	23
IV	18	Core-16	Applied Costing	6	4
	19	Core-17	Indirect Taxation	6	4
	20	Core-18	E-Commerce	5	4
	21	Core-19	Financial Markets and Institutions	5	4
	22	Core-20	Project	8	8
				30	24
			Total	120	90

Electives for II Semester

1. Credit Management

2. Business Analytics

3. Customer Relationship Management

Electives for III Semester

1. Consumer Rights and Education

2. Financial Derivatives

3. Management Information System

For the Project, flexible credits are b/w 5 – 8 &Hours per week are b/w 10 - 16.

Total number of credits ≥90 : 90

Total number of Core Courses : 20 (19 T + 1 Prj.)

Total number of Elective Courses : 2

Total hours : 120

Total Credits

First Semester : 20 credits

Second Semester : 23 credits

Third Semester : 23 credits

Fourth Semester : 24 credits

Total number of Credits : 90

Total number of papers/courses : 22

Internal Assessment: Internal Assessment is for 25 marks.

Internal Assessment shall be done in the following manner:

i)   The average of the best two scores of the students from
        three tests of an hour duration shall be averaged   -- 15 marks

ii)   Assignment   -- 4 marks

iii)   Seminars   -- 6 marks

                                                             ----
                                                                  25 marks
                                                             ========

Passing Minimum:

- There is a pass minimum of 50 for external and overall components :
- For all problems involving papers 60% for problem and 40% for theory questions shall be asked.
- (For GST and Customs Procedure: Theory 80% and Problem 20%)

Industrial Visit:

Industrial visits are compulsory for students of commerce. On duty leave shall be sanctioned to the staff accompanying the students.

Eligibility for admission:

A Candidate who has passed the B.Com, or B.A. (Corporate Secretaryship), or B.B.A., (Bank Management), or B.A. (Co-op), or B.A. (Indus. Org.) or B.Com.(C.A) degree is eligible for admission in to M.Com.

CREDIT MANAGEMENT

L	T	P	C
4	0	0	3

Objectives:

1. To enable the student to understand what credit management is, what are the lending types and process and how to monitor the credit.
2. To lay a foundation for more complex credit management topics that arise credit policies, credit appraisal and NPA
3. To inculcate advanced skills for handling credit management issues
4. To help know financial support to the agriculture and NABARD schemes to promote agri-business in India
5. To understand about retail lending and its banking product

Unit I Introduction and Overview of credit:Principles of Lending : Safety, Liquidity & Profitability - Purpose of Loan - Diversification Risk- Model Credit Policy for individual and all types of organisation - **Types of Credit Facilities :** Various Types of Credit Facilities - Cash Credit, Overdrafts, Demand Loan, Bills Finance - Drawee Bill Scheme and Bills Discounting - **Credit Delivery :** Types of Facilities, Modes of Delivery, Sole Banking Arrangement, Multiple Banking Arrangement, Consortium Lending, Syndication. Credit Thrust, Credit Priorities, Credit Acquisitions Discounting - Dimensions of Credit Appraisals

Unit II Overview of credit policies and project appraisals: The credit process – Characteristics of different types of loans- Evaluating commercial loan requests – Financial statement analysis- Cash flow analysis- Projections-Management of the firm and other factors –Feasibility study – Fundamental credit issues - Credit analysis- Project / Term Loan Appraisal : Technical Appraisal - Commercial / Market Appraisal - Managerial Appraisal - Financial Appraisal - Economic Appraisal - Environmental Appraisal

Unit III Evaluating consumer loans & loan and advances against pledge: Types of consumer loans- Credit analysis of consumer loans- Risk–return analysis of consumer loans- Customer profitability analysis and loan pricing- Fixed Vs floating rates - Hypothecation- Mortgage – Lien- Advances against goods- Document to title to goods – Life insurance policies – Stock exchange securities-Fixed deposit receipts – Book debts- Supply bills- Real Estates – Advance against collateral securities-Corporate Finance – Project Finance

Unit IV Agricultural finance and retail lending: Crop loans- Crop insurance schemes- Dairy- Sericulture-Poultry- Animal husbandry – Horticulture – Kissan credit cards – NABARD initiatives – Lead bank schemes – Retail Lending: Characteristic of Retail Loans - Advantages of Retail Loans - Retail Banking Vs Corporate Banking - Various Retail Banking Products - Model Retail Banking Products

Unit V Credit Monitoring and NPA Management: Credit Monitoring, Supervision & Follow Up : Credit Monitoring - Meaning, Monitoring Goals - Process of Monitoring - Different Monitoring Tools - Check-list for Monitoring - Monitoring by using various statements - NPA – Causes and Remedial Measures – Identification of NPAs – Debt Recovery Tribunals – Asset Reconstruction Fund - effect of NPA on profitability

BUSINESS ANALYTICS

L	T	P	C
4	0	0	3

Objectives

1. To enable students to learn the basics of business data analytics platforms
2. To teach quantitative analysis including sampling etc
3. To learn advanced statistical techniques such as multivariate analysis etc
4. To gain an understanding of the nuances of data mining
5. To teach the techniques of regression analysis

UNIT I Introduction to Data Analytics Platform - Visualizing Data - Describing and Summarizing Data - Challenges of Conventional Systems - Intelligent Data Analysis - Analytic Methodologies or Techniques Used in Logical Analysis

UNIT II Quantitative Analysis - Sampling Methods and Estimation – Probability Distributions - Descriptive Statistics - Inferential Statistics - Hypothesis Testing, Explanatory and Predictive Models, and Fact-Based Management to Drive Decisions and Actions - Tools - Analysis vs Reporting.

UNIT III One-Sample Tests - Two Independent Samples Tests - K Related Samples Tests - Measures of Correlation and Association - Multivariate Nonparametric Test for Interdependence - Probability and Decision Making Under Uncertainty - Normal, Binomial, Poisson, and Exponential Distributions

UNIT IV Data Mining - Importing Data into Excel - SQL - Analysis of Variance and Experimental Design - Statistical Process Control - Statistical Reporting - Foundations, Methods, Interpretations in Excel – R – STATA – PSPP – EVIEWS – Machine Learning.

UNIT V Regression Analysis - Estimating Relationships - Linear versus Nonlinear Relationships - Statistical Inference - Time Series Forecasting - Introduction to Optimization and Simulation Modeling – Optimization and Simulation Model - Decision Support System

Learning Outcome :

After the completion of the course, the students must be able to:

1. Gain an understanding of the basics of business data analytics platforms
2. Gainknowledge of quantitative analysis including sampling etc
3. Learnadvanced statistical techniques such as multivariate analysis etc
4. Describe the nuance of data mining
5. Gain knowledge of techniques of regression analysis

References :

1. Bowerman, B. (2016). Business Statistics in Practice: Using Data, Modeling, and Analytics. McGraw-Hill Higher Education
2. Christian Albright, Wayne L. Winston (2015). Business Analytics : Data Analysis and Decision Making 5th Edition, CENGAGE
3. Cliff, T. (2014). Exploratory Data Analysis in Business and Economics: An Introduction Using SPSS. Stata, and Excel: Springer, New York, New York, 215
4. Gert H. N. Laursen, JesperThorlund (2018). Business Analytics for Managers, 2ed: Taking Business Intelligence Beyond Reporting, Wiley

5. Kumar, U. D. (2017). Business Analytics the Science of Data-Driven Decision Making. Wiley
6. Ledolter, J. (2013). Data mining and business analytics with R. John Wiley & Sons
7. Jensen, C. (2017). Data Science for Business: Data Analytics Guide with Strategies and Techniques
8. Prasad R N and Seema Acharya (2016). Fundamentals of Business Analytics, 2ed,
9. WileyWilliams, S. (2016). Business intelligence strategy and Big Data analytics: a general management perspective. Morgan Kaufmann

CUSTOMER RELATIONSHIP MANAGEMENT

L	T	P	C
4	0	0	3

Objectives

1. To impart skill based knowledge of Customer Relationship Management
2. To understand the concepts and principles of CRM
3. To understand the need and importance of maintaining a good customer relationship
4. To gain knowledge of strategic customer acquisition and retention techniques in CRM
5. To teach the conceptual aspects of service quality

UNIT I Understanding customers: Customer information Database – Customer Profile Analysis – Customer perception- Expectations analysis – Customer Behavior in relationship perspectives; individual and group customers – Customer life time value – Selection of Profitable customer segments

UNIT II CRM structures: Elements of CRM – CRM Process – Strategies for Customer acquisition – Retention and Prevention of defection – Models of CRM – CRM road map for business applications.

UNIT III CRM Planning and Implementation: Strategic CRM planning process – Implementation issues – CRM Tools- Analytical CRM – Operational CRM – Call centre management – Role of CRM Managers – CRM Implementation Road Map- Developing a Relationship Orientation – Customer-centric Marketing Processes – Customer retention plans

UNIT IV Service quality: Concept of Quality – Meaning and Definition of Service Quality - Factors influencing customer expectations and perceptions – Types of Service Quality – Service Quality Dimensions – Service Quality Gaps – Measuring Service Quality – Service Quality measurement Scales.

UNIT V Trends in CRM: CRM Solutions – Data Warehousing – Data mining for CRM – CRM software packages – The Technological Revolution: Relationship Management – Changing Corporate Cultures.

Learning Outcome:

After the completion of the course, the students must be able to:

1. Gainskill based knowledge of Customer Relationship Management
2. Understand the concepts and principles of CRM
3. Gainknowledge on the need and importance of maintaining good customer relationship
4. Gainknowledge of strategic customer acquisition and retention techniques in CRM
5. Describe the conceptual aspects of service quality

References :

1. Alok Kumar et al, (2015), Customer Relationship Management: Concepts and Applications, Biztantra
2. Jim Catheart, (2016), The Eight Competencies of Relationship selling, Macmillan India
3. Peeru H Mohamed and A Sahadevan, (2017), Customer Relationship Management, Vikas Publishing
4. Shainesh, Jagdish, N.Sheth, (2015), Customer Relationships Management Strategic Perspective.

ADVANCED CORPORATE ACCOUNTING

L	T	P	C
6	0	0	4

Objectives:

1. To educate students on recent developments in corporate accounting

2. To teach the students on various requirements of corporate reporting.

3. To develop skill in preparation of accounts of companies.

4. To help the students to understand the techniques of restructuring and liquidating corporate entities.

5. To make the students to qualify to get employment in corporate companies

Unit I Alteration of Share Capital& Amalgamation Absorption and Reconstruction;

Alteration of Share Capital - Procedure for Reducing Share capital. Amalgamation, absorption and External reconstruction - Methods of Computing purchase consideration-types of amalgamation. Internal reconstruction Vs External reconstruction – simple problems.

Unit II   Valuation of Goodwill& Liquidation of companies: Valuation of Goodwill – Factors determining the value of Goodwill-Methods of valuation of Goodwill. Valuation of shares – Methods of valuation of shares – Liquidation of companies – Liquidators final statement of accounts – simple problems. (15L)

Unit III Accounts of Banking Companies: Accounts of Banking companies - Rebate on bills discount – Assets classification and provisions – preparation of various schedules and final accounts – Simple problems. (15L)

Unit IV Accounts of Insurance companies: Accounts of Insurance companies : Life Insurance and General Insurance – Preparation of various schedules and final accounts. Simple problems. (20L)

Unit V Double Accounting & Accounts of Holding Companies: Double Accounting – Accounts of Electric supply companies (including railways and public utilities). Replacement of assets – preparation of final accounts. Accounts of Holding companies : steps involved in preparation of consolidated balance sheet - legal provisions – simple problems. (20L)

Learning Outcome:

1. On the successful completion of this course the student will be able to gain knowledge and understand the concepts and practices of company accounts

2. The students shall have a comprehensive understanding on the advanced issues in accounting.

3. The students shall acquire a thorough knowledge in banking accounts. It helps them even to appear for competitive bank examinations.

4. The students shall get an exposure on the accounts of electricity companies

References :

1. Advanced Accountancy ,S.P.Jain and K.L.Narang.
2. Advanced Accounts,M.C.Shukla, T.S.Grewal, S.C.Gupta
3. Advanced Corporate accounts – by M.A.Arulanandam, K.S.Raman
4. Advanced Accountancy, R.L.Gupra, M.Radhaswamy

CONSUMER RIGHTS AND EDUCATION

L	T	P	C
4	0	0	3

Objectives

1. To give the students a clear understanding of the terms Consumers, Consumerism, Consumer movement
2. To give an understanding of the provisions of the Consumer Protection Act
3. To know the methods of creating awareness and education
4. To familiarize students on various aspects of consumer related Legislations and Organizations
5. To make the students aware about the rights and responsibilities of consumers

Unit I Consumer Movement in India- Definition of Consumer- Types of Consumer –Problems ofConsumer – Consumerism- Emerging concepts in consumerism: Green Consumerism, Cyber Consumerism- effects of consumerism.

Unit II Right of Consumers- Responsibilities of Consumers ––unfair trade practices-Caveat emptor and Caveat Venditor- Enforcement of Consumer rights through Public Interest Litigation

Unit III Consumer Protection Act 2019- Main Provisions –Redressal forums –District Level –State Level and National Level –Powers and Functions –Filing of Complaints Procedure Regulatory Authorities and OMBUDSMAN

Unit IV Consumer related Legislations and Organizations: Prevention of Food Adulteration Act, 1954- Standards of Weights and Measures Act, 1976- The Drugs and Magic Remedies (Objectionable Advertisement) Act 1954 - Consumer pressure groups-voluntary consumer organizations-Consumer Protection Councils -Remedy andRedressal of Grievances

Unit V Consumer awareness and Education in India: Lack of awareness- Lack of access to information-Methods of creating awareness and promotion of Consumer rights and duties- E-Commerce and Consumer Rights- Role of media in consumer education

Learning Outcomes:

At the end of this course, the Students will be able to:

1. Understand the various terms related to Consumers
2. Know the Consumers rights and duties and how to enforce their rights
3. gain knowledge of the provisions and procedures under Consumer Protection Act
4. familiar with Consumer related Legislations and Organisations
5. know the methods of creating awareness and education

References :

1. Singh Avtar, (2010), Law of consumer protection (Principles and Practice) Eastern Book Company, Luck now.
2. Aggarwal V.K, Consumer Protection Law and practice, Bharat Law House Pvt Ltd. New Delhi
3. Majaumdar P K (2009), Law of Consumer Protection in India, Orient Publishing Company,New Delhi.
4. BalakrishnaEradi(2009), Consumer protection–Jurisprudence, Lexis Nexis Butter worth publishing
5. Bangia R.K., (2004), A Handbook of Consumer Protection Laws and Procedure, Allahabad Law Agency

FINANCIAL DERIVATIVES

L	T	P	C
4	0	0	3

Objectives
1. To make the students understand about the concept of Derivatives and its types
2. To acquaint the knowledge of Options and Futures
3. To teach about hedging and the development position of derivatives in India
4. To gain an understanding about the financial derivatives market in India
5. To enable the students to know about stock futures

Unit I Introduction to derivatives –Definition of Financial derivatives- Features – Types— History of Derivatives Markets – Uses of Derivatives - Forward Market:Forward Contract concept – Features – Classification of Forward Contracts –Forward Trading Mechanism – Forward Prices Vs Future Prices.

Unit II Options and Swaps – Concept – Types – Option Valuation– Option Positions Naked and Covered Option – Underlying Assets in Exchange-traded Options – Determinants of Option Prices – Binomial Option Pricing Model – Black-Scholes Option Pricing – Basic Principles of Option Trading – SWAP: Concept, Evaluation and Features of Swap – Types of Financial Swaps – Interest Rate Swaps – Currency Swap – Debt-Equity Swap.

Unit III Futures – Financial Futures Contracts – Types of Financial Futures Contract –Evolution of Futures Market in India – Traders in Futures Market in India – Functions and Growth of Futures Markets- Theories of Future prices – Future prices and Risk Aversion – Forward Contract Vs. Futures Contracts.

Unit IV Hedging and Stock Index Futures – Concepts – Perfect Hedging Model – Basic Long and Short Hedges – Cross Hedging — Hedging Objectives – Management of Hedge – Concept of Stock Index – Stock Index Futures – Stock Index Futures as a Portfolio management Tool – Speculation and Stock Index Futures – Stock Index Futures Trading in Indian Stock Market.

Unit V Financial Derivatives Market in India – Need for Derivatives – Evolution of Derivatives in India – Major Recommendations of Dr. L.C. Gupta Committee –Derivatives Trading at NSE/BSE – Eligibility of Stocks –Emerging Structure of Derivatives Markets in India – Foreign Exchange Management

<u>**Learning Outcomes :**</u>

After the completion of the course, the students must be able to:

1. Gain an understanding of the concept of Derivatives and its types
2. Get acquainted about Options and Futures
3. Describe about hedging and the development position of derivatives in India
4. Gain mastery over the financial derivatives market in India
5. Understand about stock futures

<u>References :</u>

1. Gupta S.L., (2008), Financial Derivatives – Theory, Concepts and Problems, Prentice Hall of India, Delhi
2. Kumar S.S.S (2007), Financial Derivatives, Prentice Hall of India, Delhi
3. Chance, Don M (2001), Derivatives and Risk Management Basics, *Cen* gage Learning, Delhi
4. Stulz M. Rene, (2009), Risk Management and Derivatives, Cen gage Learning, Delhi

MANAGEMENT INFORMATION SYSTEM

(Elective Course)

L	T	P	C
4	0	0	3

Objectives

1. To offer in-depth knowledge on information systems in business and their management
2. To teach the objectives and components of data base management systems
3. To know the approaches involved in developing MIS
4. To enable students to know transaction processing and Support system
5. To gain knowledge on functional Information systems

Unit I Management Information System – Concept, Need, Strategic role – Evolution of Management Information System – Components of Management Information System – Information flow

Unit II Data base management systems – Objectives and Components – Database design – Creation and control – Recent trends in database

Unit III Developing information system – Planning, Designing and redesigning – Approaches for system development – System analysis and Design – system Implementation and Maintenance

Unit IV Transaction processing and Support system – Transaction processing system – Office automation systems – Decision support systems – Executive information systems – Artificial intelligence and Expert systems

Unit V Functional Information systems – Production, Finance, Human resource and Marketing – Managing information resources – Information Security – Control & Audit of Information Systems

Learning Outcome :

After the completion of the course, the students must be able to:

1. Gain in-depth knowledge on information systems in business and their management
2. Learn the objectives and components of data base management systems
3. Know the approaches involved in developing MIS
4. Know transaction processing and Support system
5. Gain knowledge on functional Information systems

References :

1. Azam M (2012), Management Information Systems, Vijay Nicole Imprints
2. Davis (2013), 'Management Information Systems',McGraw Hill
3. Eff Oz (2001), 'Management Information Systems', Vikas Publishing house Pvt. Ltd
4. Goyal D P (2010), 'Management Information Systems – Managerial Perspectives', Mac Millan India Ltd
5. James A O' Brain (2014), Management Information Systems', Tata McGraw Hill
6. Kenneth C.Loudan& Jane P.Loudan (2016), "Essentials of MIS", Prentice Hall India
7. Muneesh Kumar (2001), 'Business Information Systems', Vikas Publishing house Pvt. Ltd
8. Prasad L M, Usha Prasad (2012), 'Management Information Systems', Sultan chand& Sons
9. Sadagopan S (2012), 'Management Information System', Prentice Hall
10. Wetherbe, Turban (2000), 'Information Technology for Management', John Wiley publisher

APPLIED COSTING

L	T	P	C
6	0	0	4

Objectives

1. To familiarise the students with the various cost concepts, and elements of cost
2. To enable the students to prepare cost sheets
3. To apply different methods and techniques of cost control
4. To gain knowledge of different methods of payment of wages and incentives
5. To acquaint the students in the application of Marginal costing for Business decision making.

UNIT I Introduction: Costing - Cost Accounting – Meaning and Definition – Financial Accounting Vs Cost accounting – Relationship of cost accounting with management accounting - Nature and significance of Cost Accounting – Implementation of costing system – Practical difficulties in implementation – Essentials of good costing system - Elements of cost – Cost concepts and preparation of cost sheet – Methods of Costing -job order Costing – Process Costing- Materials – Issue of materials – Pricing of material issued.

UNITII Labour Costing: Labour – types of labour cost – Methods of time keeping – Idle time - overtime – labour turnover - Preparation of Pay Roll – Wage payment and incentive system – Overhead – meaning and classification of overheads – Departmentalization of Overheads – - Allocation - Apportionment – Re-apportionment- Absorption of Overhead cost – Difference between cost allocation and apportionment and Reapportionment – treatment of over and under absorbed overheads.

UNIT III Process Costing: Process costing – Comparison between joint costing and process costing – costing procedure under process costing- Process Losses – Inter process profit – Equivalent production – methods of computing equivalent units- Evaluation of equivalent production– Joint product and by products costing – accounting for joint products & by-products.

UNIT IV Marginal Costing : Marginal costing – Salient features – Marginal costing and absorption costing - Break – Even analysis – Cost – Volume-profit analysis – Application of Marginal costing for Business decision making —-Determination of sales mix- Exploring new markets- Make or buy decisions- Change versus status quo -expand or contract – shut down or continue - Inflation Accounting – Human Resource Accounting.

UNIT V Cost Management: Cost management – cost reduction and cost control – Responsibility Accounting – Responsibility Centre – Accounting for Price level changes – Methods of Accounting for price level changes – Activity Based Costing – Target costing – Kaizen

Note: Question paper shall consist of 40% Theory and 60% Problems

Learning Outcomes :

After the completion of the course, the students must be able to:

1. Gain familiarity with the various cost concepts, and elements of cost
2. Prepare cost sheets
3. Apply different methods and techniques of cost control
4. Gainknowledge of different methods of payment of wages and incentives
5. Get acquaintance with the application of Marginal costing for Business decision making

References :

1. Arora M N, (2017), Cost and Management Accounting, Himalaya Publishing House, Mumbai
2. Horngren, (2016), Cost Accounting with Managerial Emphasis, Prentice Hall India, New Delhi
3. Murthy A and Gurusamy S, (2018), Cost Accounting, Vijay Nicole Imprints Pt Ltd, Chennai
4. Jain S.P &Narang KL, (016), Cost Accounting, Kalyani Publishers, Mumbai
5. Reddy T S and Hari Prasad Reddy, (22018), Cost Accounting, Margham Publications, Chennai

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

MASTER OF PHILOSOPHY – COMMERCE
For Affiliated Colleges (Full-Time) – CBCS

(Revised Effective from the academic year 2018-2019 and thereafter)

OBJECTIVES

To Provide Exposure to emerging issues in the area of Commerce

To Undertake Research Problems on the Contemporary Issues with Social Relevance

To Persuade to Undertake Independent Projects and Consultancy

Scheme of Examination (Revised)

SI.No	Semester	Subject	Credits	Hours / Week
1.	I	Core I – Research and Teaching Methodology	4	4
2.	I	Core II – Contemporary Functional Management	4	4
3.	I	Project Oriented Elective Course (Theory) – Professional Competencies	4	4
4.	II	Dissertation and Viva - Voce	12	-
		Total	24	-

<div align="center">

PAPER-III
PROFESSIONAL COMPETENCIES

</div>

L T P C
4 0 0 4

Objectives:
- To enable the students acquire overall knowledge on Professional Competencies.
- To enable the students develop understanding on Professional Competencies.
- To enable the students apply the acquired knowledge Professional Competencies
- To enable the students develop skills of Professional Competencies.
- To enable the students to compete in the professional competitive examination.

Unit-I - Teaching Aptitude (12 L)

Teaching Aptitude- Modern methods of Teaching- Multimedia tools- Games and simulation relevant to the area of specialization

Unit-II - General Awareness (12 L)

General Awareness - Knowledge on Contemporary economic, social and Business issues- Reports on Industry and Trade analysis- People and Environment- Pollution and its impact on human life.

Unit-III – Communication (12 L)

Communication - Nature- Characteristics- types, barriers and effective classroom communication- Time Dynamics- visuals to improve verbs – Arts of Writing – Non verbal communication – word processing stations – Teleconferencing.

Unit-IV - Information Communication and Technology (12 L)

Information Communication and Technology **-** Concepts, advantages, disadvantages- using web as a tool of updating knowledge- Competency to download and save, ability to follow the right link.

Unit-V - Reasoning Aptitude (12 L)

Reasoning Aptitude - Number Series, letter series, codes; Relationships, Classification, understanding the structure of arguments- evaluating and distinguishing deductive, inductive reasoning.

Total: 60 L

References:
1. Arun Sharma, General Studies paper – II for civil services preliminary examination, McGrew Hill Education (india) Private Limited, New Delhi, 2016.
2. IBPS – Bank PO/MT/SO, CWA – VI , kiran institute of career excellence Pvt.Ltd., Delhi,2016.
3. Group –I, General Studies, sakthi's publishing house, Chennai, 2017.
4. P.Subba Rao, Business Communication, Cengage learning India Pvt.Ltd.2012.
5. Mallika Nawal, Business Communication, , Cengage learning India Pvt.Ltd.2012

COURSE STRUCTURE : Master of Social Work

Sem (1)	Sub No (2)	Subject status (3)	Subject Title (4)	Contact Hrs/ Week (5)	Credits (6)
I	1	Core – 1	Foundations for social work	4	4
	2	Core – 2	Psychology for Social work Practice	4	4
	3	Core – 3	Working With Individuals	4	4
	4	Core – 4	Skill Enhancement Course(Concurrent Fieldwork- I)	6	6
	5	Elective – 1A	Social Science For Social work (**OR**)	3	3
		Elective – 1B	Disaster Management and Social work		
II	6	Core – 5	Working with groups	4	4
	7	Core – 6	Working with Community and Social Action	4	4
	8	Core – 7	Social Work Research	4	4
		Core – 8	Social Welfare Administration And Social Legislations	4	4
	9	Core – 9	Skill Enhancement Course(Concurrent Fieldwork- II)	6	6
	10	Elective - 2A	Corporate Social Responsibility & Social Entrepreneurship(**OR**)	3	3
		Elective - 2B	Project Planning and Implementation		
	11	Core-9	Summer Placement- I (Project)	6	6
III	**SPECIALISATION-I COMMUNITY DEVELOPMENT**				
	12	Core-10	Social Development	4	4
	13	Core-11	Sustainable Rural Community Development	4	4
	14	Core-12	Contemporary Issues and Development	4	4
	SPECIALISATION-II MEDICAL AND PSYCHIATRIC SOCIAL WORK				
	12	Core-10	Health and hygiene	4	4
	13	Core-11	Mental Health	4	4
	14	Core-12	Medical Social Work	4	4
	SPECIALISATION-III HUMAN RESOURCE MANAGEMENT				
	12	Core-10	Labour Welfare	4	4
	13	Core-11	Labour Legislations-I	4	4
	14	Core-12	Human Resource Management	4	4
	15	Core-13	Skill Enhancement Course(Concurrent Fieldwork- III)	6	6
IV	**SPECIALISATION-I COMMUNITY DEVELOPMENT**				
	17	Core-15	Sustainable Urban community Development	4	4
	18	Core-16	Management of Non-Government Organizations	4	4
	19	Core-17	Legislation for Development	4	4
	SPECIALISATION-II MEDICAL AND PSYCHIATRIC SOCIAL WORK				
	17	Core-15	Psychiatric Social work	4	4
	18	Core-16	Health System Management	4	4
	18	Core-17	Counselling –Theory and Practice	4	4
	SPECIALISATION-III HUMAN RESOURCE MANAGEMENT				
	17	Core-15	Industrial Relations	4	4
	18	Core-16	Labour Legislations-II	4	4
	19	Core-17	Organizational Behaviour	4	4
	20	Core-18	Skill Enhancement Course(Concurrent Fieldwork- IV)	6	6
	21	Core-19	Summer Placement-II(Project) / Internship	4	4
	22	Core-20	Dissertation	6	6

SOCIAL SCIENCE FOR SOCIAL WORK

HOURS : 3   **CREDIT : 3**

Learning Objectives: To facilitate the students to learn the interdisciplinary approach in social work Profession

Learning Outcome

1.   To acquire knowledge on Society its Characteristics and Types.
2.   To analyze the concept and relationship of various discipline of Sociology, Economics, Political Science and Anthropology with Social Work practice

UNIT IBASIC CONCEPTS IN SOCIOLOGY

Society: Concept, Characteristics, Structure and Functions of Society, Relationship between individual and Society; Community: Concept, Definition and Characteristics of Rural, Urban and Tribal Communities; Institution; Association; Demographic Characteristics of Indian Society; Relevance of Sociology for Social Work Profession.

UNIT II SOCIALIZATION, SOCIAL CONTROL AND SOCIAL GROUPS

Socialization: Concept, Importance and Functions; Agencies of Socialization; Social control: Meaning, Mechanisms of Social control; Agencies: Formal and informal; Culture: Concept; Influence on individuals; Cultural change; Cultural Lag: Civilization; Social Groups: Concept, Definition, Characteristics and Classification of Social groups. Social medianetworking: Whatsapp, Facebook. Sanskritization and Westernization.

UNIT III RELATIONSHIP BETWEEN ECONOMICS AND SOCIAL WORK

Relationship between Economics and Social Work. Examples from theory and Practice. Creation and distribution of wealth. Five Year Plans of India (with reference to social development and poverty alleviation programmes) Introduction to Economic systems : Capitalism, Socialism, Communalism, Mixed economy ,Sustainable Development. Multi National Corporates and its effects on Indian economy.

UNIT IV RELATIONSHIP BETWEEN POLITICAL SCIENCE AND SOCIAL WORK.

Relationship between Political Science and Social Work. Definition of Politics in terms of state, power, resolution of conflicts. Concepts of Rights, Liberty, Justice and Equality, Power, Authority, Legitimacy, Totalitarianism and Autocracy. A critique of the Marxian theory of class. Communism. Fabian socialism, elites and masses, Power structure, classical theories of democracy.

UNIT V RELATIONSHIP BETWEEN ANTHROPOLOGY AND SOCIAL WORK.

Relationship between Anthropology and Social Work. Tribal society, towards a systematic view, kinship, descent and social structure, marriage, family and community. Development programmes and their impact on tribal population. Dislocation and resettlement, future directions of work in this area. Tribal population and development.

Essential Readings

1. Nataraj, S., & Nataraj, H. (2017). Self Development: Is the Prescription the same for all?. Aweshkar Research Journal, 22(1)..
2. Malik, P. An Overview of some Sociological aspects of Sports Education.
3. Deva, I. (1999). Society and culture in India: their dynamics through the ages..
4. WORK, B. O. S. SYLLABUS FOR BACHELOR OF SOCIAL WORK (BSW)(I to VI Semesters). First Language, 20(80), 100..
5. Young, A. (2012). A study of Australian intercountry adoption: choosing applicants to parent. Australian Social Work, 65(4), 490-503..
6. Jayapalan, N. (2001). Indian society and social institutions. Atlantic Publishers & Distri..
7. Training, L. S. Restructured Template 2012–2013. Medical Anthropology, 4, 4..
8. Kapoor, B. K. (2013). Indian society: Structure and change. Ritu Publications..
9. Bhat, B. A. (2010). Gender, education and child labour: A sociological perspective. Educational Research and Reviews, 5(6), 323-328..
10. Perry, J. A., & Perry, E. (1988). The Social Web: An Introduction to Sociology. Harper & Row..
11. Rao, C. S. (2017). Indian Social Problems. S. Chand Publishing.

12. Phule, M., Maharaj, R. S., & Westernization, S. From June 2017..

13. Bhattacharyya, S., Burman, R. R., Sharma, J. P., Padaria, R. N., Paul, S., & Singh, A. K. (2018). Model villages led rural development: A review of conceptual framework and development indicators. Journal of Community Mobilization and Sustainable Development, 13(3), 513-526.

MSU / 2021-22 /PG –Colleges / Master of Social Work / Semester –I/ Ppr.no.5/Elective -1(b)

DISASTER MANAGEMENT AND SOCIALWORK

HOURS : 3	CREDIT : 3

Learning Objectives:

To facilitate the students to learn the various aspects of Nature and Causes of Disaster Management

Learning Outcome

1. To acquire basic knowledge on Disaster and its different Types.
2. To understand Disaster Administration and its Impact.
3. To know about Role of Organisations in Disaster Rehabilitation.

UNIT I INTRODUCTION

Disaster - Definition, Nature and Causes. Types: Natural and Man-made. Natural - Famine, Drought, Floods, Landslides Cyclones, Earthquakes. Manmade - Riots, Biological Warfare, Militancy Insurgency, Eviction. Risk, Hazards, Vulnerability

UNIT II DISASTER MANAGEMENT AND ADMINISTRATION

Disaster Management and Administration - Principles and Dimensions. Pre Disaster Prevention. Education and Awareness. Disaster Manager's tasks - short-term and long term. Resource Mobilization. Mitigation of negative effects. Managing and Monitoring Rescue, Relief, Rehabilitation, and Reconstruction Works

UNIT IIIIMPACT ASSESMENT

Impact of Disaster: Physical, Economical, Spatial and Psycho- Social. Need and Importance of Search, Relief, Recovery, Restoration. Psycho-Social Care -Stress and Trauma care, Coping Skills. Role of Social Worker.

UNIT IV DISASTER PREPAREDNESS AND MANGEMENT

Disaster Preparedness: - Models of Disaster Preparedness. Forecasting and Warning of disasters. Recent trends in disaster information – Electronic Warning System, Remote Senses and GIS Technology.Disaster Risk Assessment and Disaster Response. Risk Reduction. Formulation of Disaster Plans, Implementation and Monitoring. Insurance and Risk management. Safety programmes

MSU / 2021-22 /PG –Colleges / Master of Social Work / Semester –I/ Ppr.no.5/Elective -1(b)
UNIT V SOCIAL WORK INTERVENTION

Post-Disaster Rehabilitation-Speedy Reconstructions- Essential services, Social infrastructures, Immediate shelters/camps, Contingency plans for reconstructions, Relief and Recovery - Role of Government, Voluntary Organizations, Local bodies, Civil Society Groups, Community and Social Workers. Appraisal of Disaster Management Policy of Government of India. Psychological Response and Management (Trauma, Stress, Rumor and Panic) .

Essential Readings

1. Jahan, B., & Ahmad, P. (2020). Impact of the International Crises on the External Trade of Kashmir (1870-1947 AD). Open Journal of Social Sciences, 8(10), 171-192..

2. ur Rehman, A. (2014). Importance and measures of disaster management in libraries. European Scientific Journal..

3. Roshan, M. R., & Kinslin, D. Emergency Management Facilities In Retail Outlets And Demand For Safe Shopping..

4. Misra, G. K., & Mathur, G. C. (1993). Natural disaster reduction. Reliance Publishing House..

5. Joshi, M. V. (2004). Environmental Disasters: Causes, Impact and Remedies. Adhyayan Publishers & Distributors..

6. Bhadra, S. (2013). Community based psychosocial support programme for resiliency building in Tsunami rehabilitation of Kanyakumari District. Journal of social work, Special issue on Building Resilient Communities: Communitarian Social Work, 3(8), 66-86..

7. Marks, M., & Marks, P. M. M. Scheme of Teaching Examination of BSW/BA in Social Work Part-III Semester–V & VI (Semester-V)..

8. Fien, J., Maclean, R., & Park, M. G. (Eds.). (2008). Work, learning and sustainable development: Opportunities and challenges..

9. Singh, R. B. (Ed.). (2006). Natural hazards and disaster management: vulnerability and mitigation. Rawat Publications..

10. Singh, R. B., & Kumar, S. (2011). Mountain risks in downstream water resource management in Upper Bhagirathi basin, Indian Himalayas. In Risk in Water Resources Management (Proceedings of Symposium H03 held during IUGG 2011) IAHS Publ (pp. 49-54).

Quality and Content of the Report	-	15 Marks
Presentation in Viva –voce	-	10Marks
Observation and Suggestions	-	10Marks
Professionalism in Development and Values	-	15 Marks
Total	**-**	**50 Marks**

For Internal Evaluation:

Regularity in field Visits	-	10 Marks
Regularity in Submission of Reports	-	10 Marks
Maintenance of Record	-	10 Marks
Communication Skill	-	10 Marks
Subject Knowledge & Field Work Knowledge	-	10 marks
Total	**-**	**50 Marks**

Field work Evaluation and Viva Voce will be conducted by concerned faculty Supervisor and one more faculty member. Students should submit weekly reports to the faculty supervisor and weekly field work conference is compulsory. At the end of the semester students should submit a consolidated field work report.

MSU / 2021-22 / PG –Colleges / Master of Social Work / Semester – II / Ppr.no.11 / Elective – 1 (a)

Corporate Social Responsibility & Social Entrepreneurship

HOURS: 3   **CREDITS: 3**

Learning Objectives: To facilitate the students to understand various aspects of Corporate Social Responsibility - Phases, Administration, Skills, Pioneering Agencies and Social Entrepreneurship through case studies.

Learning Outcome:

1. To provide the knowledge of Corporate Social Responsibility in the business world in the Social Work context.
2. To make the students to understand the business ethics and Corporate Social Responsibility in global scenario.
3. To understand the skills and technique of CSR
4. To familiarize the emerging management in CSR and Roles of Social Worker in CSR
5. To know about the Social Entrepreneurship

UNIT – I CORPORATE SOCIAL RESPONSIBILITY

Definition, Concepts, Overview of Corporate Social Responsibility, Concentrationareas; Needs to be Social responsibility; Corporate Social Responsibility in Indiancontext and International; Business ethics and Corporate Social Responsibility; Phasesof CSR. Legal Provisions and specification on CSR, Companies Act; Differencebetween CSR and CSI (Corporate Social Initiatives),

UNIT – IISKILLS AND TECHNIQUES IN CSR

Corporate Community Participation and Role and Skills of Social Worker in CSR;Corporate Perspective on building successful partnership; Tools and Techniques;Roles and skills: Advocacy, Administration, Marketing, Mediating, Budgeting,Organizing, Documenting, Presenting, Public speaking, Teaching, Supervising andReporting.

UNIT –IIICASE STUDIES OF SUCCESSFUL CSR INITIATIVE

AMM Foundation, Bajaj Auto, NLC, Infosys, Wipro, Ranbaxy, TATA, L&T, Titan,TVS, MRF, ONGC, Orchid, ACC, ITC, CRI Pumps, **Shanthi Social Services**.Implementation of CSR in Market place and Work place, CSR in the Communities,CSR in the ecological environment. Negative aspects of CSR

MSU / 2021-22 / PG –Colleges / Master of Social Work / Semester – II / Ppr.no.11 / Elective – 1 (a)

UNIT – IVSOCIAL ENTREPRENEURSHIP

Concept, Definition, Importance of Social Enterprise and Entrepreneurship; SocialEntrepreneurship and Business Entrepreneurship; Social Entrepreneurs and SocialChange; Types of Social Enterprises; Growth and Performance of Social Enterprises inIndia; Relationship between Social Enterprise, State and Civil Society

UNIT –V MOBILIZING AND MANAGING CAPITAL FOR SOCIAL ENTERPRISES

Aid agencies; Government, Corporate and Community support; Financialaccountability; Marketing of Social Services; Application of marketing principles inWelfare and Development field; Select case studies of Indian Social Enterprises andEntrepreneurs such as Ela Bhatt, Arunachalam Muruganantham, Vargeese Kurien,Aruna Roy, and Rajinder Singh, Dabbawala

Essential Readings

1. Melé, D. (2008). Corporate social responsibility theories. The Oxford handbook of corporate social responsibility, 47-82..

2. Shrivastava, H. (2000). The business of social responsibility: The why, what, and how of corporate social responsibility in India. Books for Change..

3. Baxi, C. V., & Prasad, A. (Eds.). (2005). Corporate social responsibility: Concepts and cases: The Indian experience. Excel Books India.

4. Dur, C. Semester I. Labour, 3(25), 75-100.

5. Bornstein, D. (2007). How to change the world: Social entrepreneurs and the power of new ideas. Oxford University Press..

6. Nicholls, A. (Ed.). (2008). Social entrepreneurship: New models of sustainable social change. OUP Oxford..

7. Drucker, P. F. (1995). Managing the non-profit organization: Practices and principles. Taylor & Francis..

8. Bidyut Mohanty, (1993), Urbanization in Developing Countries Basic Services and Community Participation, ISS and Concept Publishing Co., NewDelhi.

9. Clinard, Marshall, B., (1970, Slums and Urban Community Development, The Free Press, NewYork.

10. Desai, A.R. & Devadas Pillai (ed.) (1972), Slums and Urbanization, Popular Prakashan, Bombay.

11. Paul Wiebe, (1975), Social Life in an Indian Slum, Vikas Publishing House,Delhi.

PROJECT FORMULATION AND EVALUATION

HOURS : 3   **CREDIT : 3**

Learning Objectives

To help the students to acquire skill in preparation, management, monitoring and evaluation of projects and also give them an opportunity to understand the relevance of project planning and management in different fields of Social work

Learning outcome
1. To acquire basic knowledge on Project Planning
2. To understand the Methods of implementing Projects.
3. To conduct Project Evaluation.
4. To provide basic knowledge in project management

UNIT IPROJECT DEVELOPMENT

Project Development: Meaning. Organization of the Project. Community and Project Development. Social Work Profession and Project Development

UNIT IIPROJECT PLANNING

Project Planning - Identifying needs, determine priorities, Approaches. Assessing Feasibility, Specifying Goals and Objectives, Identifying preferred solutions, implementation. Micro-level Planning, Components of the Plan, Format of Project Proposals. Consultancy.

UNIT III ANALYSIS

Logical Frame Analysis of the Proposal - Cost Benefit Analysis of project, Preparation of the cost plan, Resource Mobilization,Fund Raising and Donor Management,Project Management - Selection and Training of Project Personnel, Supervision, Reporting, Accounting and Auditing.

UNIT IVPROJECT EVALUATION

Project Evaluation and Monitoring - Meaning, Types Need for Evaluation and Monitoring. Criteria for Evaluation.

UNIT VLOCAL DEVELOPMENT AGENCIES

NREG, Self Help Groups, Micro - Credit Enterprises. Role of Local Development Agencies in Micro-Level project planning.

Essential Readings

1. Hope, A., Timmel, S., & Hodzi, C. (1995). Training for transformation: a handbook for community workers. Book 2. Mambo Press..

2. Chandra, P. (1980). Projects: preparation, appraisal, budgeting and implementation. Tata McGraw-Hill Publishing Company Limited..

3. Ginsberg, L. H. (2001). Social work evaluation: Principles and methods. Pearson College Division..

4. Welfare, L., & Work–Practical-II, C. F. Scheme of Examinations: CBCS Pattern..

5. Huang, X., Zhu, Z., Guo, X., & Kong, X. (2019). The roles of microRNAs in the pathogenesis of chronic obstructive pulmonary disease. International immune pharmacology, 67, 335-347..

6. Areeparampil, M. (2009). A Relevant Theology of Women Empowerment in the Contemporary Catholic Church and Society in India, with Special Reference to Mulieris Dignitatem..

7. Mishra, S. N., & Chand, R. (1995). Public and private capital formation in Indian agriculture: Comments on complementarity hypothesis and others. Economic and Political Weekly, A64-A79..

8. Kandasamy, M., 1998 Governance and Financial Management in Non–ProfitOrganizations. New Delhi:Caritas India.

9. Kapoor, K. K., (Ed.), 1986 Directory of Funding Organizations. New Delhi: Information and News Network.

10. Kumar, A., 2003 Social Change through NGOs. New Delhi: Anmol Publishers.

11. Lawant,B. T., 1999 NGOs in Development. Jaipur: Rawat Publications.

12. Mukherjee, Amitara(Ed.), 1995 Participatory Rural Appraisal: Methods and Application in Rural Planning. New Delhi: VikasPublishing Co

SUMMER PLACEMENT- I - Project

Manonmaniam Sundaranar University
M. Phil Social Work Programme
(for affiliated colleges with effect from 2018 – 2019 Onwards)

S.No	Semester	Course Title	Credits	Hours / Week
1	I	**Core- I** : Research and Teaching Methodology	4	4
2	I	**Core- II** : Contemporary Social Work	4	4
3	I	**Project Oriented Electives:** 1. Human Resources Management 2. Family & Child Welfare 3. Community Development 4. Medical and psychiatric Social Work	4	4
4	II	**Project & Viva – Voce**	12	-
		Total	24	-

HUMAN RESOURCES MANAGEMENT

Project Oriented Elective No: 1   **L T P C**
                                                                      4 0 0 4

Objectives:
- To develop the knowledge of students about fields of Human Resource Management, its importance, practice and application.
- To develop an insight in students about various theories & challenges of Human Resource Management

Unit I

HRM – concept, meaning and evolution of HRM and HRD. HR - challenges and opportunities, HR – polices, procedures and programmes - HR policies, procedures and programmes - HR planning, recruitment, selection, placement, psychometric tests, employee attrition and retention, career planning and development and strategic HRM.

(12 L)

Unit II

Compensation Management – wage and salary Administration, current trends in compensation Management. Training and Development – policy, training need analysis, designing, conduction and evaluation of training. Competency mapping, knowledge Management. **(12 L)**

Unit III

Performance Appraisal and potential appraisal, performance, counseling, performance management, grievance handling, health and safety management – TQM (Total Quality Management), Quality at work life (QWL). Employee separation, HR Audit and HR Outsourcing. **(12 L)**

Unit IV

Management of change: Process of managing organizational change, managing resistance to change, strategies and guidelines for imparting change approaches to planned change - process of organizational development, designing intervention and evaluation intervention. Team building – conflict management. **(12 L)**

Unit V

Corporate Social Responsibility (CSR) – concept - need, importance, CSR in Indian context and in Global scenario, corporate community participation, role and skills of social policies and activities, CSR standards and norms, case of successful CSR initiatives. **(12 L)**

(Total   60 L)

References:

1. Bhatia S.K, "Human Resource Management" – A competitive advantage, Deep and Deep publications Pvt. Ltd . New Delhi 2006.(658. 3B).

2. Dipak Kumar Bhattacharya, Human Resources Management. Excel Books, New Delhi 2002 (658.3D)

3. Jyothi P. and Venkatesh D.N, Human Resource Management. Oxford University Press New Delhi 2006 (658.3j)

****

FAMILY AND CHILD WELFARE

Project Oriented Elective No: 2   **L T P C**
                                                                            4 0 0 4

 Objectives:
- To help the students understand the Theoretical and conceptual framework of family and welfare issues.
- To understand and promote Child, women and youth welfare.

Unit I

Theoretical and conceptual framework to study family: origin and evolution of family and marriage. Ideology of family rights and responsibilities, normative family and marriage function and structure, ethnicity and socio-economic background, Social changes and changes in family and marriage function and structure, implications for the family and its members. Alternative family and marriage patterns and structure: dual earner/carrier family single parent families, female headed household childless family, methods for family assessment and its implications, modes of awareness building. **(12L)**

Unit II

Family Welfare: concept, family planning and family welfare planning, methods of family planning, critical review of International, National and state policies and programmes for family planning, life education population, education and sex education: concept, scope, need, techniques. History and definition of family violence, studying family violence. Theories of family violence.   **(12L)**

Unit III

Child welfare: Concept, constitutional safeguard, International, National and state level policies, child rights - UN charter legislations related to child, Factors influencing child development, girl child socio-economic practices and their impact on girl child. Child in special circumstances - destitute child, delinquents child: child welfare board. Child abuse, and neglect, societies' role in abuse and neglect, child exposed to domestic violence. Critical review of child welfare programmes of UNICEF, WHO, ILO, Government of India and state government.   **(12L)**

Unit IV

Challenges and Intervention in Youth welfare: Concept of youth, youth profile, socialization of youth, youth problems - behaviour, functional and emotional problems. Role of youth in freedom movement, social change, politics, youth movement and ideologist, youth unrest and youth development. Youth welfare: concept definition, philosophy and evolution of youth welfare programmes in India. Policies and Programmes for youth, and training for youth leadership, problems of rural, urban and

tribal youth and application of social work methods in working with youth groups.
(12L)

Unit – V

Women welfare &Gender Issues: Status of women, concept of reproductive health and rights, gender and women development, problems of rural, urban and tribal women, critical analysis of third gender and their rights, women trafficking, women in commercial sex, women in non formal/informal sector, women in slums, women and education, critical review of policies, programmes and legislation to women. **(12L)**

(Total   60 L)

Reference:

1. Besharov, D.J. (1990), Recognizing child abuse: A guide for the concerned, The free press, New York.

2. Chalk , R. & King P.A. (eds) (1998), Violence in families: Assessing prevention and treatment programs,

3. Crosson-Tower, C. (2002), Understanding child abuse and neglect (5th Ed). Boston: Allyn & Bacon.

4. Crowell, N.A & Burgess A.W (eds) 1996), Understanding violence against women

5. D.C. National Academy press Washington

6. Duttion, D.(1995), The domestic assault of women; Psychological and criminal justice perspective, CA: UBC press, British.

7. Jayanthi, I and Thomas William A, (2017) Disaster and Tsunami: Psychosocial Impact, Kapaz Publication, New Delhi.

8. Migonon, S.I, Larson C.J., & Holmes, W.M. (2002) Family abuse: consequences, theories and responses, MA: Allyn & Bacon , Boston.

****

Community Development

Project Oriented Elective No: 3   **L T P C**
                                                                       4 0 0 4

 Objectives:
- To help the students understand various communities living in India.
- To understand the various programmes related to community development.

Unit - I Rural development-concept problem and issues

Rural community – rural urban differences and continuum – types of Indian village community concept and need of rural community development - approaches of rural development. Spatial planning approach - multipurpose approach, integrated development approach, area development approach - multilevel district planning, target sector approach – illiteracy – poverty - unemployment, underemployment, seasonal employment, untouchability, communal conflicts – political issues – impact of globalization.   **(14L)**

UNIT – II Rural community Development Administration

Organizational set up and administration from national to block level – central rural development ministry and community development agencies and district level rural development agencies and district planning authorities – functions of block development officer and extension officer – role of voluntary agencies in rural community development.   **(12L)**

UNIT - III Concept and problems of urban community

Definition, classification, characteristics and theories of urbanization, SLUM: definition, theories, causes and characteristics, housing Deviant behaviour, corruption, prostitution, beggary, sanitation, health congestion , pollution.   **(10L)**

UNIT IV

History of urban local self-government in India, form of urban local self-government, organizational structure and functions. Problems of municipal administration in India. Process of organizing the communities. New trends in popular participation in Development. Relevance of Social work practice   **(10L)**

UNIT - V Rural and urban community development programmes

Rural Development Programme: A very brief idea on IRDP, ITDP, TRYSEM, DWACRA - In-depth study on Centre and State current programmes.**Urban Development Programmes:** Urban development policies; Town planning and Related Legislations; Town planning Acts; Land Acquisition Act, programmers: A very Brief idea on IUDP, UBS; In-depth study on recent programmes: Swarna Jayanthi Shahari Rozgar Yozna: Development of women and children in urban areas; Urban self – Employment Scheme; National Slum Development Programmes; Urban Wage employment Programmes.   **(14L)**

(Total   60 L)

REFERENCES:

1. Cerdic Pagh (1990) Housing and urbanization: A study of India, New Delhi. Sage.

2. Christopher and Thomas William, (2011) Community Organisation and Social Action, 2ed. Himalaya Publications, Mumbai.

3. Dahama O.P (1982). Extension and Rural welfare, Agra, Ram Prasad and sons.

4. Desai A.R. Rural sociology in India , Bombay Popular Prakashan.

5. Dube S.C (1958) India's changing villages, London Rutledge and Kegan Paul.

6. Dube M.K (2000) Rural and urban development New Delhi, common health

7. Gopala Krishna & Ansari V. (1985), Technological change for Rural Development in India.

8. Dana Chekki (1979). Community development: theory and method of planned change, New Delhi Vikas.

9. Mahajan V.S. (Ed).(1993). Employment through rural development onwards sustainability, New Delhi Deep and Deep.

10. Madras school of social proceedings of the national seminar on people's participation in community development, Madras.

11. Mihal S.P and Rafio Khan M. History of Rural Development in Modern India New Delhi Gandharan Institute of studies.

12. Mishra G.P. Dynamics of Rural Development in village India. New Delhi. Ashiash.

13. Rajeswar Dayar (1962) Community development programmes in India. Allahabad, Kitals Mahal.

14. Ram K. Verma (1996) Development Infrastructure for Rural Economy, Jaipur Print Hell.

15. Thakur B.N (1988) Sociology of rural development, New Delhi Classical.

16. Thoha, M. and Om Prakash (1989) integrated rural development (Vo I and Vo I) Bangalore sterling.

17. Thomas William A. and Christopher A.J. (2011) Rural Development: Concept and Recent Approaches, Rawat Publications, Jaipur.

18. Vasudeva Rao, D (1985) Fact and rural development, New Delhi Ashiash.

19. Vijay C.M (1984) Rural Community Administration in India, Jaipur prateek

Medical and Psychiatric Social work

Project Oriented Elective No: 4   **L T P C**
                                                                          4 0 0 4

Objectives:

- To develop and understand issues relating to Mental Health, Illness, Psychatric and Medical Social Work and to promote interventional strategies

Unit I

Mental health and illness: Concept of positive mental Health, Psychological well being, mental health and illness, attitude towards mental illness, epidemiological studies and socio demographic correlates of mental illness in India. **View points of illness:** biological, psycho-social and socio-cultural: causal factors in abnormal behavior, perspective on causation: biological and psycho-social causal factor.Anxiety disorders, disassociative (conversion) disorders, obsessive compulsive disorders, adjustment disorders and behavioral syndromes associated with psycho physiological disorders.Psychopathology of personality and behavior disorders, specific personality disorders, behavior disorders due to psychoactive substance use and alcoholism, sexual dysfunctions and disorders, psycho active substance use disorders.   **(16L)**

Unit 2

Psychiatric social work: History, objectives, scope, nature and principles of psychiatric social work, role of psychiatric social worker in hospitals, day care centre, foster homes, community projects and educational institutions, half way home. Psychological based therapies: psycho dynamic therapy, behaviour therapy, cognitive behaviour thereby, humanistic experiential therapies and therapy for inter personal relationship. Applications of tools/scales to measure the psychiatric disorders and use of statistical package (practical exposure study).   **(14L)**

Unit 3

Medical Social work: Concept, historical development, principles, need and scope. Dimensions of health; positive health and well being; determinants of health, right to health; indicators of health, parameters of community health, philosophy of health services.   **(10L)**

Unit 4

Pathology of Disease: Causation, modes of transmission, disease control, concept of prevention and level of prevention, mode of intervention and changing patterns of disease.   **(10L)**

Unit 5

Hospital planning and Administration: Management process and principles, hospital organization structure, hospital planning and challenges of the administration of hospital services, administration of outpatient and inpatient services, emergency services in hospitals, planning and management of ophthalmic services, radiotherapy and oncology centre, management of neonatal intensive care, administration of rural hospitals, role of hospitals in primary health.   **(10L)**

(Total   60 L)

References:

1. Robert C. Carson James N. Butcher & James C. Coleman: Abnormal psychology and modern life (8th edition), Marfatia j.c: Psychiatric of Children Popular Prakhasan , Bombay, 1971.

2. Roberts N. Mental health and mental illness, Rutledge & Kegan Paul, London 1967.

3. Eden D.J. Mental handicap – an introduction George Allen and unnin , London, 1976.

4. Gaind R.N. Hudson B.L.: Current themes in psychiatry Mc millan, 1979

5. Bartlell,Harriet M.: Social work practice in Health field, New York National Association of social workers., 1961

6. Banergee G.R.: Social service Departments in Hospitals – Is organizations and functions , TISS , Bombay, 1950

7. J.E Park, social and preventive Medicine

8. John Howells G. Modern perspective in international child

9. Psychiatry, Williams & wilkins , Vol. 2 & 3 1980

10. Verma, Ratna , Psychiatric social work in India, sage Pub., New Delhi, 1991

11. Skinner, sue Walrond: Developments in family therapy, Rutledge & Kegan Paul, London, 1981

****