SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi and Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi and Accredited by NAAC with "A" Grade)
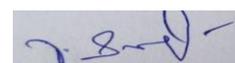Madagadipet, Puducherry
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SCHOOL OF ARTS AND SCIENCE

BACHELOR OF SCIENCE
IN
PHYSICS

ACADEMIC REGULATIONS 2020
(R-2020)
CURRICULUM AND SYLLABI

COLLEGE VISION AND MISSION

Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

Mission

M1: Quality Education:

To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: Research and Innovation:

To foster value based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship:

To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: Ethical Values:

To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

DEPARTMENT OF PHYSICS

VISION AND MISSION

Vision

To excel in quality based science education by igniting the young talented minds with novel ideas and to develop a scientific temper and a sense of social commitment in students.

Mission

M1: Preeminent Education

To impart quality education both in theoretical and experimental physics through effective Teaching Learning process and to motivate students to pursue higher studies in Physics this will improve their career forecasts.

M2: Reach global standard

To reach global standards in production and value based living through an honest and scientific approach

M3: Ethical Responsibility

To create a sense of ethical responsibilities among the students

B.Sc Physics

STRUCTURE FOR UNDERGRADUATE PROGRAMME

Sl. No	Course Category	Breakdown of Credits
1	Modern Indian Language (MIL)	6
2	English (ENG)	6
3	Discipline Specific Core Courses (DSC)	73
4	Discipline Specific Elective Courses (DSE)	16
5	Inter-Disciplinary Courses (IDC)	20
6	Skill Enhancement Courses (SEC)	10
7	Employability Enhancement Courses (EEC*)	--
8	Ability Enhancement Compulsory Courses (AECC)	4
9	Open Elective (OE)	6
10	Extension Activity (EA)	1
Total		**142**

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

Sl.No	Course Category	Credits per Semester						Total Credits
		I	II	III	IV	V	VI	
1	Modern Indian Language (MIL)	3	3	-	-	-	-	6
2	English (ENG)	3	3	-	-	-	-	6
3	Discipline Specific Core Courses (DSC)	10	10	10	10	16	17	73
4	Discipline Specific Elective Courses (DSE)	-	-	4	4	4	4	16
5	Inter-Disciplinary courses (IDC)	4	6	5	5	-	-	20
6	Skill Enhancement Courses (SEC)	2	-	2	2	2	2	10
7	Employability Enhancement Courses (EEC*)	-	-	-	-	-	-	-
8	Ability Enhancement Compulsory Courses (AECC)	2	2	-	-	-	-	4
9	Open Elective (OE)	-	-	3	3	-	-	6
10	Extension Activity (EA)	-	1	-	-	-	-	1
Total		**24**	**25**	**24**	**24**	**22**	**23**	**142**

EEC will not be included for the computation of "total of credits" as well as "CGPA"

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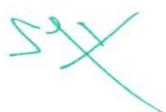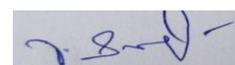
SEMESTER – I										
Sl. No.	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESM**	**Total**
Theory										
1	A20XXT101	Language - I[*]	**MIL**	3	0	0	3	25	75	100
2	A20GET101	General English I	**English**	3	0	0	3	25	75	100
3	A20PHT101	Mechanics and Properties of Matter	**DSC**	4	0	0	4	25	75	100
4	A20PHT102	Heat and Thermodynamics	**DSC**	4	0	0	4	25	75	100
5	A20PHD101	Allied Mathematics – I	**IDC**	3	1	0	4	25	75	100
Practical										
6	A20PHL101	Physics Practical – I	**DSC**	0	0	4	2	50	50	100
Skilled Enhancement Courses										
7	A20PHS101	Communication Skills lab	**SEC**	0	0	4	2	100	0	100
Employability Enhancement Course										
8	A20PHC101	MS office	**EEC**	2	0	2	0	100	0	100
Ability Enhancement Compulsory Course										
9	A20AET101	Environmental Studies	**AECC**	2	0	0	2	100	0	100
				First Semester Total			24	475	425	900

Modern Indian Languages are to be selected from the list given in Annexure I

B.Sc Physics

SEMESTER – II										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20XXT202	Language -II*	**MIL**	3	0	0	3	25	75	100
2	A20GET202	General English II	**English**	3	0	0	3	25	75	100
3	A20PHT203	Electricity and Magnetism	**DSC**	4	0	0	4	25	75	100
4	A20PHT204	Optics	**DSC**	4	0	0	4	25	75	100
5	A20PHD202	Allied Mathematics II	**IDC**	3	1	0	4	25	75	100
Practical										
6	A20PHL202	Physics Practical II	**DSC**	0	0	4	2	50	50	100
7	A20PHD203	Statistics Laboratory	**IDC**	0	0	4	2	50	50	100
Employability Enhancement Course										
8	A20PHC202	Programming in C and C++	**EEC**	2	0	2	0	100	0	100
Ability Enhancement Compulsory Course										
9	A20AET202	Public administration	**AECC**	2	0	0	2	100	0	100
Extension Activity										
10	A20EAL201	National Service Scheme	**EA**	0	0	2	1	100	0	100
Second Semester Total							23	525	475	1000

Modern Indian Languagesare to be selected from the list given in Annexure I

B.Sc Physics

		SEMESTER – III								
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20PHT305	Waves, Oscillations and Acoustics	DSC	3	1	0	4	25	75	100
2	A20PHT306	Basic Electronics	DSC	3	1	0	4	25	75	100
3	A20PHEXXX	Discipline Specific Elective- I**	DSE	3	1	0	4	25	75	100
4	A20PHD304	Allied Chemistry – I	IDC	3	0	0	3	25	75	100
5	A20XXOXXX	Open Elective – I***	OE	0	3	0	3	25	75	100
Practical										
6	A20PHL303	Physics Practical III	DSC	0	0	4	2	50	50	100
7	A20PHD305	Allied Chemistry Practical I	IDC	0	0	4	2	50	50	100
Skilled Enhancement Courses										
8	A20PHS302	Quantitative Aptitude and Logical Reasoning – I	SEC	0	0	4	2	100	0	100
Employability Enhancement Course										
9	A20PHC303	Embedded systems using Arduino	EEC	2	0	2	0	100	0	100
				Third Semester Total			24	425	475	900

**Discipline Specific Electives are to be selected from the list given in Annexure II*
***Open electives are to be selected from the list given in Annexure III*

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Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20PHT408	Applied Electronics	**DSC**	3	1	0	4	25	75	100
2	A20PHT409	Laser and Fiber Optics Communication	**DSC**	3	1	0	4	25	75	100
3	A20PHEXXX	Discipline Specific Elective-II**	**DSE**	3	1	0	4	25	75	100
4	A20PHD406	Allied Chemistry – II	**IDC**	3	0	0	3	25	75	100
5	A20XXOXXX	Open Elective – II***	**OE**	0	3	0	3	25	75	100
Practical										
6	A20PHL404	Physics Practical IV	**DSC**	0	0	4	2	50	50	100
7	A20PHD407	Allied Chemistry Practical II	**IDC**	0	0	4	2	50	50	100
Skilled Enhancement Courses										
8	A20PHS403	Essentials of Electricity	**SEC**	2	0	0	2	100	0	100
Employability Enhancement Course										
9	A20PHC404	Java	**EEC**	2	0	2	0	100	0	100
			Fourth Semester Total				24	425	475	900

SEMESTER – IV

**Discipline Specific Electives are to be selected from the list given in Annexure II*
***Open electives are to be selected from the list given in Annexure III*

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SEMESTER – V										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20PHT510	Atomic and Molecular Spectroscopy	DSC	3	1	0	4	25	75	100
2	A20PHT511	Solid state Physics	DSC	3	1	0	4	25	75	100
3	A20PHT512	Relativity, Quantum Mechanics& Mathematical Methods	DSC	3	1	0	4	25	75	100
4	A20PHEXXX	Discipline Specific Elective-III**	DSE	3	1	0	4	25	75	100
Practical										
5	A20PHL505	Physics Practical V	DSC	0	0	4	2	50	50	100
6	A20PHL506	Physics Practical VI	DSC	0	0	4	2	50	50	100
Skilled Enhancement Course										
7	A20PHS504	Renewable Energy and Energy Harvesting	SEC	2	0	0	2	100	0	100
Employability Enhancement Course										
8	A20PHC505	Basics of Python	EEC	2	0	2	0	100	0	100
			Fifth Semester Total				22	400	400	800

***Discipline Specific Electives are to be selected from the list given in Annexure II*

B.Sc Physics

				Periods				Max. Marks		
				SEMESTER – VI						
Sl. No.	Course Code	Course Title	Category	L	T	P	Credits	CAM	ESM	Total
Theory										
1	A20PHT613	Nuclear& RadiationPhysics	**DSC**	3	1	0	4	25	75	100
2	A20PHT614	Semiconductor Device Physics	**DSC**	3	1	0	4	25	75	100
3	A20PHEXXX	Discipline Specific Elective – IV**	**DSE**	3	1	0	4	25	75	100
Practical										
4	A20PHL607	Physics Practical VII	**DSC**	0	0	4	2	50	50	100
5	A20PHL608	Physics Practical VIII	**DSC**	0	0	4	2	50	50	100
Project										
6	A20PHP601	Project	**DSC**	0	0	10	5	40	60	100
Skilled Enhancement Course										
7	A20PHS605	Weather Forecasting	**SEC**	2	0	0	2	100	0	100
Employability Enhancement Course										
8	A20PHC606	Data Science using Python	**EEC**	2	0	0	0	100	0	100
			Sixth Semester Total				23	415	385	800

*****Discipline Specific Electives are to be selected from the list given in Annexure II**

B.Sc Physics

Annexure – I
Modern Indian Languages*
(For those who are admitted from AY 2021-22)

Language - I Offered in First Semester		
Sl.No	Course Code	Course Title
1	A20TAT101	Tamil - I
2	A20HNT101	Hindi - I
3	A20FRT101	French - I
Language - II Offered in Second Semester		
Sl.No	Course Code	Course Title
1	A20TAT202	Tamil - II
2	A20HNT202	Hindi – II
3	A20FRT202	French - II

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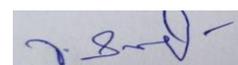
Annexure – II
DISCIPLINE SPECIFIC ELECTIVE COURSES**

Discipline Specific Elective – I (Offered in Semester III)		
Sl. No.	**Course Code**	**Course Title**
1	A20PHE301	Materials Science
2	A20PHE302	Physics for electronic devices
3	A20PHE303	Microprocessor
Discipline Specific Elective – II (Offered in Semester IV)		
1	A20PHE404	Medical Physics
2	A20PHE405	Energy Physics
3	A20PHE406	Agricultural Physics
Discipline Specific Elective – II (Offered in Semester V)		
1	A20PHE507	Digital Electronics
2	A20PHE508	Group Theory and Spectroscopy
3	A20PHE509	Nanomaterial
Discipline Specific Elective – II (Offered in Semester VI)		
Sl. No.	**Course Code**	**Course Title**
1	A20PHE610	Geo Physics
2	A20PHE611	Astronomy and Astrophysics
3	A20PHE612	NumericalMethods&Basic ComputerProgramming

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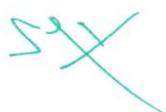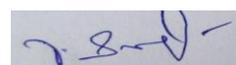
SKILLED ENHANCEMENT COURSE

Sl. No.	Semester	Course Code	Course Title
1	I	A20PHS101	Communication Skills lab
2	III	A20PHS302	Quantitative Aptitude and Logical Reasoning – I
3	IV	A20PHS403	Essentials of Electricity
4	V	A20PHS504	Renewable Energy and Energy Harvesting
5	VI	A20PHS605	Weather Forecasting

EMPLOYABILITY ENHANCEMENT COURSE

Sl. No.	Semester	Course Code	Course Title
1	I	A20PHC101	MS office
2	II	A20PHC202	Programming in C and C++
3	III	A20PHC303	Embedded systems using Arduino
4	IV	A20PHC404	Java
5	V	A20PHC505	Basics of Python
6	VI	A20PHC606	Data Science using Python

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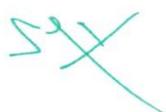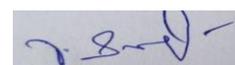
Annexure – III
OPEN ELECTIVE COURSES***

Sl. No	Course Code	Course Title	Offering Department	Permitted Departments
	Open Elective – I (Offered in Semester III)			

| Sl. No	Course Code	Course Title	Offering Department	Permitted Departments
1	A20BTO301	Boon and Bane of Microbes	Bioscience	Chemistry, Food Science, Physics
2	A20BTO302	Microbial Technology for Entrepreneurship	Bioscience	Chemistry, Food Science, Physics
3	A20BTO303	Origin of Life	Bioscience	Chemistry, Food Science, Physics
4	A20CHO304	Food Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
5	A20CHO305	Molecules of Life (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
6	A20CHO306	Water Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
7	A20CMO307	Fundamentals of Accounting and Finance	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
8	A20CMO308	Fundamentals of Management	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
9	A20CMO309	Fundamentals of Marketing	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
10	A20CPO310	Data Structures	Computational Studies	Mathematics
11	A20CPO311	Programming in C	Computational Studies	Commerce and Management, Mathematics, Media Studies
12	A20CPO312	Programming in Python	Computational Studies	Commerce and Management, Mathematics, Media Studies
13	A20ENO313	Conversational Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	A20ENO314	Fine-tune your English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	A20ENO315	Interpersonal Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics

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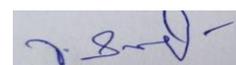
| 16 | **A20MAO316** | Mathematical Modelling | Mathematics | Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics |
17	**A20MAO317**	Quantitative Aptitude - I	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
18	**A20MAO318**	Statistical Methods	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
19	**A20VCO319**	Event Management	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	**A20VCO320**	Graphic Design	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	**A20VCO321**	Role of social media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	**A20NDO322**	Basic Food Groups	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
23	**A20NDO323**	Life Style Management	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
24	**A20NDO324**	Nutritive Value of Foods	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
25	**A20PHO325**	Astrophysics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
26	**A20PHO326**	Basic of Modern Communication System	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
27	**A20PHO327**	Bio-Physics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies

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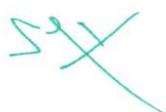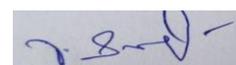
28	**A20TMO328**	அடிப்படைத்தமிழ்	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
29	**A20TMO329**	வாழ்வியல் இலக்கணம்	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
30	**A20TMO330**	புதுக்கவிதைப் பட்டறை	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics

Open Elective – II (Offered in Semester IV)				
Sl. No.	**Course Code**	**Course Title**	**Offering Department**	**Permitted Departments**
1	**A20BTO401**	Fermented Food	Bioscience	Chemistry, Food Science, Physics
2	**A20BTO402**	Herbal Technology	Bioscience	Chemistry, Food Science, Physics
3	**A20BTO403**	Self-Hygiene	Bioscience	Chemistry, Food Science, Physics
4	**A20CHO404**	C++ Programming and its Application to Chemistry	Chemistry	Computational Studies, Mathematics, Physics
5	**A20CHO405**	Computational Chemistry Practical	Chemistry	Computational Studies, Mathematics, Physics
6	**A20CHO406**	Instrumental Methods of Analysis	Chemistry	Computational Studies, Mathematics, Physics
7	**A20CMO407**	Essential Legal Awareness	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
8	**A20CMO408**	Essentials of Insurance	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
9	**A20CMO409**	Practical Banking	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
10	**A20CPO410**	Database Management Systems	Computational Studies	Commerce and Management, Media Studies, Mathematics
11	**A20CPO411**	Introduction to Data Science using Python	Computational Studies	Chemistry, Commerce and Management, English, Media Studies, Mathematics, Physics

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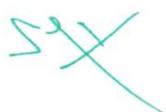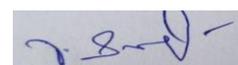
12	**A20CPO412**	Web Development	Computational Studies	Commerce and Management, Media Studies, Mathematics
13	**A20ENO413**	English for Competitive Exam	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	**A20ENO414**	English Next-India	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	**A20ENO415**	Functional English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	**A20MAO416**	Discrete mathematics	Mathematics	Chemistry, Computational Studies, Physics
17	**A20MAO417**	Operations Research	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
18	**A20MAO418**	Quantitative Aptitude - II	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
19	**A20VCO419**	Basics of News Reporting	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	**A20VCO420**	Scripting for media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	**A20VCO421**	Video Editing	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	**A20NDO422**	Food Labelling	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
23	**A20NDO423**	Hygiene and Sanitation	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
24	**A20NDO424**	Nutrition for Adolescent	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil

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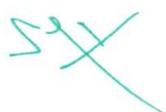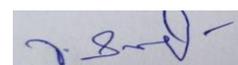
25	**A20PHO425**	Digital Electronics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
26	**A20PHO426**	Geo-Physics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
27	**A20PHO427**	Space Science	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
28	A20TMO428	சிறுகதைப் பயிற்சி	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
29	A20TMO429	செய்தி வாசிப்பு பயிற்சி	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
30	A20TMO430	நிகழ்த்துக்கலை	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics

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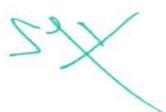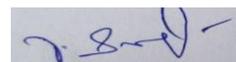
மொழித்தாள்

தமிழ்– I

(B.A., B.Sc., B.Com., B.B.A., & B.C.A., பாடப்பிரிவுகளுக்குமான பொதுத்தாள்)

				L T P C Hrs
A21TAT101				**3 0 0 3 45**

பாடத்திட்டத்தின் நோக்கம்

- இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

- தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள்,அடையாளங்க ள் ஆகியவற்றைக் காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

- மொழியின் கட்டமைப்பைப் புரிந்து கொள்வதாக இப்பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.

- வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.

- சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

CO1 - இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.
CO2 - நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.
CO3 - தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்த்தல்.
CO4 - தாய்மொழியின் சிறப்பை அறிதல்.
CO5 - இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு–1			(9 Hrs)

இக்காலக் கவிதைகள்–1

1. பாரதியார்	–	கண்ணன் என் சேவகன்
2. பாரதிதாசன்	–	தமிழ்ப்பேறு
3. அப்துல் ரகுமான்	–	அவதாரம்
4. மீரா	–	கனவுகள் + கற்பனைகள் = காகிதங்கள்
5. து.நரசிம்மன்	–	மன்னித்துவிடு மகனே

அலகு–2			(9 Hrs)

இக்காலக் கவிதைகள்–2

1.ராஜா சந்திரசேகர்	–	கைவிடப்பட்ட குழந்தை
2. அனார்	–	மேலும் சில இரத்தக் குறிப்புகள்
3. சுகிர்தராணி	–	அம்மா
4. நா.முத்துக்குமார்	–	தூர்

அலகு–3			(9 Hrs)

சிற்றிலக்கியங்கள்

1. கலிங்கத்துப் பரணி	–	பொருதடக்கை வாள் எங்கே... (பாடல்–485)
2. அழகர்கிள்ளைவிடு தூது	–	இதமாய் மனிதருடனே...(பாடல்–45)
3. நந்திக் கலம்பகம்	–	அம்பொன்று வில்லொடிதல்...(பாடல்–77)
4. மூக்கூடற் பள்ளு	–	பாயும் மருதஞ் செழிக்கவே...(பாடல்–47)
5. குற்றாலக் குறவஞ்சி	–	ஓடக் காண்பதுமே...(பாடல்–9)

B.Sc Physics

காப்பியங்கள்

மணிமேகலை–உலகறவி புக்க காதை– 'மாசில் வால்ஒளி! – இந்நாள் போலும் இளங்கொடி கெடுத்தனை'.
(28–அடிகள்)

அலகு-4   **(9 Hrs)**

தமிழ் இலக்கிய வரலாறு

1. சிற்றிலக்கியம்– தோற்றமும் வளர்ச்சியும்

2. புதுக்கவிதை– தோற்றமும் வளர்ச்சியும்

3. சிறுகதை –தோற்றமும் வளர்ச்சியும்

4. புதினம் –தோற்றமும் வளர்ச்சியும்

5. உரைநடை – தோற்றமும் வளர்ச்சியும்

அலகு 5   **(9 Hrs)**

மொழிப்பயிற்சி

1. கலைச்சொல்லாக்கம்

2. அகரவரிசைப்படுத்துதல்

3. மரபுத்தொடர்/பழமொழி

4. கலை விமர்சனம்

5. நேர்காணல்

உரைநடைப் பகுதி

1. உ.வே.சாமிநாதையர் – சிவதருமோத்திரச் சுவடி பெற்ற வரலாறு.

2. தஞ்சாவூர் – கூஜாவின் கோபம்.

3. இரா. பச்சியப்பன் – மாடல்ல மற்றையவை.

பார்வை நூல்கள்

1. கைலாசபதி, க., தமிழ் நாவல் இலக்கியம், குமரன் பதிப்பகம், வடபழனி, 1968.

2. சுந்தரராஜன், பே.கோ. சிவபாதசுந்தரம். சோ., தமிழில் சிறுகதை வரலாறும் வளர்ச்சியும், க்ரியா, சென்னை, 19
89.

3. பரந்தாமனார், அ.கி., நல்ல தமிழ் எழுத வேண்டுமா, பாரி நிலையம், சென்னை, 1998.

4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.எச். பதிப்பகம், சென்னை, 2011.

5. வல்லிக்கண்ணன், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், அன்னம், சிவகங்கை, 1992.

உரைநடை நூல்கள்

1. சக்திவேல், சு., தமிழ் மொழி வரலாறு, மாணிக்கவாசகர் பதிப்பகம், சிதம்பரம், 1988.

2. சிற்பி பாலசுப்ரமணியம் மற்றும் நீலபத்மநாபன், புதிய தமிழ் இலக்கிய வரலாறு, தொகுதி–1, 2, 3, சாகித்திய
    அகாமி, புதுடெல்லி,2013.

3. பாரதியார், பாரதியார் கவிதைகள், குமரன் பதிப்பகம், சென்னை, 2011.

இணையத்தளங்கள்

1. http://www.tamilkodal.com
2. http://www.languagelab.com
3. http://www.tamilweb.com

B.Sc Physics

	L	**T**	**P**	**C**	**Hrs**

FRENCH - I

A20FRT101   (Common to B.A., B.Sc., B.Com., B.B.A. & B.C.A)   **3   0   0   3   45**

OBJECTIVES

- To enable the students read, understand, and write simple sentences.

- To grasp relevant grammar for communication

- To learn about the land, people and culture of France.

UNITÉ - 1

LeÇon 1 : Je m'appelle Elise. Et Vous ?

LeÇon 2 : Vous Dansez ? D'accord.

LeÇon 3 : Monica, Yukiko et compagnie

LeÇon 4 : Les Voisins de Sophie

UNITÉ - 2

LeÇon 5 : Tu vas au Luxembourg ?

LeÇon 6 : Nous Venons pour l'inscription

LeÇon 7 : A Vélo, en tain, en avoin

LeÇon 8 : Pardon, monsieru,le BHV s'il vous plait ?

UNITÉ - 3

LeÇon 9   : Au marche

LeÇon10 : On déjeune ici ?

LeÇon11 : On va chez ma copine ?

LeÇon12 : Chez Susana

TextBook
Prescribed Textbook : *FESTIVAL 1* - Méthode de Français
Authors : Sylvie POISSON-QUINTON
Michèle MAHEO-LE COADIC
Anne VERGNE-SIRIEYS
Edition : CLE International, Nouvelle Édition révisée : 2009.
Portions :Unités : 1, 2, 3.

Reference Book: Festival 1

B.Sc Physics

A20GET101	**GENERAL ENGLISH I**	L T P C Hrs
	(Common to B.A., B.Sc., and BCA)	3 0 0 3 45

Course Objectives

- To recognize the rhythms, metrics and other musical aspects of poetry
- To read a variety of texts critically and proficiently
- To enable the students to enjoy the flair of literature through the work of great writer
- To make the students to know the functions of basic grammar and frame sentences without grammatical error.
- To enable them understanding the intrinsic nuances of writing in English language

Course Outcomes

After the completion of this course, the students will be able to

CO1-Comprehend and discuss the various facets of selected poems
CO2-Analyze and interpret texts written in English
CO3-Read drama with graduate-level interpretive and analytical proficiency
CO4-Improve the fluency and formation of grammatically correct sentence
CO5-Enhance the writing skills for specific purposes

UNIT - I POETRY   (9 Hrs)

1. John Milton: On His Blindness
2. William Wordsworth: Daffodils
3. Percy Bysshe Shelly: Ozymandias
4. Emily Dickinson: Because I could not stop for Death
5. Sarojini Naidu: The Queen's Rival

UNIT - II PROSE   (9 Hrs)

1. Francis Bacon: Of Love
2. Charles Lamb: A Dissertation upon Roast Pig

UNIT - III DRAMA   (9 Hrs)

1. Oscar Wilde: Lady Windermere's Fan

UNIT - IV GRAMMAR   (9 Hrs)

1. Parts of Speech
2. Tenses
3. Subject-Verb Agreement

UNIT - V COMPOSITION   (9 Hrs)

1. Essay Writing
2. Email

Text Books

1. James Barrett, "Brookside Musings: A Selection of Poems and Short Stories: Board of Editors", Orient Longman Limited, 2009.
2. Wilde Oscar, "Lady Windermere's Fan. Published in The Importance of Being Earnest and Other Plays"London: Penguin, 1940.
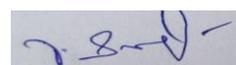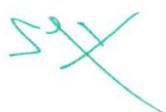3. Wren & Martin, "High School English Grammar & Composition". Blackie ELT Books, 2017.

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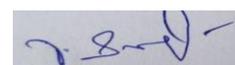
Reference Books

1. Lalitha Natarajan and SasikalaNatesan, "English for Excellence: Poetry",Anuradha Publications,2015.
2. Charles Lamb, "Selected Prose", Penguin Classics. United Kingdom, 2013.
3. Usha Mahadevan, "Sunbeams: Empower with English", Emerald Publishers, Chennai. 2016.

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1. https://www.englishcharity.com/of-love-by-francis-bacon-explanation/
2. https://www.poetry-archive.com/n/the_queens_rival.html
3. https://www.gradesaver.com/lady-windermeres-fan/study-guide/summary-act-i
4. https://www.english-grammar-revolution.com/parts-of-speech.html
5. https://www.internationalstudent.com/essay_writing/essay_tips/

B.Sc Physics

A20PHT101	MECHANICS AND PROPERTIES OF MATTER	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To apply the concepts of dynamics to develop skills in analysis of both particles and rigid bodies.
- To learn the mathematical formulations of dynamics problems.
- To find center of mass and inertia of mechanical systems.
- To study the elastic behavior andanalyse the expression for young's modulus.
- To understand the surface tension and viscosity of liquid.

Course Outcomes

After the completion of this course, the students will be able to

CO1– Understand the concepts of dynamics.
CO2– Identify the concepts of rigid body motion.
CO3 –Understand the Gravitational interaction and central field
CO4 - Know about the principles of elasticity
CO5 - Learn the properties of viscosity for liquids

UNIT I - DYNAMICS   (12Hrs)

Projectile –range of horizontal and inclined plane- impulse – impact – Impulsive force – laws of impact – direct and oblique impact of smooth sphere – loss in kinetic energy - impact of smooth sphere on a smooth horizontal plane – motion of two interacting bodies – reduced mass.

UNIT II - RIGID BODY MOTION   (12Hrs)

Rotational motion and moment of inertia - Theorem of perpendicular and parallel axes - calculation of Moment of inertia of ring - planer lamina(Disc) - Solid cylinder - solid cone - Spherical shell - Solid sphere - Hollow cylinder and sphere and Fly wheel - Acceleration of a body rolling down on an inclined plane - Compound Pendulum.

UNIT III - GRAVITATIONAL INTERACTION AND CENTRAL FIELD   (12 Hrs)

Inertial and Gravitational mass- Gravitational potential - Potential and field due to a spherical shell and solid sphere - Gravitational self-energy - central forces - Angular momentum in central forces - Central motion as one body and two body problem, reduced mass - Principle of space flight and satellite (Geostationary).

UNIT IV – ELASTICITY   (12Hrs)

Stress – Strain – Hooke's law – Relation between elastic constants – poisson's Ratio – Expression for poisson's ratio in terms of elastic constants – work done in twisting –torsional pendulum – determination of rigidity modulus – Young's modulus – determination – uniform – non-uniform bending - Bending of beam, Torsion of cylinder, Maxwell's Needle, Bending beam, Determination of ´Y, Ŋ and σ.

UNIT V – VISCOSITY   (12Hrs)

Poiseuille's formula for flow of liquid through a capillary tube, viscous resistance, combination of capillary tubes, effects of temperature and concentration on viscosity.
Surface Tensions: Molecular theory of surface tension, Excess of pressure inside a curved surface, Excess pressure inside a liquid drop and air and soap bubble, Wetting, vapour pressure and surface tension, Effect of temperature on surface tension, Jaeger's method of determination of surface tension.
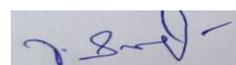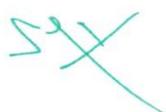
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Text Books

1.   D.S. Mathur. "Mechanics" S. Chand Publishing Company Limited, New Delhi
2.   R.K.Shukla and AnchalSrivastava, "Mechanics", New age international Private Ltd.,
3.   Brijlal Subramanian "Properties of Matter" by, S. Chand Publishing Company Limited

Reference Books

1. University Physics FW sears, M.W Zemansky and H.D Young 13 e, 1986, Addision Wesley
2. Mechanics: Berkeley Physics Physics course Volume 1: Charles Kittel et.al, 2007, Tata McGraw Hill.
3. Physics – Resnick, Halliday and Walker 9 e, 2010 Wiley.

Web References

1.   https://www.stem.org.uk/elibrary/resource/32028
2.   https://physicstoday.scitation.org/doi/abs/10.1063/1.3057473?journalCode=pto
3.   http://mppsc.nic.in/preliminary_exam/PHYSICS%20(pre).pdf

B.Sc Physics

	L	T	P	C	Hrs
A20PHT102 **HEAT AND THERMODYNAMICS**	4	0	0	4	60

Course Objectives

- To demonstrate an understanding of the first and second laws of thermodynamics, and of the concept of entropy.
- To explain and derive the fundamental thermodynamic relation.
- To explain the concepts of entropy, enthalpy, reversibility and irreversibility.
- To understand the role of the internal energy, temperature, pressure and specific volume thermodynamic properties.
- To understand different form of pure substances and their boiling point

Course Outcomes

After the completion of this course, the students will be able to
CO1- Develop the ideas of classical thermodynamics
CO2 –Know the difference between the microscopic properties of individual atoms or other particles and the macroscopic properties of many-body systems
CO3 - Demonstrate the power of statistical methods in physics
CO4 - Learn the principles and properties of thermodynamics
CO5- Know the concepts of statistical thermodynamics

UNIT I – TRANSMISSIONOFHEAT   (12Hrs)

Thermal conductivity – good & bad conductors – Forbe's method - Lee's disc method– relationship between thermal and electrical conductivities - Wiedemann Franz's law - Radiation- Prevost's theory of heat exchanges - law of cooling – Black body radiation - Kirchhoff's law - Wien's laws of energy distribution in black body radiation - Wien's displacement law- Rayleigh-Jean's law -Plank's law – pyrometry - solar constant – sources of solar energy &applications.

UNIT II - KINETICTHEORY   (12 Hrs)

Expression for pressure **-** Transport phenomenon – expression for mean free path - thermal conductivity and diffusion of gases - distribution of molecular velocities – energy distribution function - Degrees of freedom - equipartition law of energy - C_P , C_V and R of a gas - theory of Brownian motion – Langevin's theory.

UNIT III - GASSES AND LOWTEMPERATUREPHYSICS   (12hrs)

Molar heat capacities – Mayer's relation reversible adiabatic and isothermal changes– equations – Clement and Desormers method of determining C_p / C_v – Andrew's work on Co_2– regenerative cooling – the Linde process – Liquid air, oxygen, hydrogen and Helium – He I and He II – super fluidity - practical applications of low temperatures – refrigerating machines– electroflux refrigerator – Frigidaire – air conditioning machines – effects of CF_2 and Cl_2 on Ozone layer.

UNITIV – THERMODYNAMICS   (12 Hrs)

Intensive and extensive variables – I & II laws of thermodynamics – reversible and irreversible processes – Heat engines – Otto and diesel engines – thermodynamic scale of temperature - entropy - change of entropy in reversible and irreversible processes – T-S diagram– entropy for a perfect gas - third law of thermodynamics.

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UNIT V – STATISTICALTHERMODYNAMICS   **(12 Hrs)**

First Latent heat equation (Clausius – Clapeyron equation), effect of pressure on melting and boiling point – second Latent heat equation - Maxwell's Thermodynamical relations– derivations - Phase space – MB statistics
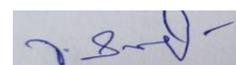
Text Books

1. Brijlal and Subramanyam, "Heat and Thermodynamics", S. Chand & Co.,2000
2. Mathur D.S,"Heat and Thermodynamics", S. Chand, 2014.
3. Murugeshan.R., "Thermal Physics", S. Chand & Co.,2009.

Reference Books

1. Nelkon Parker, *Advanced Level Physics* (Vol 5), Arnold Publication, Berkely Series, 1995.
2. Dr. Ilangovan and Dr.D. Jayaraman,, *Thermal Physics*, S. Chand & Co.,2014.

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1. https://www.livescience.com/50776-thermodynamics.html
2. http://hyperphysics.phy-astr.gsu.edu/hbase/Kinetic/kinthe.html
3. https://nationalmaglab.org/education/magnet-academy/learn-the-basics

B.Sc Physics

	L	**T**	**P**	**C**	**Hrs**
A20PHD101 `ALLIED MATHEMATICS – I**	**3**	**1**	**0**	**4**	**60**

Course Objectives
- To understand the concept of types of Integration.
- To introduce Double and Triple Integration.
- To explore the expansion of $sin\theta, cos\theta, tan\theta$
- To learn the concept of inverse trigonometry functions.
- To introduce the concept of correlation and regression.

Course Outcomes
After completion of the course, the students will be able to
CO1 - Understand the different types of integration.
CO2- Solve double and Triple integral problems.
CO3 - Find expansion of trigonometric values and solution of trigonometric solutions.
CO4 - Identify the different types of Inverse trigonometry.
CO5 - Learns different methods in solve statistics.

UNIT I DEFINITE INTEGRALS   (9 Hrs)
Revision of all Integral models - Definite integrals – Integration by parts & Reduction formula.

UNIT II MULTIPLE INTEGRALS   (9 Hrs)
Multiple Integrals, change of order of integration and change of variables in double integrals (Cartesian to polar). Applications: Areas by double integration and volumes by triple integration (Cartesian and polar).

UNIT III TRIGNOMETRY   (9 Hrs)
Expansions of cos nθ, sin nθ – Expansion of tan nθ in terms of tan θ - Expansion of tan(A+B+C+…) – Formation of Equations .Powers of sines and cosines of θ in terms of functions of multiples of θ – expansions of sin θ and cos θ in a series of ascending powers of θ

UNIT IV INVERSE TRIGNOMETRY   (9 Hrs)
Expansion of Inverse Circular Functions. Definition – Relation between Hyperbolic Functions – Inverse Hyperbolic Functions. Resolution into Factors – simple problems only -DeMoivre's Property on the Circle and Cote's Property on the Circle. Logarithm of complex quantities.

UNIT V STATISTICS   (9 Hrs)
Measures of central tendency – Arithmetic Mean, Median and Mode – Measures of dispersion and Standard deviation – Skewness and Measures of Skewness – Pearson's coefficient of Skewness – Moments – Correlation – Rank correlation and regression.

Text Books
1.S. Durai pandian and Laxmi Durai pandian (1984) *Trigonometry*. Emerald Publishers, Chennai.
2.N.P.Bali-Trigonometry-Year of Publication 1994.Krishna Prakasan Mandhir, 9, Shivaji Road, Meerut (UP)
3. Shanti Narayan, "Integral Calculus", S Chand & Co. New Delhi, 2001.

Reference Books
1. A. Singaravelu "Algebra and Trigonometry*"*, Vol.-I Meenakshi Agency,Chennai(2003).
2. P.R.Vittal,*"*Trigonometry, Margham"Publications, Chennai.(2004)
3. P. Kandasamy, K. Thilagavathy, "Mathematics of B.SC", Vol I & II, S. Chand Company Ltd, New Delhi – 2004.

Web References
1. https://nptel.ac.in/courses/111/105/111105122/
2.https://www.khanacademy.org/math/precalculus/x9e81a4f98389efdf:trig/x9e81a4f98389efdf:inverse-trig/v/inverse-trig-functions-arcsin
3. https://www.khanacademy.org/math/statistics-probability

B.Sc Physics

	L	T	P	C	Hrs

A20PHL101   **PHYSICS PRACTICAL– I**   0   0   4   2   30

Choose any 8 experiments from the list given below

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.
- To evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- To extend the scope of an investigation whether or not results come out as expected.
- To conduct an experiment collaboratively and ethically.
- To collect data and revise an experimental procedure iteratively and reflectively

Course Outcomes

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

CO 1 – Understand to know the moment of inertia. Capable of handling screw gauge, and venire calliper

CO 2 - Acquired basic knowledge about Potentiometer and magnetic field due to a current carrying coil.

CO 3 – Gain the knowledge about the thermal conductivity behavior in good and bad conductors.

CO 4 – Gain the knowledge about formal laboratory reports describing the results of experiments and to interpret the data from the experiments

CO 5 – Know the practical knowledge to describe the experiments and to correlate the theoretical values

LIST OF EXPERIMENTS

1. Compound pendulum - determination of g, radius of gyration and moment of inertia
2. Young's modulus - non-uniform bending – Pin and Telescope.
3. Spectrometer – Ordinary & Extraordinary rays.
4. Determination of moment of inertia – fly wheel method
5. Rigidity modulus - torsional oscillations without masses.
6. Thermal conductivity of a bad conductor- Lee's disc method.
7. Surface tension of a liquid and interfacial surface tension (water & kerosene) - method of drops.
8. Young's modulus –non- uniform bending – Scale and Telescope.
9. Specific heat capacity of a liquid and emissivity of a surface – newton's law of cooling.
10. Y - Searle's method for determining Y, n and η of a material.

Text Books

1. C.C Ouseph, V.J.Rao and V.Vijayendran "Practical Physics"
2. M.N. Srinivasan "Practical Physics", Sultan son Pub.
3. D P Khandelwal, "Laboratory Manual of Physics" for UG classes (Vani Pub. House, NewDelhi)

Reference Book

1. V Y Rajopadhye and V L Purohit, Text book of experimental Physics

Web Resources

1. https://www.niser.ac.in/sps/sites/default/files/basic_page/Compound%20pendulum_2017.pdf
2. https://www.iist.ac.in/departments/physics-lab

B.Sc Physics

A20PHS101   **COMMUNICATIONSKILLS LAB**   L   T   P   C   Hrs

                                                          0   0   4   2   30

COURSE OBJECTIVES

- To improve the skill of rapid reading and comprehending efficiently
- To decode the correspondence between sound and spelling in English
- To train students to organize, revise and edit ideas to write clearly and commendably
- To enhance the sense of social responsibility and accountability of the students
- To expound the significance of time and stress management

COURSE OUTCOMES

After the completion of the course, the students will be able to

CO1 - Understand the pattern to communicate effectively

CO2 - Impart Speaking skills with self-confidence

CO3 - Use writing strategies to improve their drafting skills and comprehending of articles

CO4 - Demonstrate leadership qualities to Participate in Group Discussion and Interview efficiently

CO5 - Expertise in Managerial skills

UNIT - ILISTENING SKILLS   (6Hrs)

1. Negotiation and Persuasion
2. Leadership
3. Teamwork
4. Problem solving
5. Empathy
6. Decision making

UNIT – II SPEAKING SKILLS   (6Hrs)

1. Aspects of speaking
2. Process and techniques of effective speech
3. Presentations
4. Short speech
5. TED Talks
6. Self-Introduction

UNIT – III READING SKILLS   (6Hrs)

1. Phonetics
2. Reading Vocabulary
3. Reading Comprehension
4. Skimming and Scanning

UNIT - IV WRITING SKILLS   (6Hrs)

1. Descriptive
2. Narrative
3. Persuasive
4. Expository
5. Picture composition

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UNIT II SELF-MANAGEMENTSKILLS   (6Hrs)

1. Time Management
2. Stress management
3. Perseverance
4. Resilience
5. Mind mapping
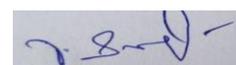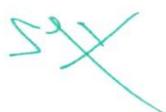6. Self- confidence

Text Books

1. Syamala. V, "Effective English Communication for you", Emerald Publishers, 1st Edition,2002.
2. Balasubramanian, "A Textbook of English Phonetics for Indian Students", Trinity Press, 1st Edition, 1981.
3. Sardana, C.K., "The Challenge of Public Relations", Har- Anand Publications, 1st Edition,1995.

Reference Books

1. Murphy, John J, "Pulling Together: 10 Rules for High-Performance Teamwork", Simple Truths, 1stEdition,2016.
2. Sanjay Kumar, Pusph Lata. "Communication Skills". Oxford University Press. 1st Edition,2015.
3. Barun K. Mitra, "Personality Development and Soft skills", Oxford University Press, 1st Edition, 2016.

Web References

1. https://blog.dce.harvard.edu/professional-development/10-tips-improving-your-public-speaking- skills
2. https://corporatefinanceinstitute.com/resources/careers/soft-skills/management-skills/
3. https://zety.com/blog/how-to-introduce-yourself
4. http://blogs.placementindia.com/2010/04/23/exercise-to-improve-communicationskills/
5. http://www.businesscommunicationblog.com

A20AET101	**ENVIRONMENTALSTUDIES**	L	T	P	C	Hrs
	(Common to B.A, B.Sc, BBA, B.Com)	**2**	**0**	**0**	**2**	**30**

Course Objectives

- To gain knowledge on the importance of natural resources and energy
- To understand the structure and function of an ecosystem
- To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation and appreciate the concept of interdependence
- To understand the causes of types of pollution and disaster management
- To observe and discover the surrounding environment through field work

Course Outcomes

After the completion of this course, the students will be able to

CO1 - Realize the importance of natural resources and various energy resources
CO2 - Learn about the biodiversity
CO3 - Learn the different types of pollution and to prevent the pollution
CO4 - know about the pollution Act and social issues
CO5 - understand Human related issued and environment

UNIT I INTRODUCTION TO NATURAL RESOURCES/ENERGY   (6 Hrs)

Natural Resources – Definition – Scope and Importance – Need for Public Awareness
Renewable and Non-renewable Resources: Natural resources and associated problems. Forest resources and over-exploitation – Water resources and over- utilization – Mineral resource extraction and its effects - Food resources - food problems and Modern agriculture - Energy resources and its future.

UNIT II ECOSYSTEMS   (6 Hrs)

Concept of an ecosystem-structure and function of an ecosystem-producers, consumers and decomposers- ecological succession- food chains(any 2 Examples)- food webs(any 2 Examples)- ECOLOGICAL PYRAMIDS.

UNIT III ENVIRONMENTAL POLLUTION /DISASTER MANAGEMENT   (6 Hrs)

Definition-causes, effects and control measures of Air, Water and Soil pollution- e- waste management- Disaster management: Natural and manmade- food/earthquake/cyclone, tsunami and landslides.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT   (6 Hrs)

Sustainable development- Climate change: global warming, acid rain, ozone layer depletion and nuclear radiation- Environment Protection Act (any 2) air, water, wildlife and forest.

UNIT VHUMAN POPULATION AND THE ENVIRONMENT   (6 Hrs)

Population growth, variation among nations - Population explosion-Family Welfare Programme - Environment and human health - Human rights - Value education - HIV/AIDS - Women and Child Welfare Role of Information Technology in environment and human health

Text Books

1. K. De, "Environmental chemistry" 9th Ed; New age international (P) Ltd, New Delhi, 2010.
2. K. RaghavanNambiar, "Text Book of Environmental Studies" 2ndEd, Scitech Publications (India) Pvt Ltd, India, 2010.
3. G. S. Sodhi, Fundamental concepts of environmental chemistry, I Ed, Alpha Science International Ltd, India, 2000.

Reference Books

1. B.K. Sharma, "Environmental chemistry" 11th Ed, Krishna Prakashan Media (P) Ltd, Meerut, 2009.
2. S.S.Dara, and D.D. Mishra "A text book of environmental chemistry and pollution control, 5th Ed, S.Chandand Company Ltd, New Delhi, 2012.
3. Richard T. Wright, Environmental Science: Toward a Sustainable Future, 10thedition, Prentice Hall, 2008

Web Resources

1. www.ifpri.org/topic/environment-and-natural-resources
2. https://www.iucn.org/content/biodiversity
3. http://www.world.org/weo/pollution

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A20TAT202	மொழித்தாள்	L	T	P	C	Hrs
	தமிழ்–II	3	0	0	3	45

(B.A., B.Sc., B.Com., B.B.A., & B.C.A., பாடப்பிரிவுகளுக்குமான பொதுத்தாள்)

பாடத்திட்டத்தின் நோக்கம்

- இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

- தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள்,அடையாளங்க ஆகியவற்றைக் காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

- மொழியின் கட்டமைப்பைப் புரிந்து கொள்வதாகவும் பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.

- வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.

- சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

CO1-இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.

CO2-நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.

CO3-தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.

CO4-தாய்மொழியின் சிறப்பை அறிதல்.

CO5-இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு–1   **(9 Hrs)**

எட்டுத்தொகை:

1. குறுந்தொகை (பாடல்–130).

2. நற்றிணை (பாடல்–27).

3. அகநானூறு (பாடல்–86)

4. ஐங்குறுநூறு (பாடல்–203)

5. கலித்தொகை– பாலைத்திணை (பாடல்–9)

6. புறநானூறு (பாடல்–235)

பத்துப்பாட்டு:

1. சிறுபாணாற்றுப்படை (அடிகள்–126–143)

2. முல்லைப்பாட்டு (6–21)

அலகு–2   **(9 Hrs)**

பதினெண் கீழ்க்கணக்கு:

1. திருக்குறள்– வெகுளாமை (அதிகாரம்–31), காதல் சிறப்புரைத்தல் (அதிகாரம்–113)

2. நாலடியார் – நல்லார் எனத்தான் (221)

3. திரிகடுகம்– கோலஞ்சி வாழும் குடியும் (33)

4. இனியவை நாற்பது– குழவி தளர்நடை (14)

5. கார் நாற்பது– நலமிகு கார்த்திகை (26)

6. களவழி நாற்பது–கவளங்கொள் யானை (14)

அலகு–3   **(9 Hrs)**

சைவம்– பன்னிரு திருமுறைகள்

1. திருஞானசம்பந்தர் – வேயுறு தோளிபங்கன் (இரண்டாம் திருமுறை)

2. திருநாவுக்கரசர் – மனமெனும் தோணி (நான்காம் திருமுறை)

3. சுந்தரர் – ஏழிசையாய் இசைப்பயனாய் (ஏழாம் திருமுறை)

4. மாணிக்கவாசகர் – ஆதியும் அந்தமும் இல்லா (திருவெம்பாவை)

5. திருமூலர் – அன்பு சிவம் இரண்டு (திருமந்திரம்)

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வைணவம் – நாலாயிரத் திவ்வியப் பிரபந்தம்

1. பேயாழ்வார் – திருக்கண்டேன் பொன்மேனி....
2. பெரியாழ்வார் – கருங்கண் தோகை மயிற் பீலி....
3. தொண்டரடிப்பொடிஆழ்வார் – பச்சைமாமலை போல்....
4. ஆண்டாள் – கருப்பூரம் நாறுமோ? கமலப்பூ....
5. திருமங்கையாழ்வார் – வாடினேன் வாடி வருந்தினேன்....

இஸ்லாமியம்

சீறாப்புராணம்– பாடல் நின்ற பிணை மானுக்குப்...5 பாடல்கள் (பாடல் எண்கள் 61–65)

கிறித்துவம்

இரட்சண்ய யாத்ரீகம்– கடைதிறப்புப் படலம் –5 பாடல்கள் (பாடல் எண்கள்: 3,9,10,15,16)

அலகு – 4   **(9 Hrs)**

தமிழ் இலக்கிய வரலாறு

1. சங்க இலக்கியங்கள்
2. நீதி இலக்கியங்கள்
3. பக்தி இலக்கியங்கள்
4. காப்பியங்கள்

அலகு–5   **(9 Hrs)**

சிறுகதைகள்

1. புதுமைப்பித்தன் – அகலிகை
2. நா. பிச்சமூர்த்தி – வேப்பமரம்
3. அகிலன் – ஒரு வேளைச்சோறு
4. ஜி.நாகராஜன் – பச்சக் குதிரை
5. கி.ராஜநாராயணன் – கதவு
6. சா.கந்தசாமி – தக்கையின் மீது நான்கு கண்கள்
7. ஆண்டாள் பிரியதர்ஷினி – மாத்திரை
8. வண்ணதாசன் – ஒரு உல்லாசப் பயணம்
9. சு. தமிழ்ச்செல்வன் – வெயிலோடு போய்
10. பாரததேவி – மாப்பிள்ளை விருந்து

பார்வை நூல்கள் :

1. அரசு, வீ., இருபதாம் நூற்றாண்டு சிறுகதைகள் நூறு, அடையாளம் பதிப்பகம், திருச்சி, 2013.
2. அருணாச்சலம், பா., பக்தி இலக்கியங்கள், பாரி நிலையம், சென்னை, 2010.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை, 2000.
4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.பி.எச். பதிப்பகம், சென்னை, 2011.
5. பசுபதி, மா. வே., செம்மொழித் தமிழ் இலக்கண இலக்கியங்கள், தமிழ்ப் பல்கலைக்கழகம், 2010 .

உரைநடை நூல்கள் :

1. அன்பு, பா., மா.பொ.சி யின் ஒரு இலக்கிய நூல்கள் ஒரு மதிப்பீடு, உலகத் தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 1983.
2. பிள்ளை, கே.கே., தமிழக வரலாறும் மக்களும் பண்பாடும், உலகத் தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 2000.
3. ஜெயமோகன், நவீன இலக்கிய அறிமுகம், உயிர்மெய் பதிப்பகம், சென்னை, 1995.

இணையத்தளங்கள் :

1. http://www.tamilkodal.com
2. http://www.languagelab.com
3. http://www.tamilweb.com

B.Sc Physics

	L	**T**	**P**	**C**	**Hrs**
FRENCH – II	3	0	0	3	45

A20FRT202   (Common to B.A., B.Sc., B.Com., B.B.A. & B.C.A)

OBJECTIVES

- To enable the students read, understand, and write simple sentences.
- To grasp relevant grammar for communication
- To learn about the land, people and culture of France.

UNITÉ - 4

Leçon 13 : Qu'est -ce qu'on leur offre ?

Leçon 14 : On solde !

Leçon 15 : Découvrir Paris en bus avec l'open Tour

Leçon 16 : Si vous gagne vous ferez quoi

UNITÉ - 5

Leçon 17 : Parasol ou parapluie ?

Leçon 18 : Quand il est midi á Paris

Leçon 19 : Vous allez Vivre

Leçon 20 : L'avenir du Français

UNITÉ - 6

Leçon 21 : Souvenirs d'enfance

Leçon 22 : j'ai fait mes études á Lyon 2

Leçon 23 : Retour des Antilles

Leçon 24 : Au voleur ! Au voleur

TextBooks

PrescribedTextbook : *FESTIVAL 1* - Méthode de Français
Authors : Sylvie POISSON-QUINTON
Michèle MAHEO-LE COADIC
Anne VERGNE-SIRIEYS
Edition : CLE International, Nouvelle Édition révisée : 2009.

Reference Book

Festival 1

B.Sc Physics

	L	T	P	C	Hrs
A20GET202 **GENERAL ENGLISH- II** (Common to B.A, B.Sc. and BCA)	3	0	0	3	45

A20GET202 **GENERAL ENGLISH- II**
(Common to B.A, B.Sc. and BCA)

L T P C Hrs
3 0 0 3 45

Course Objectives
- To recognize poetry from a variety of cultures, languages and historic periods
- To develop the intensive study of language by critical reading
- To identify the various genres and analyze the works of writers in English
- To expand the basic understanding of targeted grammatical structures
- To understand the conventions of writing in English

Course Outcomes
After completion of the course, the students will be able to
CO1-Understand and appreciate poetry as a literary art form
CO2-Comprehend and recognize relationship between ideas, events and facts
CO3-Learn to explore characters and their conflicts, dilemmas and extend their response to stories
CO4-Apply grammatical structures meaningfully and appropriately in oral and written form
CO5-Write effectively and coherently in English language

UNIT I POETRY (9 Hrs)
1. Lord Byron - She Walks in Beauty
2. Robert Frost - Stopping by Woods on a Snowy Evening
3. Nissim Ezekiel - Night of the Scorpion
4. Rabindranath Tagore - Where the Mind is Without Fear
5. Dylan Thomas – Do not go gentle into that good night

UNIT II PROSE (9 Hrs)
1. A.G. Gardiner - On Saying 'Please'
2. Martin Luther King - I have a Dream
3. M.K. Gandhi - Women, Not the Weaker Sex
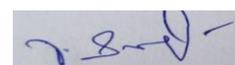
UNIT III SHORT STORIES (9 Hrs)
1. Frank R. Stockton – The Lady, or the Tiger
2. Ernest Hemingway - A Day's Wait
3. Anton Chekhov - The Lottery Ticket

UNIT IV GRAMMAR (9 Hrs)
1. Voice
2. Conditionals
3. Coherence
4. Idioms and Phrase
5. Determiners
6. Connectors

UNIT V COMPOSITION (9 Hrs)
1. Letter Writing
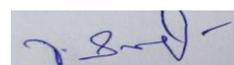2. Report Writing

B.Sc Physics

Text Books

1. Sharma, O.C "The Approach to Life: A Selection of English Prose", Orient Longman Publication, 1st Edition, 2009.
2. Dipankar Purkayastha & Dipendu Das & Jaydeep Chakrabarty,"Brookside Musings: A Selection of Poems and Short Stories", Orient Longman Publication, 1st Edition, 2009.
3. Wren & Martin, "English Grammar and Composition", Chand Publication, 18th Edition, 2017.

Reference Books

1. Lalitha Natarajan & Sasikala Natesan, "English for Excellence: Poetry", Anuradha Publications, 1st Edition, 2015.
2. Ernest Hemingway, "The Complete Short Stories of Earnest Hemingway", Simon and Schuster Publication, 1st Edition,1998.
3. S.C.Gupta, "English Grammar & Composition", Arihant Publication, Old Edition,2003.

Web Reference

1. https://www.litcharts.com/poetry/lord-byron/she-walks-in-beauty
2. https://americanliterature.com/author/anton-chekhov/short-story/the-lottery-ticket
3. https://www.cliffsnotes.com/literature/p/pride-and-prejudice/book-summary

B.Sc Physics

	L	T	P	C	Hrs
A20PHT203 **ELECTRICITY AND MAGNETISM**	4	0	0	4	60

Course Objectives

- To understand the phenomena of electricity and magnetism.
- To describe the electric field and potential and related concepts, for stationary charges.
- To understand the basic of electric circuits capacitors and resistors.
- To calculate electrostatic properties of simple charge distributions using Coulomb's law Gauss's law and electric-potential.
- To calculate the magnetic force act on moving charges and magnetic fields due to current

Course Outcomes

CO1 - Develop a basic understanding of electric and magnetic fields in free space using the integral forms of Maxwell's laws.

CO2 - Understand the chemical effects of electric current

CO3 - Understand of growth and decay of current

CO4 - Know the difference between ac and dc current

CO5 - Know the magnetic properties of materials

UNITI – ELECTROSTATICS   (12 Hrs)

Coulomb's law – electric intensity and electric potential – electrical images(any four examples)- electric intensity and potential due to an earthed conducting sphere applying the principle of electrical images- electric dipole – potential and intensity due to a dipole – capacity – capacitance of a spherical and cylindrical capacitor – energy of a charged capacitor – loss of energy due to sharing of charges

UNIT II - CHEMICAL EFFECTS OFELECTRICCURRENT   (12 Hrs)

Carey foster bridge - theory – Determination of temperature co-efficient of resistance– Calibration of voltmeter – Ammeter - Using Potentiometer - thermoelectricity- Peltier's coefficient – Thomson coefficient – application of thermodynamics to a thermocouple and connected relations- thermoelectric diagram and uses.

UNIT III–TRANSIENTCURRENT   (12 Hrs)

Growth and decay of current in a circuit containing resistance and inductance – Growth and decay of charge in a circuit containing resistance and capacitor-Growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

UNIT IV - A.C ANDELECTROMAGNETICINDUCTION   (12 Hrs)

Power in AC circuit – wattles current- choke coil construction and working of transformers- energy losses – AC motors – single phase, three phases – star and delta connection –electric fuses- circuit breakers.Inductances in series and parallel-Self-inductance of co-axial cylinders-energy stored in a magnetic field-time varying magnetic field-Single phase induction motor

UNIT V- MAGNETIC PROPERTIESOF MATERIALS   (12 Hrs)

Susceptibility- permeability- intensity of magnetization and the relation B= μ(H+M), M-H and B-H curves for a magnetic material using magnetometer method and ballistic galvanometer method – Terrestrial magnetism – magnetic elements- dip circle.
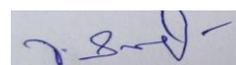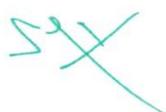
B.Sc Physics

Text Books

1. MurugeshanR"*ElectricityandMagnetism*"8thEdition,New Delhi, S. Chand & Co.,2006.
2. Brijlal and N. Subramanian," Electricity and Magnetism", Agra, Ratan & Prakash, 6thEdition.
3. Narayanamoorthy M & Nagarathnam N, *Electricity and Magnetism*, Meerut, National Publishing Co., 4thedition.

Reference Book

1. David J Griffith, *Introduction to Electrodynamics*, 2nd Edition, New Delhi, Prentice Hall of India Pvt. Ltd,1997.
2. Sehgal D.L, Chopra K. L and Sehgal N. K, *Electricity and Magnetism*, New Delhi, Sultan Chand &Co.,
3. Brij Lal, Subramanian N and Jivan Seshan, *Mechanics and Electromagnetics*, New Delhi, Eurasia Publishing House Pvt .Ltd,2005.

Web Resourses

1.   https://www.britannica.com/science/physics-science/The-study-of-electricity-and-magnetism
2.   https://www.materialstoday.com/electronic-properties/news/relationship-between-electricityand-magnetism

B.Sc Physics

A20PHT204	OPTICS	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To produce ray diagrams to predict the position and size of the image produced by simple lenses.
- To understand the behavior of light rays travelling in free space on reflective surfaces
- To measure the focal length of a simple convex lens by producing an image of a distant object.
- To understand the interference of two or more optical waves
- To calculate the focal length of a simple lens by making measurements of image and object distance and using the lens equation

Course Outcomes

After the end of the course, the students will able to

CO1 – Understand the geometric optics and the use of ray diagrams using lenses and mirrors.
CO2 – Operate how to analyze the simple optical instruments work.
CO3 - know the principle and uses of interference
CO4 - Understand the concept of diffraction
CO5 - Learn the optical instruments and the concepts of polarization

UNIT I-RAYOPTICS   (12 Hrs)

Fermat's principle and its applications Principle of extreme path, Proof of laws of reflection and refraction, paraxial approximation, matrix method in paraxial optics, ABCD matrix.

UNIT II - REFLECTION AND REFRACTION   (12 Hrs)

Snell's law of reflection and refraction, reflection and refraction at spherical surfaces: formula for refraction at single spherical surface, sign convention. Thick lens: matrix methods in paraxial optics, basic ideas of unit planes and nodal planes, Cardinal points of an optical system, general relationship, combination of thin lenses. Aberration in images :chromatic aberrations; achromatic combination of lenses in contact and separated lenses. Monochromatic aberrations and their reduction. Properties of wavefront, Huygen's principle.

UNIT III – INTERFERENCE   (12 Hrs)

Interference of light: The principle of superposition; two slit interferences, coherence requirements for the sources, localized fringes in thin films, transition from fringes of equal thickness to those of equal inclination Michelson interferometer; its uses for determination of wavelength, wavelength difference and standardization of the meter. Intensity distribution in multiple beam interference; Fabry - Perot interferometer and concept of finesse.

UNIT IV – DIFFRACTION   (12 Hrs)

Fresnel diffraction: Half-period zones, circular apertures and obstacles, straight edge, explanation of rectilinear propagation. Cornu Spiral and its applications Babinet's Principle.
Fraunhofer diffraction: Diffraction at a single slit a circular aperture and a circular disc. Resolution of images; Rayleigh criterion, resolving power of a telescope and a microscope -Outline of phase contrast microscope (no derivations). Diffraction grating: Diffraction at N parallel slits; plane diffraction grating, resolving power of gratings and prisms.

UNIT V- POLARIZATION OPTICS   (12 Hrs)

Electromagnetic nature of light. Transverse nature of light waves. Plane polarized light – production and analysis. Circular and elliptical polarization. Double refraction, interference of polarized light, phase retardation plates (quarter wave and half wave plates).
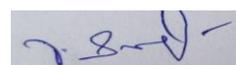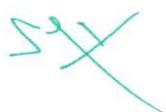
B.Sc Physics

Text Books

1. Ajoy Ghatak, "Introduction to Modern Optics" (Tata McGrawHill)
2. Brijilal and Subramanian, "Optics" ((S.Chand &Co).
3. S.L. Kakani and H.C. Bhandrai, "Optics" (S.Chand &Co)

Reference Books

1. Optics, K D Meller, (Oxford UniversityPress)
2. Optics, Smith and Thomson, (John Wiley and Sons,1980)
3. Optics, A.N.Matveev, (Mir Publishers1988)

Web Resourses

1. https://www.britannica.com/science/optics
2. https://www.learncbse.in/ray-optics-optical-instruments-cbse-notes-class-12-physics
3. https://www.student-baba.com/2020/01/ray-optics-importantce-for-board-and-handwritten-notes-pdf.html.

B.Sc Physics

	L	**T**	**P**	**C**	**Hrs**
A20PHD202 **ALLIED MATHEMATICS – II**	3	1	0	4	60

Course Objectives

- To familiarize the concept of matrices.
- To introduce mathematical tools to solve first order differential equations.
- To learn linear differential equations of higher order with constant coefficients.
- To understand the concept of partial differentiation.
- To introduce the concepts of curl, divergence and integration of vectors in vector calculus.

Course Outcomes

After completion of the course, the students will be able to

CO 1 - Find Eigen values and Eigen vectors, diagonalization of a matrix.
CO 2 - Solve differential equations.
CO 3 - Solve higher order differential equations.
CO 4 - Solve different types of partial differential equation.
CO 5 - Understand the use of vector calculus.

UNIT I MATRICES   (12 Hrs)

Rank of a Matrix- Consistency of system of equations. Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigen vectors. Cayley-Hamilton Theorem.

UNIT II DIFFERENTIAL EQUATION   (12 Hrs)

Exact equations, First order linear equations, Bernoulli's equation, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT III HIGHER ORDER DIFFERENTIAL EQUATION   (12 Hrs)

Linear differential equations of higher order with constant coefficients, the operator D, Euler's linear equation of higher order with variable coefficients, Solution by variation of parameter method.

UNIT IV PARTIAL DIFFERENTIAL EQUATION   (12 Hrs)

Partial derivatives, Total derivatives, Differentiation of implicit functions, Maxima and Minima of two variables. Partial differential equations of higher order with constant coefficients.

UNIT V VECTOR CALCULUS   (12 Hrs)

Gradient, divergence and curl - Directional derivative- Irrotational and Solenoidal vector fields - Gauss Divergence Theorem and Stoke's Theorem.

Text Books

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, Tenth edition, 2019
2. B.V.Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, Sixth edition 2018.
3. N.P. Bali and Manish Goyal, "A Text Book of Engineering Mathematics", Lakshmi Publications, New Delhi, Ninth Edition, 2018

Reference Books

1. C W. Evans, "Engineering Mathematics", A Programmed Approach, 3th Edition, 2019
2. Singaravelu. A., "Engineering Mathematics - I", Meenakshi publications, Tamil Nadu, 2019
3. M.K. Venkataraman, "Engineering Mathematics (Third Year-Part A)", The National Publishing Company, Madras, 2016.

Web References

1.http://www.yorku.ca/yaoguo/math1025/slides/chapter/kuttler-linearalgebra –slides-

Systemsofquation-handout.pdf

2. https://nptel.ac.in/courses/111/105/111105122/

3. https://nptel.ac.in/courses/122/104/122104017/

B.Sc Physics

	L	T	P	C	Hrs
A20PHL202 **PHYSICS PRACTICAL – II**	0	0	4	2	30

Choose any 8 experiments from the list given below

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.
- To evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- To extend the scope of an investigation whether or not results come out as expected.
- To conduct an experiment collaboratively and ethically.
- To collect data and revise an experimental procedure iteratively and reflectively

Course Outcomes

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

CO 1 - Understand the concepts of light experiments

CO 2 - Acquired basic knowledge about Potentiometer and magnetic field due to a current carrying coil.

CO 3 – Acquired the knowledge about the purity of given solution.

CO 4 – Gain the knowledge about laboratory reports describing the results of experiments and to interpret the data from the experiments

CO 5 – Know the practical knowledge to describe the experiments and to correlate the theoretical values

LIST OF EXPERIMENTS

1. Spectrometer- refractive index– Hollow prism.
2. Spectrometer – Grating-Determination N& λ (Normal incidence method).
3. Young's modulus - cantilever - pin &microscope.
4. Potentiometer - calibration of low range ammeter
5. Sonometer - determination of frequency of tuning fork
6. Laurent's Half Shade polarimeter – Determination of Specific rotation of an optically active substance.
7. P.O. Box - temperature coefficient of the material of a coil of wire.
8. Spring Balance – Variation of Periodic oscillations with mass and spring constant.
9. Stokes method of viscosity determination
10. Oscillations on a bifilar pendulum -verificationof laws of parallel and perpendicular axes theorem

Text Books

1. C Ouseph, V.J.Rao and V.Vijayendran "Practical Physics"
2. M.N..Srinivasan "Practical Physics", Sultan son Pubs
3. D P Khandelwal, "Laboratory Manual of Physics" for UG classes (Vani Pub. House,(NewDelhi)

Reference Book

1. V Y Rajopadhye and V L Purohit, Text book of experimental Physics

Web Resources

1. https://www.niser.ac.in/sps/sites/default/files/basic_page/Compound%20pendulum_2017.pdf
2. https://www.iist.ac.in/departments/physics-lab

B.Sc Physics

	L	T	P	C	Hrs
A20PHD203 **STATISTICS LABORATORY**	0	0	4	2	30

Course Objectives

- To familiarize the concept of Descriptive Statistics.
- To know the concepts of Skewness.
- To learn Moments.
- To understand the concepts of Correlation.
- To familiarize the Regression lines.

Course Outcome:

At the end of the course students will be able to

CO1 - Find Mean, Median, Mode.

CO2 - Calculate the value of Skewness.

CO3 - Understand moments and its relation.

CO4 - Evaluate correlation between two variables.

CO5 - Evaluate the regression lines.

LIST OF EXPERIMENTS (Using SCI LAB)

1. Measures of Central tendency.
2. Mean Deviation.
3. Standard Deviation.
4. Moments.
5. Quartile Deviation
6. Skewness and Kurtosis.
7. Correlation
8. Rank Correlation
9. Regression x on y.
10. Regression y on x.

Text Books

1. S.C Gupta and V.K. Kapoor, "Elements of Mathematical Statistics ", Sultan Chand Publishers, New Delhi. 2009.
2. Aliaga, Gunderson, "Interactive Statistics", 2nd Edition – Pearson/Prentice Hall
3. Hamilton, "Statistics with STATA", 8thEdition, Duxbury 2004.

Reference Books

1. P.R.Vittal, "Mathematical Statistics ‖", Margham Publications -2002- Reprint 2012.
2. Weisberg, S, "Applied Linear Regression", John Wiley and Sons, New York - 1980.
3. Kokoska, "Introductory Statistics: A Problem-Solving Approach", Review copy, Freeman2011.

Web References

1. https://scilab.in/lab migration/generate lab/167/1
2. https://scilab.in/textbook_companion/generate_book/291
3. http://www.tf.uns.ac.rs/~omorr/radovan_omorjan_003_prII/s_examples/Scilab/Gilberto/scilab15.pdf

B.Sc Physics

A20AET202	PUBLIC ADMINISTRATION	L	T	P	C	Hrs
		2	0	0	2	30

Course Objectives

- To introduce the elements of public administration
- To help the students obtain a suitable conceptual perspective of public administration
- To introduce them the growth of institution devices to meet the need of changing times
- To instill and emphasize the need of ethical seriousness in contemporary Indian Public Administration

Course Outcomes

After completion of the course, the students will be able to

CO1– Understand the concepts and evolution of Public Administration.

CO2 – Understand what is happening in the Public Administration in the country

CO3 – Know the Territory Administration in the State and the Centre

CO4 – Gain the knowledge about the emerging issues in Indian Public Administration

UNIT I INTRODUCTION TO PUBLIC ADMINISTRATION   (6 Hrs)

Meaning, nature and Scope of Public Administration and its relationship with other disciplines-Evolution of Public Administration as a discipline – Woodrow Wilson, Henry Fayol , Max Weber and others - Evolution of Public Administration in India – Arthashastra – Colonial Administration upto 1947

UNIT II PUBLIC ADMINISTRATION IN INDIA   (6 Hrs)

Enactment of Indian Constitution - Union Government – The Cabinet – Central Secretariat -– All India Services – Training of Civil Servants – UPSC – Niti Ayog – Statutory Bodies: The Central Vigilance Commission – CBI - National Human Rights Commission – National Women's Commission –CAG

UNIT III STATE AND UNION TERRITORY ADMINISTRATION   (6 Hrs)

Differential Administrative systems in Union Territories compared to States Organization of Secretariat: -Position of Chief Secretary, Functions and Structure of Departments, Directorates – Ministry of Home Affairs supervision of Union Territory Administration – Position of Lt.Governor in UT – Government of Union Territories Act 1963 – Changing trend in UT Administration in Puducherry and Andaman and Nicobar Island

UNIT IV EMERGING ISSUES IN INDIAN PUBLIC ADMINISTRATION   (6 Hrs)

Changing Role of District Collector – Civil Servants – Politicians relationship – Citizens Charter - Public Grievance Redressal mechanisms –– The RTI Act 2005 – Social Auditing and Decentralization – Public Private partnership.

Text Books

1. Avasthi and Maheswari, "Public Administration", Lakshmi Narain Agarwal, 1st Edition, 2016.
2. Ramesh K.Arora, "Indian Public Administration: Institutions and Issues", New Age International Publishers, 3rd Edition, 2012.
3. Rumki Basu, "Public Administration: Concept and Theories", Sterling, 1st Edition, 2013.

Reference Books

1. Siuli Sarkar, "Public Administration in India", Prentice Hall of India, 2nd Edition, 2018.
2. M. Laxmikanth, "Public Administration", McGraw Hill Education, 1st Edition, 2011.
3. R.B.Jain, "Public Administration in India,21st Century Challenges for Good Governance",Deep and Deep Publications, 2002.

Web References

1. http://cic.gov.in/
2. http://www.mha.nic.in/
3. http://rti.gov.in/

B.Sc Physics

A20EAL201	NATIONAL SERVICESCHEME	L	T	P	C	Hrs
		2	0	0	1	30

Course Objectives
- To introduce about various activities carried out by national service scheme
- To gain life skills through community service
- To gain awareness about various service activities performed in higher educational institutions.
- To give exposure about the use of technology to uplift the living standards of rural community.
- To induce the feeling of oneness through harmony of self and society

Course Outcomes
After the end of the course, the students will able to
CO1 – recognize the importance of national service in community development.
CO2 – convert existing skills into socially relevant life skills.
CO3 – differentiate various schemes provided by the government for the social development
CO4 – identify the relevant technology to solve the problems of rural community.
CO5 – associate the importance harmony of nation with long term development

UNIT I- INTRODUCTION TO NATIONALSERVICE SCHEME (6 Hrs)
History and objectives, NSS symbol, Regular activities, Special camping activities, Village adaptation programme, Days of National and International Importance, Hierarchy of NSS unit in college. Social survey method and Data Analysis. NSS awards and recognition. Importance of Awareness about Environment, Health, Safety, Gender issues, Government schemes for social development and inclusion policy etc.,

UNIT II-LIFE SKILLS AND SERVICE LEARNINGOF VOLUNTEER (6 Hrs)
Communication and rapport building, problem solving, critical thinking, effective communication skills, decision making, creative thinking, interpersonal relationship skills, self- awareness building skills, empathy, coping with stress and coping with emotions. Understanding the concept and application of core skills in social work practice, Team work, Leadership, Event organizing, resource planning and management ,time management, gender equality, understanding rural community and channelizing the power of youth.

UNIT III-EXTENSION ACTIVITIES FOR HIGHER EDUCATIONAL INSTITUTIONS (6Hrs)
Objective and functions of Red Ribbon Club, Swatchh Bharath Abhiyan, Unnat Bharat Abhiyan, Jal Shakthi Abhiyan, Road Safety Club, Environmental club and Electoral literacy club.

UNIT IV-USE OF TECHNOLOGY IN SOLVING ISSUES OF RURAL INDIA(6 Hrs)
Understanding community issues, economic development through technological development. Selection of appropriate technology, Understanding issues in agriculture, fishing, artisans, domestic animals, health and environment.

UNIT V- NATIONAL INTEGRATION ANDCOMMUNALHARMONY   (6Hrs)
TheroleofYouthorganizationsinnationalintegration,NGOs,DiversityofIndianNation,Importanceof National integration communal harmony for the development of nation , Indian Constitution, Building Ethical human Relationships, Universal Human Values, Harmony of self and Harmony ofnation.

Reference Books
1. Joseph, Siby K and Mahodaya Bharat (Ed.), (2007), Essays on Conflict Resolution, Institute of Gandhian Studies,Wardha
2. Barman Prateeti and Goswami Triveni (Ed.), (2009), Document on Peace Education, Akansha Publishing House, NewDelhi
3. Sharma Anand, (2007), Gandhian Way, Academic Foundation, New DelhiMyers G.Davi (2007).

Web References
1. http://www.thebetterindia.com/140/national-service-scheme-nss/
2. http://en.wikipedia.org/wiki/national-service-scheme19=http://nss.nic.in/adminstruct
3. http://nss.nic.in/propexpan

B.Sc Physics

SEMESTER - III

	L	T	P	C	Hrs

A20PHT305   WAVES OSCILLATIONS AND ACOUSTICS

L	T	P	C	Hrs
3	1	0	4	60

Course Objectives
- The course presents an introduction to the Oscillations, Waves and Acoustics.
- The aim is to show the importance, types and applications of waves.
- Recognize the production, applications and properties of Ultrasonic waves.
- To know the knowledge about the practical applications
- To know the character of oscillations and waves

Course Outcomes
After the end of the course, the students will able to
CO 1: Acquire knowledge of Simple Harmonic Motion
CO 2: Understand the character of Transverse waves
CO 3: Understand the character of longitudinal waves and Doppler effect
CO 4: Acquire knowledge of Acoustics.
CO 5: Acquire the knowledge of production, detection and applications of Ultrasonic.

UNIT - I: SIMPLE HARMONIC MOTION   (12 Hrs)
Simple harmonic motion– Velocity and acceleration in SHM – Energy of a simple harmonic oscillator (LC) –Examples of simple harmonic oscillators in electrical systems – Superposition of two SHMs of Equal time periods and acting at right angles to each other - Lissajous figures –Damped harmonic oscillations.

UNIT - II: TRANSVERSE WAVES & LONGITUDINAL WAVES   (12 Hrs)
Introduction to transverse waves – Velocity of transverse waves in stretched string – Standing waves on a string-Determination of AC frequency using Sonometer – Energy of a vibrating string. Introduction to longitudinal waves – Sound waves in gases – Energy distribution in sound waves – Intensity of sound waves – Longitudinal waves in a solid

UNIT - III: ACOUSTICS   (12 Hrs)
Reflection and transmission of sound waves at boundaries – Diffraction of sound waves- Noise and music – Limits of human audibility – The decibel unit- Reverberation time-Sabine's formula for growth and decay – Acoustics of auditoriums and halls– Introduction to acoustic transducers.

UNIT - IV: ULTRASONICS   (12 Hrs)
Ultrasonics – Production of Ultrasonics: Piezo electric effect- Piezo electric crystal generator – Magnetostriction generator –Detection of ultrasonics –Thermal detectors – Piezo electric detectors – Kundt,s tube method and Sensitive flame methods - Determination of velocity of Ultrasonic Waves in Liquid using Acoustic grating

UNIT - V: APPLICATIONS OF ULTRASONICS   (12 Hrs)
Basic concepts of SONAR – Echo location, Ultrasonic drilling, welding & Cutting, Ultrasonic Cleaning, Ultrasound scan, Ultrasonography, – NDT, Pulse Echo system, Doppler effect , Doppler radar, Police radar, Doppler echocardiogram

Textbooks
1. H. J. Pain, The Physics of Vibrations and Waves, John Wiley, (2005), 6th Edition, for Units I, II & III.
2. N. Subrahmanyam, Brijlal, A Text Book of Sound, Second Edition, Vikas Publishing house PVT Ltd, 2016.
3. N.K. Bajaj, The Physics of Waves and Oscillations, Mc Graw Hill Publishers, 2017.

Reference Books
1. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, John Wiley &Sons(2004), 7th Edition.
2. Berkeley Physics Course-Waves: Volume-III, McGraw Hill, (1969).
3. A. P. French, Vibrations and Waves (M.I.T Introductory Physics Series), CRC Press, (1971).

Web resources
1. https://www.britannica.com/science/acoustics.
2. https://www.ikbooks.com/openPdf/9789380578279.
3. http://cds.cern.ch/record/1529274?ln=en

B.Sc Physics

A20PHT306	**BASIC ELECTRONICS**	**L**	**T**	**P**	**C**	**Hrs**
		3	1	0	4	60

Course Objectives:
- To acquire knowledge about basics and physical mechanism behind electronics.
- To know the various semiconductor devices and it's working mechanism.
- To apply the development of the electronic instruments.
- To motivate the students to apply the principles of electronics in their day – to – day life.
- To get knowledge about the electronics properties and its application

Course Outcomes
After the end of the course, the students will able to
CO1 - Acquired knowledge about physical mechanism of solids through band theory.
CO2 - Understand the basic semiconductor devices and its connection configuration
CO3: Gain the knowledge about the special semiconductor devices
CO4: Understand the applications of semiconductor on various device applications
CO5: Understand the know the principles operational amplifiers

UNIT – I DIODES AND ITS APPLICATIONS   (12 Hrs)
Special diodes : Light Emitting Diode (LED) and its advantages – multicolor LEDs and its applications - Photo diode – characteristics and applications – Tunnel diode and its characteristics – Tunnel diode as an Oscillator – Varactor diode – Theory and its applications – Shockley diode – PIN diode and its applications.

UNIT – II TRANSISTOR BIASING AND TRANSISTOR AMPLIFIERS   (12 Hrs)
Different modes of operation –biasing and characteristics of a transistor in CE mode-h Parameters of CE mode- α and β of a transistor – Potential divider bias-Double stage RC coupled amplifier – frequency response curve– classification of amplifiers – class A power amplifier – Push-pull, class B power amplifier – Emitter follower.

UNIT – III OSCILLATORS   (12 Hrs)
Voltage gain of a feedback amplifier – Barkhausen criterion – Hartley, Colpitt's, and Phase shift oscillators– expression for frequency of oscillations and condition for sustained oscillations in each case– frequency stability.

UNIT – IV WAVE SHAPING CIRCUITS AND MULTI VIBRATORS   (12 Hrs)
Clipping and clamping circuits – integrating and differentiating circuits – RC time constants. Multivibrators – Astable, – Mono stable and bi-stable multivibrators – Schmitt trigger .

UNIT – V TESTING ELECTRONIC COMPONENTS   (12 Hrs)
Testing various cables, connectors and fuses (Continuity test using multimeter) - Identifying, finding values and testing different types of resistors and Capacitors (by colour codes & multimeter) - Identifying (leads & type) and Testing Diodes, Zener diodes and Transistors (using multimeter) - Testing IC's.

Text Books
1. B.L. Theraja, Electronics, S. Chand Publishing, 2005.
2. V. K Mehta, Principles of Electronics, S. Chand & Co., 2005
3. M.K. Bagde, S. P. Singh, Elements of Electronics, S. Chand Publishing, 2000.

Reference Books
1. A. Malvino, Electronics Principles, McGraw Hill Education, 7th Edition, 2006.
2. Allen Mottershed, Electronic Devices and Circuits, Goodyear Pub. Co., 1973.
3. Manna, Solid state electronics, Tata McGraw Hill

Web Resources
1. https://www.electronics-tutorials.ws/
2. https://www.makerspaces.com/basic-electronics/.
3. https://semiconductorclub.com/courses/diodes-and-its-applications/.

B.Sc Physics

	ALLIED CHEMISTRY - I	L	T	P	C	Hrs
A20PHD304		3	1	0	4	45

Course Objectives
- To gain knowledge on the importance of basic organic chemistry
- To acquire knowledge about hydrocarbon and their reactions
- To promote the importance of silicon and metals.
- To acquire knowledge in chemical kinetics and photochemistry
- To observe the classification and structure Industrial Chemistry and Pesticides

Course Outcomes
After completion of this course, the students will be able to
CO1 -Develop their knowledge on the chemistry of hybridization and isomerism
CO2 -Comprehend the preparation, properties and methods of alkanes
CO3– Gain knowledge on occurrence of heavy metals and borazole
CO4 -Develop their knowledge on pseudo first and second reaction.
CO5 -Apply the chemistry in industrial fuels, fertilizers and pesticides

UNIT – I Introduction of Hybridisation and Isomerism   (9Hrs)
Hybridisation - sp, sp^2 and sp^3-Bond length- bond angle- dipole moment- inductive effect- mesomeric effect and hyperconjucation - Isomerism- geometrical and optical isomerism- optical activity- asymmetry- dissymmetry, elements of symmetry- R, S notations.

UNIT – II Hydrocarbons   (9Hrs)
Methods of preparation of alkanes, properties - Reactions. Free radical mechanism of halogention of alkanes, Methods of preparation of alkenes -Stereochemistry of dehydrohalogenation (E1, E2, E1CB mechanism). Properties of alkenes -Electrophilic and nucleophilic addition mechanisms.

UNIT – III Chemistry of Hydrogen, Silicon and Metals   (9Hrs)
Occurrence- extraction and chemical properties of iron- cobalt- nickel and copper. Position of hydrogen in periodic table- atomic hydrogen and isotopes of hydrogen. Preparation and structure of borazole - SiO_2, SiC and $SiCl_4$.

UNIT – IV Chemical Kinetics   (9Hrs)
Rate of reaction, order- molecularity, first order rate law and simple problems- Half- life period of first order reaction- pseudo first order reaction- zero and second order reactions.Arrhenius and collisiontheories.

UNIT – V   Industrial Chemistry   (9Hrs)
Industrial Chemistry: Fuel gases–Water gas- producer gas- LPG gas- Gobar gas and natural gas. Fertilizers –NPK and mixed Fertilizers-soaps and detergents.
Pesticides: Dichloromethane- chloroform- carbon tetrachloride- DDT and BHC. Types of solvents: - Polar, Nonpolar.

Text Books
1. B.R. Puri, L.R. Sharma, K.K. Kalia, Principles of Inorganic Chemistry, Shobulal Nagin Chand and Co, 2001.
2. P. L. Soni, A Textbook of Inorganic Chemistry, Sultan Chand and Co., 1977.
3. Mark Anthony Benvenuto, AText book of Industrial Chemistry, De Gruyter, 2014.

References
1. R. Gopalan, Text Book of Inorganic Chemistry, 2nd edition, Hyderabad, Universities Press, (India),2012.
2. R.T. Morrison and R.N. Boyd, S. K. Bhattacharjee, Organic Chemistry, 7th edition, Pearson India, 2011.
3. B.R. Puri, L.R. Sharma and M.S. Pathania, Principles of Physical Chemistry, 35th edition, New Delhi ShobanLal Nagin Chand and Co, 2013.

Web References
1. https://www.organicchemistrytutor.com/topic/hybridization/
2. https://www.britannica.com/science/chemical-kinetics
3. https://www.thoughtco.com/definition-of-water-gas-605785

B.Sc Physics

A20PHL303	PHYSICS PRACTICAL – III	L	T	P	C	Hrs
		0	0	4	2	30

Choose any 8 experiments from the list given below

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.
- To evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- To extend the scope of an investigation whether or not results come out as expected.
- To conduct an experiment collaboratively and ethically.
- To collect data and revise an experimental procedure iteratively and reflectively

Course Outcomes

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

CO 1–Understand the specific latent heat and Capable of handling compound and torsional pendulum

CO 2 - Acquired basic knowledge about spectrometer and magnetic field due to a current carrying coil.

CO 3 - Identify the focal length of high power microscope and to know basic knowledge about Potentiometer

CO 4 - Prepare formal laboratory reports describing the results of experiments and to interpret the data from the experiments

CO 5 - Gain practical knowledge to describe the experiments and to correlate the theoretical values

LIST OF EXPERIMENTS

1. Rigidity modulus – Torsional pendulum with equal masses
2. Spectrometer-Grating- Determination of N and λ(minimum deviation method)
3. Spectrometer - i-d curve.
4. Field along axis of the circular coil carrying current and determination of B_H.
5. Carry-Foster's bridge - Resistivity of the material of the coil of wire.
6. Potentiometer - Internal resistance of a cell.
7. Potentiometer - Comparison of emf of two cells
8. Specific latent heat fusion of ice.
9. Study of polarization of light by simple reflection
10. Study of the rise and decay of current in a RC circuit

Textbooks

1. Practical Physics C.C Ouseph, V.J.Rao andV.Vijayendran
2. Practical Physics M.N.Srinivasan, Sultan sonPubs
3. D P Khandelwal, A Laboratory Manual in Physics for Undergraduate Students (Vani Publication, NewDelhi)

Reference Books

1. Olon, Experiments in Modern Physics.
2. Adrian C. & Melissinos, Experiments in Modern Physics (Academic Press).
3. V Y Rajopadhye and V L Purohit, Text book of experimental Physics.
4. Verma, Ahluwalia, Sharma, Computational Physics, an Introduction (New Age Int.)

Web Resources:

1. https://www.niser.ac.in/sps/sites/default/files/basic_page/Compound%20pendulum_2017.pdf

2. https://www.iist.ac.in/departments/physics-lab.

B.Sc Physics

A20PHD305	**ALLIED CHEMISTRY PRACTICAL –I**	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives
- To gain knowledge on the importance of basic acidimetry.
- To acquire knowledge about permanganametry.
- To understand the importance of dichrometry.
- To acquire knowledge in iodimetry.
- To gain knowledge on complexometry.

Course Outcomes
After completion of this course, the students will be able to

CO1- Gain the knowledge in principles of volumetric analysis.
CO2- Estimating the amount of substances present in solutions
CO3- Learn to approach a problem systematically and to interpret the result logically
CO4- Understand permanganametry titration
CO5- Know about the dichrometry and iodimetry titration.

VOLUMETRIC ANALYSIS
Acidimetry and Alkalimetry
1. Estimation of HCl using standard oxalicacid
2. Estimation of NaOH using standard sodiumcarbonate

Permanganametry
1. Estimation of FAS using standard oxalicacid
2. Estimation of $KMnO_4$ using standard potassium dichromate

Dichrometry
1. Estimation of $FeSO_4$ using standard FAS.

Complexometric or EDTA titration
1. Estimation of Zn/Mg

Iodimetry
1. Estimation of ascorbicacid
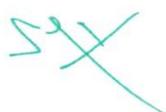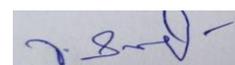2. Estimation of phenol /aniline

Text Books
1. V.Venkateswaran, R.Veeraswamy, A.R.Kulandaivelu, Basic Principles of Practical Chemistry, 2nd edition, Sultan Chand and Sons, 1997.
2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith, A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry, 5th edition, Pearson Education, 2005.
3. Mohammed Awad Ali Khalid, "Redox Principles and advanced application", 1 st Edition, 2017.

References
1. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt.,1996.
2. N.S. Gnanapragasam and G.Ramamurthy, Organic Chemistry – Lab Manual, S. Viswanathan and Co., 1998.
3. J.N. Gurtu and R. Kapoor, Experimental Chemistry, S.Chand and Co, 1987.
Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2009.

Web References
1. https://en.wikipedia.org/wiki/Acid%E2%80%93base_titration
2. https://en.wikipedia.org/wiki/Permanganometry
3. http://staff.buffalostate.edu/nazareay/che112/chromate.htm

B.Sc Physics

DISCIPLINE SPECIFIC CORE ELECTIVE (DSE)

A20PHE301   **MATERIAL SCIENCE**   L T P C Hrs
                                                              4 0 0 4 60

Course Objectives

- To understand the importance of Material Science as a subject that revolutionized modern day technologies
- To understand the significance of material science in the development of new materials and devices for all branches of Engineering
- To impart knowledge to the Engineering students about some of the important areas of Materials Science so as to enable them perceive the significant contributions of the subject in Engineering and Technology
- To understand the crystal properties and its applications
- To know the importance of the material selection for various applications

Course Outcomes

After the end of the course, the students will able to
CO1 – Identify crystal lattices and their structures and Lattice defects.
CO2 – Identify the nature of polarization in a dielectric material and to explain the various dielectric materials.
CO3 – Understand the source of a materials magnetic behaviour and be able to distinguish types of magnetism.
CO4 – Define basic properties of Semiconductors & superconducting materials.
CO5 – Have a broad understanding of the techniques used to synthesize the advanced materials.

UNIT -I CRYSTAL STRUCTURE AND LATTICE DEFECTS   (12Hours)

Crystal structure - Bravais Lattices, Crystal Systems — Coordination Number, Atomic Radius, Packing Factor for FCC & HCP structures – Miller Indices- Powder X Ray Diffraction Method. Lattice defects – Qualitative ideas of point, line, surface and volume defects.

## UNIT II – DIELECTRIC PROPERTIES   (12Hours)

Dielectric Polarization and Mechanism –Temperature dependence of polarization, Internal or local Field - Clausius-Mossotti relation. Basic ideas of Dielectric loss - frequency dependence of dielectric constant – Measurement of Dielectric constant and loss using Schering bridge – Elementary ideas of Piezoelectric, Ferroelectrics and Pyro electric materials and Applications.

UNIT III – MAGNETIC PROPERTIES   (12 Hours)

Origin of atomic magnetic moment – Bohr magneton-Elementary Ideas of classification of magnetic materials (Dia, Para, Ferro, antiferro & Ferri). – Quantum theory of Para & Ferro Magnetism – Domain Theory of Hysteresis –Structure and Properties of Ferrites – Properties of Soft & Hard Magnetic Materials – Applications. Magnetic data storage – Magnetic tapes, Hard disks, Magneto optical recording.

UNIT IV – SEMICONDUCTORS AND SUPERCONDUCTORS   (12 Hours)

Semiconductors -Derivation of Carrier concentration in intrinsic Semiconductors –temperature dependence of carrier concentration and electrical conductivity in semiconductors (qualitative ideas), Hall effect in Semiconductors -- Application of Hall Effect, Superconductivity - Basic concepts – transition temperature – Meissner effect – Type I and II superconductors – high temperature superconductors– Applications of superconductors.

B.Sc Physics
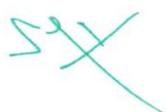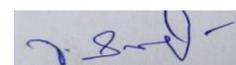
UNIT V – ADVANCED MATERIALS   **(12 Hours)**

Liquid Crystals – Types – Application as Display Devices. Metallic Glasses – preparation by melt spinning. Twin roller system, properties and applications. Shape Memory alloys (SMA), Shape memory effect, Properties and applications of SMA Nanomaterial's- Nano materials (one, two & three Dimensional) –Methods of synthesis (PVD, CVD, Laser Ablation, Sol gel, and Ball-milling Techniques), Properties and applications of nanomaterial.

Text books

1.   V Rajendran, Engineering Physics, 2 nd Edition, TMH, New Delhi 2011.
2. V Raghavan , Materials Science and Engineering- A First Course, 5th Edition, Prentice Hall of India, 2008.
3.   S.O Pillai , Solid State Physics– New Age International,2005.

Reference Books

1. Ali Omar M, Elementary Solid State Physics, Addison Wesley Publishing Co., 2009.
2. William D Callister Jr., Material Science and Engineering, 6th Edition, John Wiley and sons, 2009.
3. Srivatsava J P, Elements of Solid State Physics, Prentice Hall of India, 2004.

Web Resource:

1. https://www.sciencedaily.com/terms/materials_science.htm.
2. https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/materials-science.html.
3. https://mse.umd.edu/about/what-is-mse.

B.Sc Physics

A20PHE302   **PHYSICS FOR ELECTRONIC DEVICES**   **L T P C Hrs**
                                                                   3 1 0 4 60

Course Objectives
- To understand the importance of Physics of Devices & Instrumentation as a subject that revolutionized modern day technologies.
- To teach the interaction between light and semiconductor
- To study the basic importance of photodiodes
- Recognize the applications and properties of Optoelectronic device design and development.
- To understand the significance of Device and Instrumentation in the development of new materials and devices for all branches of Engineering

Course Outcomes
After the end of the course, the students will able to
CO1 – Know the Energy band, Charge Carrier in semiconductor etc.
CO2 – Understand the roles played by Excess Carriers in Semiconductors.
CO3 – Identify the Internal and schematic structure of p-n junction diodes.
CO4 –Know the various Optoelectronic Devices, design and challenges.
CO5 – Find the Photodector and their characteristics.

UNIT- I: ENERGY BAND AND CHARGE CARRIER IN SEMICONDUCTORS   (12Hrs)
Energy band in solids: Energy band – Metal, Semiconductor and Insulators – Direct and Indirect Semiconductors. Charge Carriers in Semiconductor: Electron and Holes – Effect Mass in intrinsic semiconductors, dependence of Fermi level on temperature and doping concentration. and mobility – drift – effect of temperature and doping on mobility. (qualitative only)

UNIT-II: EXCESS CARRIERS IN SEMICONDUCTORS   (12 Hrs)
 Luminescence: Photoluminescence – Electroluminescence – Carrier Lifetime and Photoconductivity – direct recombination of electrons and holes – indirect recombination; trapping – photoconductivity devices – Diffusion of Carriers – diffusion processes – diffusion and drift of carriers; built-in field – diffusion and recombination –Diffusion length.

UNIT-III: P-N JUNCTION DIODES   (12 Hrs)
 P-N Junction Diode, Depletion region, Barrier Potential, Working in Forward and Reverse bias condition – Junction capacitance, Diode current equation– Effect of temperature on reverse saturation current – construction, working, V-I characteristics and simple applications of varactor diode, Zener diode and Tunnel diode.

UNIT-IV: OPTOELECTRONIC DEVICES   (12Hrs)
Current and Voltage in an illumination junction – Solar Cells – Photo detectors - Light Emitting Diodes: Light – Emitting materials – Semiconductor Lasers: population inversion at a junction – Basic of Semiconductor Laser – materials for semiconductor Lasers.

UNIT-V: PHOTODIODES   (12 Hrs)
Types of FET-Characteristics and Principles of operation of JFET -JFET as an amplifier- CS, CD, CG configuration-Operation of MOSFET as a switch – as a variable resistor – UJT-SCR and it's Characteristics

B.Sc Physics

Text Books:

1. Ben G Streetman and Sanjay Kumar Banerjee, "Solid State Electronics" 6thEdn PHI
2. Electronic Devices and Circuit Theory --- Robert L. Boylestad& Louis Nashelsky. 2.
3. Electronic Devices and Circuits I – T.L.Floyd- PHI Fifth Edition

Reference Books

1. S.Salivahanan, N. Suresh Kumar and A. Vallavaraj "Electronic divces and circuits" TMH(1998)
2. Millman and Halkias, "Electronics Devices and Circuicts"- McGraw Hill, V reprint 1993,
3. Boylestsd. L.Robert and Nashalsky Louis, "Electronic devices and Circuit theory", PHI 1997.

Web Resource:

1. https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html
2. https://mycbseguide.com/blog/ncert-solutions-class-12-physics-electronic-devices/
3. https://www.ece.ucsd.edu/faculty-research/ece-research-areas/applied-physics-electronic-devices-materials.
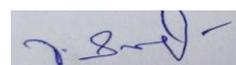
A20PHE303	**MICROPROCESSOR**	**L**	**T**	**P**	**C**	**Hrs**
		3	**1**	**0**	**4**	**60**

Course Objectives

- The course presents an introduction to the embedded system and Microcontrollers.
- The aim is to show how to program 8051 microcontroller and its physical mechanism.
- Recognize the applications and properties of embedded system design and development.
- To study the importance of microprocessor
- To learn the basic applications of microcontroller

Course Outcomes

After the end of the course, the students will able to

CO1 – Understand the embedded system, design issues and challenges.

CO2 – Know the roles played by 8085 programming, subroutines, hardware and software interrupts.

CO3 – understand the Internal and schematic structure of 8051 microcontroller.

CO4 – understand the program of 8051 microcontroller, addressing the system and operations.

CO5 – understand the 8051 compilation, debugging and industrial applications.

UNIT I: ARCHITECTURE OF INTEL 8085   (12 Hrs)

General architecture of microcomputer- Architecture of Intel 8085 – functions of individual blocks – registers in 8085 – pin configuration – functions of individual pins – opcode and operand – instruction cycle – fetch operation – execute operation – machine cycle and state – instruction and data flow.

UNIT II: INSTRUCTION SET OF INTEL 8085   (12 Hrs)

Instruction word size - instruction and data formats – addressing modes– status flags – Data transfer group – arithmetic group – logical group – branch control group – stack, I/O and machine control group.

UNIT III: PROGRAMMING OF MICROPROCESSOR   (12 Hrs)

Assembly language - subroutine - addition, subtraction of 8 bit numbers - sum of a series of eight bit numbers – comparing two 8 bit numbers - finding smallest/largest element of an integer array- sorting integers in ascending and descending order - multiplication and division of 8 bit numbers.

UNIT IV: INTERFACING   (12 Hrs)

Address space partitioning – memory and I/O interfacing – data transfer scheme – interrupts of Intel 8085 – programmable peripheral interface –Architecture of Intel 8255 – operating modes – control word.

UNIT V: MICROPROCESSOR APPLICATIONS   (12 Hrs)

Delay subroutine – Delay subroutine using one register, register pair, two registers - 7 segment LED display – display of decimal numbers 0 to 9 - display of alphanumeric characters – formation of codes for alpha numeric characters – multiple digit display- microprocessor - based Traffic control.

Text Books

1. Ram B. Fundamentals of microprocessors and microcomputer – Eighth Edition, Dhanapat Rai Publications (P) Ltd, New Delhi (2013).
2. Embedded Systems: Architecture, Programming & Design, R. Kamal, 2008, Tata McGraw Hill
3. Embedded Microcomputer System: Real Time Interfacing, J.W. Valvano, 2000, Brooks/Cole.

Reference Books:

1. Ramesh Gaonkar, Microprocessor: Architecture, Programming and Applications with 8085, Sixth Edition, Penram International Publishing (India) Pvt.Ltd. Mumbai (2013).

2. Nagoor Kani A., Microprocessors and Microcontrollers, First Edition, RBA Publications, Chennai (2006).

Web Resource:

1. https://www.springer.com/gp/book/9781461431428.
2. https://www.circuitstoday.com/embedded-systems-an-introduction

B.Sc Physics

OPEN ELECTIVE COURSES

A20PHO325	ASTROPHYSICS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives
- To know the history of the astronauts.
- To provide the knowledge about the astronomical related mechanics.
- To introduce learn the concepts of the stellar principles.
- To provide the understanding of astronomical instrumentation.
- To understand the evolution of solar system.

Course Outcomes

After completion of the course, the students will be able to

CO1 – StudyabouttheHistoryofAstronomyandCelestialMechanics

CO2 – Learntheconcepts ofastronomicalinstrumentation

CO3 – AcquireKnowledgeofStellarMagnitudesandColors

CO4 – Befamiliarwiththestellarstructure

CO5 – Applytheknowledgeofstellarevolution

UNIT I: ASTRONOMY   (9Hrs)
History of Astronomy Celestial Mechanics; Distances in Astronomy; Magnitude Scale; Color-index Size and Time Scales

UNIT II: ASTRONOMICAL INSTRUMENTATION   (9Hrs)
Basic Optics; Optical Telescopes; Radio Telescopes; Infrared, Ultraviolet, X-ray, and Gamma-Ray Astronomy

UNIT III: STARS   (9Hrs)
Stellar Magnitudes and Colors, Brightness and distance, Luminosity, temperature and spectral class, the motion of stars relative to the Sun, the masses of stars.

UNIT IV: STELLAR STRUCTURE   (9Hrs)
Equations of Stellar Structure – Solutions to Equations of Stellar Structure, Toy Stellar Models: Homologous Stellar Models, the Radiative Stellar Envelope, and Fully Convective Stars with H~ Opacity, Observational Aspects of Stellar Atmospheres, Continuum Radiation, and Lines.

UNIT V: STELLAR EVOLUTION   (9Hrs)
Stellar Clusters Evolution of massive stars, Supernovae, Gamma-Ray bursts White Dwarfs, Chandrasekhar Limit, Neutron Stars, Pulsars GTR, Black holes.

Text Books:
1. Bradley Carroll & Dale Ostlie, An Introduction to Modern Astrophysics, 2006.
2. T Padmanabhan, Theoretical Astrophysics: Vol. I-II-III, Cambridge University Press (2005).
3. WM Smart and R M Greene, Textbook on Spherical Astronomy, Cambridge University Press (1986) Sixth Edition.

Reference Books:
1. Chandrasekhar S, an Introduction to the Study of Stellar Structure, Dover Publications (1967).
2. Clayton D D, Principles of Stellar Evolution and Nucleo synthesis, University of Chicago Press (1983).
3. Kippenhahn and Weigert, Stellar Structure and Evolution, Springer (1990).

Web Reference:
1. https://en.wikipedia.org/wiki/Astrophysics.
2. https://www.aanda.org/
3. https://www.springer.com/journal/10509.

B.Sc Physics

A20PHO326	BASICS OF MODERN COMMUNICATION SYSTEMS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objective:
- To understand the basic ideas of radio communication,
- To Know about basics of Microwave communication
- To get the Knowledge of satellite communication,
- To understand the basic ideas of fiber optic
- To have the basic ideas about the mobile communication and IOT

Course Outcomes:
After the end of the course, the students will able to
CO1 - Familiar about radio communication.
CO2 - Study about Microwave communication
CO3 - Acquire Knowledge about satellite communication.
CO4 - Apply the knowledge of fiber optics in communication.
CO5 - Basic ideas of mobile service and Internet
.
UNIT I: RADIO COMMUNICATION   **(9 Hrs)**
Modulation - Types of modulation - Analysis of amplitude modulated wave - carrier suppression -SSB transmission - advantages and disadvantages - generation of SSB signals - Filter method - FM modulation - FM station - Diode detector - receiver - super heterodyne receiver.

UNIT II: MICROWAVE COMMUNICATION   **(9 Hrs)**
Introduction - Generation of microwaves - Klystron oscillator - Television picture tube - image orthicon - scanning - synchronization - T.V. Transmission - T.V. reception - Principle of a colour TV Television screens - CRT and LCD - fundamentals of RADAR - Applications of RADAR.

UNIT II: SATELLITE COMMUNICATION   **(9 Hrs)**
Introduction Kepler's I, II, III laws – Classification of satellites - Satellite orbit – Satellite Launching - - path loss - Satellite earth station - satellite station –satellite navigational system- GSM- GPS- DTH-Indian satellites- Application of satellite

UNIT III: FIBER OPTIC COMMUNICATION SYSTEM   **(9 Hrs)**
Introduction – Total internal reflection in optical fiber - Principles of light transmission in a fiber – Numerical aperture – Fiber optic communication link (Block diagram) - Advantages of optic fibers- losses in fiber -Applications in telecommunication.

UNIT IV: MOBILE COMMUNICATION AND INTERNET   **(9 Hrs)**
Wireless communication system- - Cell phone - Internet - GPRS – Bluetooth-. Cellular Phone: Basics and signal transmission – GSM - Mobile service – Wifi – 3G & 4G- Bluetooth (Basic idea). INTERNET (Basic ideas) - Search engines - E-MAIL (Basic ideas) – Blogs – Twitter – Whatsapp – Facebook.

Textbooks:
1. Ambrose A and Vincent Devaraj. T, Introduction to Electronics, GaungalMera,5 th Edition (1992).
2. Dennis Roddy and John Coolen , Electronic Communication , 3 rd Edition, Prentice Hall of India.
3. Robert J. Schoenbeck, Electronic communications, 2 nd Edition, Prentice Hall of India Private Limited, New Delhi (1999).
Reference Books:
1. Deshpande N.D.,Deshpande D. A., and Rangole P.K., Communication Electronics, Fifteenth reprint, Tata McGraw Hill Publishing Company Limited, New Delhi (2001).
2. Kennedy, Electronic Communication systems, 4thEdition, Tata McGraw Hill publishing co., Ltd., New Delhi (2002).
3. Kumar R., Communication systems, Anuradha agencies, Educational publishers, Kumbakonam (2000).
Web Reference:
1. https://www.telegroup-ltd.com/radio-communications-systems/
2. https://nptel.ac.in/content/storage2/courses/106108098//Learning%20Material%20-%20DataCommunication.pdf.
3. https://en.wikipedia.org/wiki/Communications_system.

B.Sc Physics

A20PHO327	BIOPHYSICS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives
- To have basic knowledge in the area of biophysics
- To deal with how physics applies to the processes of biology.
- To discover how to modify micro-organisms for producing bio fuel.
- To replace bio-electricity in the place of coal and petroleum products for producing electricity.
- To have knowledge about radiation biology.

Course Outcomes
After completion of the course, the students will be able to
CO1 -understand interactions between various systems of cells
CO2 -provide life-saving treatment methods like radiation therapy.
CO3 -find powerful vaccines against infectious diseases.
CO4 - understand the optical techniques in biological studies
CO5 - understanding the concepts of bioelectricity.

UNIT: I STRUCTURE OF BIOMOLECULES (9Hrs)
Introduction - Atomic structure - Hydrogen atom - Bonds between atoms and molecules - secondary or weak bonds - Bond energy - Disulphate bonds – Peptide bond - Structure of Proteins - Molecular weight determination - Kinetic methods - Static methods - Structure of nucleic acids.

UNIT: II KINETICS OF MOLECULES I (9hrs)
Factors affecting diffusion·- Simple diffusion – Fick's law of diffusion - Diffusion of electrolytes - Biological significance of diffusion. Osmosis - Osmotic pressure - Laws of osmosis - osmometry - osmotic pressure of electrolytes. Filtration - Passage of fluid though blood vessels - Dialysis Principle of dialysis in artificial kidney - kinds of dialysis.

UNIT: III KINETICS OF MOLECULES II (9hrs)
Adsorption - Factors affecting adsorption - Adsorption of ions by Solids and Liquids - adsorption of Gases by solids - Biological significance of adsorption-Hydrotropy - Biological importance of hydrotropy. Precipitation - Biological significance. Colloids- Types of colloids - characteristics of colloids - stability of colloids - Gel.

UNIT: IV OPTICAL TECHNIQUES IN BIOLOGICAL STUDIES (9hrs)
Characteristics of light- compound· microscope - Ultraviolet microscope - Electron microscope Transmission electron microscope - Scanning Electron microscope - Light sensitive detectors- Spectrophotometer - Atomic absorption flame photometer - Electromagnetic radiation Spectroscopy - Ultraviolet, visible, infrared and fluorescent spectroscopy - Atomic absorption and emission spectroscopy - mass spectroscopy - Raman spectroscopy – X-ray diffraction crystallography

UNIT: V BIOELECTRICITY AND RADIATION BIOLOGY (9hrs)
Membrane potential - Resting membrane potential - Action potential and nerve impulse conduction Rate of nerve impulse conduction- Recording of nerve impulses by C.R.O - Resting membrane potential -.J Injury potential- Monophasic and diphasic action potentials - Radioactivity - Natural radioactivity Artificial or induced radioactivity - Radioactive disintegration - units of Radioactivity.
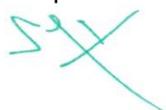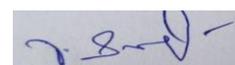
Text Books:
1. Biophysics: Principles and Techniques, M.A. Subramanian, MJP Publishers, (2015).
2. Principles of biophysics, Dr S. Palanichamy, Dr.M. Shanmugavelu, Palani Paramount Publications, (1996).
3. Biophysics, S. Thiravia Raj, Saras Publication, (2009).

Reference Books:
1. Basic Biophysics for Biologist, M. Daniel, Agro-Bios, (1998).
2. Biological Physics Philip nelson. S.chand publications 2014 edition.
3. Introduction to Biophysics P.k Banerjee S.chand publications (2008).

Web Reference
1. https://www.sciencedirect.com/topics/earth-and-planetary-sciences/biophysics
2. https://onlinecourses.nptel.ac.in/noc20_ph02/preview.
3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4788750/.

B.Sc Physics

SEMESTER -IV

A20PHT408	APPLIED ELECTRONICS	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives:
- To get knowledge about Special devices, circuits and its applications.
- To know the various special semiconductor
- To amplifiers and it's working mechanism.
- To motivate the students to learn about memory elements and Boolean mechanism.
- To know the students to learn material properties

Course Outcomes
After the end of the course, the students will able to

CO1: Acquire knowledge about physical mechanism of special semiconductor devices.
CO 2: Understand the special semiconductor devices and its circuit configurations
CO3: Acquire knowledge about the operational amplifier and various oscillator circuits.
CO4: Understand the Boolean mechanism and various memory elements
CO5: know the principles of convertors such as analog to digital and vice versa.

UNIT - I: SPECIAL DEVICES AND APPLICATIONS   (12 Hrs)

Field Effect Transistors (FET) - Characteristics – parameter FET as amplifier – FET as Voltage variable resistor (VVR) – Metal Oxide Semiconductor (MOSFET) – Depletion and enhancement – Uni-Junction Transistor (UJT) characteristics – UJT as relaxation oscillator – Silicon controlled Rectifier (SCR) characteristics.

UNIT - II: LINEAR OPERATIONAL AMPLIFIER CIRCUITS   (12 Hrs)

OPAMP – Parameters – inverting and Non-inverting amplifier – gain – Miller effect – Virtual ground – offset voltage – offset current – Power Supply Ripple Ratio (PSRR) – Common Mode Rejection Ratio (CMRR) - OPAMP – Sign and scale changer – adder, subtractor and averager – integrator and differentiator – voltage follower – solving simultaneous linear equation.

UNIT – III: APPLICATIONS OF OPERATIONAL AMPLIFIER   (12 Hrs)

OP AMP logarithmic amplifier – antilogarthmic amplifier – Logarithmic multiplier – Logarithmic divider - Comparator – Schmitt trigger – Astable multivibrator – Monostable multivibrator – Bistable multivibrator – Wein Bridge oscillator – phase shift oscillator.

UNIT - IV: BOOLEAN AND MEMORY DEVICES   (12Hrs)

Fundamental concepts of Boolean algebra – Basic gates and universal gates – De margon's theorem: Simplification of expressions – Memory cell – Random Access Memory (RAM) – types – Read Only Memory (ROM) – Programmable (PROM), Erasable Programmable (EPROM), Electrically Erasable Programmable EEPROM – Magnetic Disk Memories – Magnetic tapes – Compact disc.

UNIT - V: D / A AND A / D CONVERTER   (12 Hrs)

555 Timer block diagram - Monostable operation – A stable operation – Schmitt trigger. Phase – Locked Loops (PLL): Basic principles – phase Detector- Analog phase detector – Digital phase detector – voltage controlled oscillator (VCO). Weighted resistor D/A converter – 4bit R-2R ladder DAC – Analog to Digital converter – Stair case ADC– Successive approximation ADC.

Text Books
1. Vijayendran, *Introduction to Integrated Electronics*, S.Viswanathan Pvt. Ltd., 2009.
2. M. Arul Thalapathi, *Basic and Applied Electronics,* Cometak Publisher Chennai, 2005.
3. V.K. Mehta, Principles of Electronics, S. Chand & Company Ltd, Chennai, 2005

Reference Books
1. Albert Paul Malvino, *Digital Computer Electronics,* TMH Edition, 1992.
2. I. J. Jagrath, *Electronics – Analog and Digital,* Prentice – Hall of India, New Delhi, 1999.
3. Malvino Leach, *Digital Principles and Applications,* 4thEdn., Tata McGraw Hill, 1992.

Web Resources
1. https://www.wilhelmsen.com/other-services/imtc/courses/engineering-coursess/engineequipmentmaintenanceworkshop22/
2. http://ecoursesonline.iasri.res.in/course/view.php?id=528
3. https://www.getmyuni.com/applied-electronics-and-instrumentation-course

B.Sc Physics

A20PHT409	**LASER AND FIBER OPTICS**	L	T	P	C	Hrs
	COMMUNICATION	3	1	0	4	60

Course Objectives:

- To get knowledge about LASER and its applications.
- To know the various special LASER devices and its physical mechanism.
- To know the basic knowledge about Fiber Optic communications and its importance.
- To know the different types of laser
- To get the knowledge about the applications of laser

Course Outcomes

After the end of the course, the students will able to

CO 1: Understand the basics principles of laser

CO 2: Study the information about the types of lasers and its characteristics

CO 3: Obtain the knowledge about applications of laser

CO 4: Understand the basics of optic fibers

CO 5: Obtain the knowledge about the Communication processes

UNIT I: LASER PHYSICS   (12 Hrs)

Basic Principle of Laser – Einstein Coefficients – condition for light amplification – Population Inversion – Threshold Condition – Line shape function – Optical Resonators – Three level and four level systems.

UNIT II: TYPES OF LASERS AND OUTPUT MODULATION METHODS   (12 Hrs)

Solid State lasers – Small diode-pumped Nd:YAG (YAG lasers) - Nd:YVO$_4$ lasers (vanadate lasers) Gas lasers – Helium Neon (He-Ne) and Carbon dioxide (CO$_2$) lasers – semiconductor lasers – Heterojunction lasers - Argon ion and Eximer Laser– Q switching and mode locking.

UNIT III: APPLICATIONS OF LASER   (12 Hrs)

Application of laser in industry – cutting and welding – Drilling – surface Hardening – Medical applications - laser as diagnostic and therapeutic tool – Holography – Theory of recording and reconstruction – application of Holography.

UNIT IV: OPTIC FIBERS COMMUNICATION   (12 Hrs)

Fiber optic revolution – basic characteristics of optical fiber – acceptance angle – numerical aperture – propagation of light through optical fiber – theory of mode formation – classification of fibers – step index and graded index fibers – single mode and multi-mode fibers – losses in fibers – fabrication techniques of fibers.

UNIT V: APPLICATIONS OF FIBER OPTICS   (12 Hrs)

Source and detectors for fiber optic communication – Laser and LED – Analog and digital modulation methods – principle of optical detection – pin and APD photo detectors – Noise – Design consideration of a fiber optic communication system.

Text Books

1. R. Murugeshan, *Modern Physics*, S. Chand & Co., 2009.
2. Senthil Kumar, *Engineering Physics*, VRB Publishers Pvt. Ltd., 2013.
3. K. Thyagarajan and Ajoy Ghatak, *Laser Theory and Applications*, Cambridge University Press, 1999.

Reference Books

1. John M. Senior, *Optical Fiber Communications,* Cambridge University Press, 1996.
2. Govind P. Agrawal, *Fiber – Optic Communication Systems*, John- Willey & Sons, 2007.
3. P. K. Palanisamy, *Physics for Engineering*, Scitech publishing Pvt. Ltd., Chennai, 2009.

Web Resources

1. https://www.electronics-notes.com/articles/connectivity/fibre-optics/optical-fibre-telecommunications-basics.php
2. https://www.slideshare.net/bhupi212/led-and-laser-source-in-optical-communication
https://vitextech.com/laser-types/

B.Sc Physics

	L	T	P	C	Hrs
A20PHD406 **ALLIED CHEMISTRY - II**	4	0	0	3	45

Course Objectives
- To gain knowledge on the importance of basic organic chemistry
- To acquire knowledge about coordination compounds
- To promote the importance of industrial chemistry
- To acquire knowledge in phase rule and adsorption
- To observe the fundamentals in electrochemistry

Course Outcomes
After completion of this course, the students will be able to
CO1 -Develop their knowledge on Carbohydrates and heterocyclic compounds
CO2 - Understand Nomenclature and isomerism of coordination compounds
CO3– Gain knowledge on types, softening and purification of hard of water
CO4 -Develop their knowledge on adsorption and phase rule
CO5– Improve the knowledge on basic of electrochemistry

UNIT – I Carbohydrates, Benzene and Heterocyclic Compounds (9Hrs)
Classification of carbohydrates–Properties and uses of glucose and fructose mutarotation - Chemistry of benzene - Preparation, mechanism of electrophillic substitution reactions. Heterocyclic compounds– Preparation and properties of pyrrole and pyridine.

UNIT – II Coordination Chemistry (9Hrs)
Nomenclature and isomerism of coordination compounds. EAN rule - VB and Crystal field theories of octahedral, tetrahedral and square planar complexes. Chelation and its industrial applications.

UNIT – III Industrial Chemistry (9Hrs)
Hardness of water – Temporary and permanent hardness, disadvantages of hard water Boiler scales and sludges - Softening of hard water – Zeolite process - demineralization process and reverse osmosis – Purification of water for domestic use: use of chlorine, Ozone and UV light.

UNIT- IV Phase Rule and Adsorption (9Hrs)
Phase rule- Definition of terms involved. phase diagram of H_2O, Pb-Ag . Adsorption - Langmuir adsorption isotherms - Principles of chromatography (Paper, TLC and column).

UNIT –V Electrochemistry (9Hrs)
Faradays laws of electrolysis - Specific conductance, equivalent conductance - Cell constant - Arrhenius theory Ostwald"s dilution law and Kohlrausch law - Nernst equation - Applications of EMF-Measurements.

Text Books
1. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Shobulal Nagin Chand and Co, 2001.
2. R. Gopalan, S. Sundaram, Allied Chemistry, Sultan Chand and Sons, 1995.
3. M.J.Sienko and R.A.Plane, Chemistry: Principles and properties, International Student Edition, 1995.

References
1. B.S. Bahl and ArunBahl, A Text book of Organic Chemistry, 21st edition, Sultan Chand and Co., 2012.
2. I.L. Finar, Organic Chemistry, Vol 1&2, 6th edition England, Addison Wesley, Longman Ltd, 1996.
3. P.W. Atkins, Physical Chemistry, 5th edition, Oxford University press, 1994.

Web References
1. https://www.britannica.com/science/heterocyclic-compound
2. https://www.nature.com/subjects/coordination-chemistry
3. https://en.wikipedia.org/wiki/Phase_rule

B.Sc Physics

A20PHL404	PHYSICS PRACTICAL – IV	L	T	P	C	Hrs
		0	0	4	2	30

Choose any 8 experiments from the list given below

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.
- To evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- To extend the scope of an investigation whether or not results come out as expected.
- To conduct an experiment collaboratively and ethically.
- To collect data and revise an experimental procedure iteratively and reflectively

Course Outcomes

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

CO 1 – Understand the values of Young's modulus experimentand to handle Sonometer

CO 2 - Gain basic knowledge about Potentiometer and magnetic field due to a current carrying coil.

CO 3 - Prepare formal laboratory reports describing the results of experiments and to interpret the data from the experiments.

CO 4 - Calculate the values for figure of merit and to study optical rotation of solutions.

CO 5 – Gain the practical knowledge about computer simulation and to handle half and full wave rectifier.

LIST OF EXPERIMENTS

1. Rigidity Modulus – Statistic Torsion
2. Sonometer ac frequency using steel wire
3. Newton's Ring – Focal length of the Convex lens
4. Potentiometer -Calibration of high range voltmeter
5. PN Junction diode & Zener diode characteristics
6. Half and full wave rectifier using Junction diode
7. Carry-Foster's bridge - Temperature co-efficient of the material of a wire.
8. Jolly's apparatus – pressure coefficient of air.
9. B.G. - Comparison of Mutual inductance
10. Figure of merit of a periodic Table galvanometer.

Textbooks

1. Practical Physics C.C Ouseph, V.J.Rao and V.Vijayendran
2. Practical Physics M.N.Srinivasan, Sultan son Pubs
3. D P Khandelwal, A Laboratory Manual in Physics for Undergraduate Students (Vani Publication, NewDelhi)

Reference Books

1. Olon, Experiments in Modern Physics.
2. Adrian C. & Melissinos, Experiments in Modern Physics (Academic Press).
3. V Y Rajopadhye and V L Purohit, Text book of experimental Physics.

Web Resources:

1. https://www.niser.ac.in/sps/sites/default/files/basic_page/Compound%20pendulum_2017.pdf

2. https://www.iist.ac.in/departments/physics-lab.

B.Sc Physics

		L	T	P	C	Hrs
A20PHD407	**ALLIED CHEMISTRY PRACTICAL –II**	0	0	4	2	30

Course Objectives

- To get a good exposure to the basic concepts of chemistry
- To enable the students to acquire quantitative skills in volumetric analysis.
- To learn the fundamentals of conductometric and potentiometric titrations.
- To understand the method of determination of molecular weight by viscosity average method.
- To gain knowledge on nickel and copper estimation

Course Outcomes

After completion of this course, the students will be able to

CO1- Gain the knowledge in principles of volumetric analysis.
CO2- Estimating the amount of substances present in solutions
CO3- Learn to approach a problem systematically and to interpret the result logicaaly
CO4- Understand molecular weight determination of a polymers
CO5- Know about the Conductometric and potentiometric titration

List of Experiments

1. Estimation of $KMnO_4$ using standard Oxalic Acid
2. Estimation of $K_2Cr_2O_7$ using decinormal solution of Sodium thiosulphate solution
3. Estimation of Copper using decinormal solution of Potassium dichromate solution
4. Estimation of Nickel using decinormal solution of EDTA
5. Determination of Molecular Weight of a Polymer
6. Conductometric Titrations –I (HClvsNaOH)
7. Conductometric Titrations- II (KCl vs $AgNO_3$)
8. Potentiometric Titration (RedoxTitrations)

Text Books

1. V.Venkateswaran, R. Veeraswamy, A.R.Kulandaivelu, Basic Principles of Practical Chemistry, 2nd Edition Sultan Chand andSons,1997.
2. Daniels et al., Experimental Physical Chemistry, 7th edition, New York, McGraw Hill, 1970.
3. K.K. Sharma and D.S. Sharma, Introduction to Practical Chemistry, Vikas Publishing House, New Delhi, 2005.

References

1. N.S. Gnanapragasam and G.Ramamurthy, Organic Chemistry – Lab Manual,
2. S. Viswanathan and Co., 1998.
3. A.Findlay, Practical Physical Chemistry, 7th Edition, London, Longman, 1959.

Web References

1. https://www.vedantu.com/chemistry/titration-of-oxalic-acid-with-kmno4
2. http://atsherren.faculty.noctrl.edu/chm210/niedta.htm
3. https://www.intertek.com/polymers/molecular-weight/gpc/

B.Sc Physics

DISCIPLINE SPECIFIC CORE ELECTIVE (DSE)

A20PHE404	MEDICAL PHYSICS	L	T	PC	Hrs
		4	0	0	4	60

Course Objectives

- To explain the physical principles underlying the five areas of the application for the module.
- To discuss the advantages and drawbacks of each of these therapeutic or investigative techniques
- Understanding of the current research into ways in which they might be improved.
- To study the purposes of the nuclear medicine
- To know the basic applications of Medical Physics

Course Outcomes

After the end of the course, the students will able to

CO1 – Know the X-ray imaging, X-ray production, Optical Chromatographyetc.

CO2 – Understand the roles played by Nuclear medicine.

CO3 – Gain the Brief ideas about Ultrasound medicine.

CO4 –Know the various types of Radiotherapy.

CO5 – Understand the concept of various imaging techniques like EEG, ECG, MEG and MCG.

UNIT I- X-RAY IMAGING   (12 Hrs)

Production of X-ray images, attenuation coefficients, choice of suitable energy, contrast, hardware; digital imaging X-ray computed tomography, five generations of scanners, reconstruction methods, CT number, contrast stretching-Optical Chromatography.

UNIT II- NUCLEAR MEDICINE   (12 Hrs)

In vitro and in vivo testing, gamma rays for imaging, radiopharmaceuticals, the gamma camera, SPECT, PET, examples of clinical use.

UNIT III - ULTRASOUND IN MEDICINE   (12 Hrs)

Ultrasound imaging, generation and detection of ultrasound, ultrasound propagation, choice of frequency, A-scan, B-scan, M-mode imaging and echo cardiography. Use of Doppler techniques for blood flow etc. Use of ultrasound in therapy

UNIT IV - RADIOTHERAPY   (12 Hrs)

Effect of radiation on normal and malignant tissue, cell survival Types of radiotherapy unit: low voltage, ortho-voltage, megavoltage, and electron beam, brachytherapy Dosimeter: conformal radiotherapy- Photodynamic Therapy.

UNIT V - NEUROELECTRICS AND NEUROMAGNETICS   (12 Hrs)

Basic electrophysiology, genesis of electric and magnetic signals Techniques for measurement and imaging of Electroencephalogram (EEG), Electrocardiogram (ECG), MEG and MCG.

Text Books:-

1. Webb. S (Ed), The Physics of Medical Imaging, Hilger 1988
2. Dendy. P.P and B Heaton, Physics of Diagnostic Radiology, IOPP 2012
3. Brown. B.H et. al., Medical Physics and Biomedical Engineering IOPP 1999

Reference Books

1. Maisey, Britton and Gilday (Eds), Clinical Nuclear Medicine, Chapman and Hall 1991
2. Hendee. W.R, Radiation Therapy Physics, Mosby 2004
3. HedrickW.R, DL Hykes, and DE Starchmann, Ultrasound Physics and Instrumentation, Mosby 1995

Web Resource:

1. https://www.iomp.org/medicalphysics/#:~:text=Medical%20Physics%20is%20a%20branch,human%20health%20and%20well%2Dbeing.

2.https://www.medphys.org

B.Sc Physics

A20PHE405   **ENERGY PHYSICS**   L T PC Hrs
                                                          4 0 0   4 60

Course Objectives

- The course presents an introduction to conventional and Non-conventional energy sources.
- The aim is to show various Biomass and Geothermal energy.
- Recognize the Energy storage and impacts of Non-conventional energy.
- To know the Energy resources applications
- To study applications of the energy storage impacts on conventional energy

Course Outcomes

After the end of the course, the students will able to

CO1-Study about the Conventional Energy Sources

CO2- Learn about the Non-Conventional Energy Sources

CO3- Acquire Knowledge of Biomass energy

CO4- Know the ideas and familiar with the geothermal energy

CO5- Apply the knowledge of Energy storage and impacts of Non-conventional energy

UNIT I - CONVENTIONAL ENERGY SOURCES: (12 Hrs)

World's reserve of commercial energy sources and their availability-various forms of energy-renewable and conventional energy systems- comparison and natural gas – availability –statistical details-applications- merits and demerits

UNIT II - NON-CONVENTIONAL ENERGY SOURCES :   (12 Hrs)

Renewable energy sources- solar energy- nature of solar radiation- components-solar heaters- crop dryers- space cooling-solar ponds-solar cookers-water desalination- photovoltaic generation basics-merits and demerits of solar energy

UNIT III - BIOMASS ENERGY   (12 Hrs)

Classification- photosynthesis- biomass conversion process-go-bar gas plants wood gasification-ethanol from wood- advantages and disadvantages of biomass as energy source

UNIT IV - GEOTHERMAL ENERGY   (12 Hrs)

Wind energy- ocean thermal energy conversion (OTEC)-energy from waves and tides (basic ideas, nature, applications, merits and demerits)

UNIT V - ENERGY STORAGE- IMPACTS OF NON-CONVENTIONAL ENERGY (12 Hrs)

Conversion of energy- patterns of energy consumption in domestic, industrial, transportation, agricultural sectors- conservation principles in these sectors- energy crisis and possible solutions-energy options for the developing countries- energy storage and hydrogen as a fuel (basics)-impact due to nonconventional energy sources-global warming

Text Books

1. Rajamaanar, 2004, Environmental Studies.
2. Katharina Krischer , Konrad Schönleber,Physics of energy conversion.
3. Washington Taylor, Robert L.Jaffe, Physics of energy.

Reference Books

1. Sukhatme, Solar Energy, McGraw-Hill Inc., US, 2nd Revised Edition,1997.
2. Pratima Bajpai, Biomass to energy conversion technologies.
3. Biomass for energy and the environment,P.Chartier,G.L Ferrero,1997

Web Resource

1. http://www.umsl.edu/~naumannj/Geography%20PowerPoint%20Slides/population/professor%20rodrique/Geog%20102%20Topic%207.ppt.
2. https://www.slideshare.net/Rameshpandey41/energy-resources-71750497.
3. https://www.slideshare.net/lorizimmerman/energy-resources-ppt-33606107.

B.Sc Physics

A20PHE406   AGRICULTURAL PHYSICS

L	T	P	C	Hrs
3	1	0	4	60

Course Objectives
- To have knowledge of physical phenomena in agricultural environment.
- To evoke logical thinking in the field of farming.
- To improve practical knowledge of the student.
- To improve the practical knowledge about the solar collector
- To know the complete information about the soils

Course Outcomes
On Completion successful students will be able to
CO1- Understand the role of physics in daily life.
CO2 –Understand the technological applications into agriculture.
CO3- Explore the physical properties of soil and water.
CO4 – Understand the hygrometry
CO5 – Explore the solar collector

UNIT - I SOIL PHYSICS   (12 Hrs)
Mechanical composition of soil – physical properties of soil, pore space, bulk density, particle density – classification – significance of clays– Soil structure – soil colour – Thermal properties of soil and soil temperatures – types of soil water – its retention, movement – viscosity, swelling – soil moisture losses – Elementary ideas of soil water conservation.

UNIT – II WATER PHYSICS   (12 Hrs)
Water qualities – Rain fall – Ground water – surface water pollution – instrumentation and sampling – water quality monitoring.

UNIT - III ELECTRIC POWER   (12 Hrs)
Principle of production of A.C. – Average value of A.C. voltage or current – R.M.S. value of alternating voltage or current – power consumed in A.C. Circuits– A.C. generator – Three phase A.C. – Distribution of three phase A.C. Three phase power system – The choke- The transformer – Transmission of electric power over long distances.

UNIT - IV HYGROMETRY AND PUMPS   (12 Hrs)
Absolute Humidity – Relative Humidity – Dew point, Daniell's Hygrometer, Regnault's hygrometer. Advantages of Regnault's hygrometer – wet and Dry and Bulb hygrometer. Water pumps – common pump – force pump – Fire engine, inflator (or) compression pump – pressure after n strokes – Exhaust pump (or) common air pump.

UNIT – V SOLAR COLLECTOR AND APPLICATIONS   (12 Hrs)
Solar Air heaters- Application of solar air heaters. Solar Drying with various driers – Heating and Drying of Agricultural products – Theory of solar drying – moisture content and its measurement – solar ponds – Application of solar ponds – Solar pumping – Solar pump system components –

Text Books
1.The Nature and Properties of Soil, H.O. Buckman, Brady, Macmillan, (1967).
2 Soil Physics, H. Kohnke, McGraw-Hill, (1968).
3 Systematic Hydrology, John C. Rodda, Richard A. Downing, Frank M. Law, NewnesButterworths, (1976).

Reference Books
 1.Electricity and Magnetism, R. Murugesan, S.Chand, (2017).
 2 Hydrostatics, A. S. Ramsey, Cambridge University Press, (2017).
 3 Solar energy Utilization, G.D. Rai, Khanna Publisers, (1987).

Web Sources
1 https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/soil-physics 2
2.https://www.sciencedirect.com/science/article/pii/S1631071304002780
3https://www.sciencedirect.com/topics/engineering/solar-energy-application

B.Sc Physics

OPEN ELECTIVE COURSES

A20PHE425	DIGITALELECTRONICS	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To understand the fundamental concepts of digital
- To explain the Logic circuits
- To know the basic knowledge arithmetic circuits
- To know basic principles of D/A and A/D converters
- To understand the concepts of microprocessors

Course Outcomes

After the completion of this course, students will be able to

CO1 - Learn theFundamentalofDigitalelectronics&Microprocessor
CO2 – StudythefunctionsofBooleanalgebra
CO3 – ObtainingtheknowledgeaboutArithmeticcircuits&SequentialLogiccircuits
CO4- Learn abouttheworkingofD/A&A/DConverters
CO5 –Introducetheconceptsandworkingofmicroprocessor8085

UNIT–IDIGITAL FUNDAMENTALS   (12 Hrs)

Number systems – decimal, binary, octal and hexadecimal systems – conversion from one numbersystem to another Codes – BCD code – excess 3 code, Gray code – ASCII code – Binary arithmetic –Binary addition – subtraction – unsigned binary numbers – sign magnitude numbers – I's and 2'scomplement–Binarymultiplicationanddivision.

UNIT–IIBOOLEANALGEBRAANDSIMPLIFICATIONOFLOGICCIRCUITS   (12 Hrs)

Laws and theorems of Boolean algebra – De Morgan'stheorems and their circuit implications –Duality theorem,simplification of Boolean equations –Karnaugh map – pairs,quads,octets–2,3and4variables–SOPmethod–NAND–NANDcircuits–POSmethod–NOR–NORcircuits.

UNIT-IIIARITHMETICCIRCUITS ANDSEQUENTIALLOGICCIRCUITS   (12Hrs)

Arithmetic building blocks – Half adder – Full adder – parallel binary adder – Half subtractor – Fullsubtractor–Theadder-subtractor–digitalcomparator–paritychecker/generator.Flip-flops–JKflip flop – JK master slave flip-flop –Flip flop applications. Shift register functions- Shift right-shift left-Shiftregisterapplications.

UNIT–IVD/AANDA/DCONVERTERS   (12Hrs)

Introduction–variableresistornetwork–binaryladder–D/Aconverter–D/Aaccuracyandresolution–
A/Dconverter–simultaneousconversion–A/Daccuracyandresolution.

UNIT–VINTRODUCTIONTOMICROPROCESSOR8085   (12Hrs)

Basics of semiconductor memory- RAM, ROM, PROM and EPROM. Microcomputer organization-8085Microprocessor-pinfunctions-architecture-machineandassemblylanguage-programmer'smodel of 8085-8085 addressing modes. Classification of instruction and format – 8-bit data transferandarithmeticinstructions.

TextBooks

1. ArulThalapapathi,*FundamentalsofDigitalComputers*,ComptekPublishers,Chennai,1995.
2. Vijayendran,*Fundamentals of Microprocessor 8085*,S.ViswanathanPrinters&PublishersPvt.Ltd,2006.
3. Vijayendran,*IntegratedElectronics*,Viswanathan,S.,Printers&PublishersPvt.Ltd.,2009.

ReferenceBooks

1. MalvinoandLeech,*DigitalPrinciplesandApplication*,4[th]Edition,TataMcgrawHill,NewDelhi,2000.
2. MillmanandHalkias,*IntegratedElectronics*,InternationalEdition,McGrawHill,NewDelhi,1972.
3. T.C.Bartee, *ComputerArchitectureandLogicDesign*,McGrawHill,1991.

	L	T	P	C	Hrs
A20PHT426 **GEOPHYSICS**	3	1	0	4	60

Course Objectives

- To understand the physical parameters of a geothermal field.
- To relate them with geological phenomena.
- To locate or detect the presence of subsurface structures.
- To develop their careers in a wide range of fields, including natural resource exploration.
- To measure the variation of the physical properties of subsurface

Course Outcomes

After completion of the course, the students will be able to

CO1 – Know the information about the earth and solar system

CO2 –Understand the interpretation of Mathematical functions in geographical fields

CO3 – Obtaining the knowledge about the Magnetic field on earth

CO4 – Learn the concepts of Sesimology

CO5 –Understand the basics of Geodynamics

UNITI –THEEARTHIN THESOLARSYSTEM   (12Hrs)

Solar System Formation, Accretion, and the Early Thermal State of the Earth-Rotation and Angular Momentum- The Sun-Planetary Formation-Early Thermal State of the Earth-Radioactive Decay-Radiometric Dating- Radioactivity as a Heat Source-Meteorites and the Bulk Composition of the Earth-Chondrites-Secondary Processing-Achondrites-Irons and Stony-Irons-The Terrestrial Planets-One-dimensional Earth's Structure-Lateral Heterogeneity in the Mantle

UNIT II –THEEARTH'SGRAVITATIONALFIELD   (12Hrs)

Global Gravity, Potentials, Figure of the Earth, Geoid-Gravitational Potential due to NearlySphericalBody-ThePoissonandLaplaceEquations-CartesianandSphericalCoordinateSystems-SphericalHarmonics-GlobalGravityAnomalies-GravityAnomaliesandtheReductionofGravityData-CorrelationbetweenGravityAnomaliesandTopography-FlexureandGravity.

UNIT III –THEMAGNETICFIELDOFTHEEARTH   (12Hrs)

The Main Field-The Internal Field- The External Field-The Magnetic Induction due to a Magnetic Dipole-Magnetic Potential due to More Complex Configurations-Power Spectrum of the Magnetic Field-Downward Continuation-Secular Variation.

UNIT IV - SEISMOLOGY   (12Hrs)

Introduction- Strain-Stress-Equations of Motion, Wave Equation, P and S-waves- From Vector toScalarPotentials–Polarization-SolutionbySeparationofVariables-PlaneWaves-Snell'sLaw-Fermat's Principle and Snell's Law- Ray Geometries of the Wave Field-Travel Time Curves and Radial Earth Structure-Surface Waves- Sensitivity Kernels-Excitation of Surface Waves-Dispersion: PhaseandGroupVelocity-DispersionCurves-Seismology:FreeOscillation

UNITV - GEODYNAMICS   (12Hrs)

Heat Flow-Heat Flow, Geothermal Gradient, Diffusion-Thermal Structure of the Oceanic Lithosphere-Thermal Structure of the Oceanic Lithosphere (cont.)-Bending, or Flexure, of Thin Elastic Plate-The Upper Mantle Transition Zone.

B.Sc Physics

TextBooks:

1. Lowrie,William.FundamentalsofGeophysics.Cambridge,UK:CambridgeUniversityPress, September1997.
2. Fowler,C.M.R.TheSolidEarth:AnIntroductiontoGlobalGeophysics.SecondEdition. Cambridge,UK:CambridgeUniversityPress, 2004,
3. Stacey,F.D. PhysicsoftheEarth.3rded.Brisbane,Australia:BrookfieldPress,1992.

ReferenceBooks:

1.Turcotte,DonaldL.,andGeraldSchubert.Geodynamics.2nded.Cambridge,UK:CambridgeUniversity Press, 2001.
2. Stein,Seth,andMichaelWysession.AnIntroductiontoSeismology,EarthquakesandEarthStructure.Mal den, MA:Blackwell Science, 2002.
3. Anderson,Don.TheoryoftheEarth.Malden,MA:BlackwellScience,1990.

B.Sc Physics
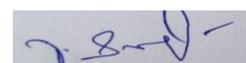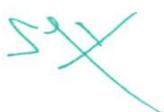
	L	T	P	C	Hrs
A20PHO427 **SPACE SCIENCE**	3	0	0	3	45

Course Objectives

- To have ideas about earth and space.
- To know about the celestial bodies.
- To have clear idea about the solar system.
- To know basic ideas about stars.
- To have idea about the origin of universe

Course Outcomes

After completion of the course, the students will be able to

CO1 – Gain knowledge about earth and space

CO2 – understand different types of celestial bodies

CO3 – Deep understanding about the planets, satellites

CO4 – Get knowledge about galaxies and stars

CO5 - understanding different theories on origin of universe.

UNIT I: INTRODUCTION TO EARTH AND SPACE   **(9hrs)**

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: CELESTIAL BODIES   **(9hrs)**

Comets, Meteors, Asteroids Composition and structure of comets - Periodic comets - Salient features of asteroids, meteors and its use.

UNIT III: SOLAR SYSTEM   **(9hrs)**

Sun Structure of Photosphere, Chromosphere, Corona - Sunspots - Solar flares - Solar Prominences - solar piages - satellites of planets - Structure, Phases and their features of moon.

UNIT IV: STELLAR PHYSICS   **(9hrs)**

Life cycle of stars –Stars- Constellations - nebulae-red gaint-blue giant-Binary stars- H-R diagram-origin and types star clusters – Globular clusters - Types of variable stars - Types of galaxies.

UNIT V: ORIGIN UNIVERSE   **(9hrs)**

Origin of Universe- Big bang theory - Pulsating theory - Steady state theory - Composition of universe expansion.

Text Books:

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.

Reference Books:

1. Elements of Space Physics – R.P. Singhal,
2. Clayton D D, Principles of Stellar Evolution and Nucleo synthesis, University of Chicago Press (1983).
3. Chandrasekhar S, an Introduction to the Study of Stellar Structure, Dover Publications (1967).

Web Reference:

1. https://planetary-science.org/planetary-science-3/exploration-2/an-introduction-to-space-exploration/.
2. https://www.aero.iitb.ac.in/~ashokj/Course_3_Overview.pdf.
3. https://www.britannica.com/science/space-exploration.

B.Sc Physics