NEHRU MEMORIAL COLLEGE [AUTONOMOUS]
PUTHANAMPATTI – 621007

B.Sc., PHYSICS

SYLLABUS

UNDER CHOICE BASED CREDIT SYSTEM [CBCS]

[FOR THE CANDIDATES ADMITTED FROM THE YEAR 2019-2020 ONWARDS]

2019

Curriculum Framework for the year 2019-2020

B.Sc., PHYSICS

Programme Objectives:

The objectives of the undergraduate programme in Physics are designed to the students who will be able to succeed in obtaining employment appropriate to their interest in Physics. The degree course in Physics will make them productive and create a valuable professional. In addition, they will continue to develop professional skills through life-long learning. Additionally we inculcate inclination for higher education and to pursue research appropriate to the local needs. Exercise leadership qualities in a responsive, ethical, and innovative manner

Programme Specific Outcomes:

1. Read understands and interprets physical information by verbal, mathematical, and   graphical methods
2. Impart skills required to gather information from resources and use them.
3. Provide need based education in physics of the highest quality at the undergraduate   level.
4. Offer courses to the choice of the students.
5. Perform experiments and interpret the results of observation, including assessing   experimental uncertainties.
6. Provide an intellectually stimulating environment to develop skills and enthusiasms of   students to the best of their potential.
7. Use Information Communication Technology to gather knowledge at will.
8. Attract outstanding students from all backgrounds.

Programme Learning Outcomes
- Students will have a firm foundation in the fundamentals and application of current scientific theories in optics, nuclear physics, digital electronics, and computer programmes.
- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
- Students will be skilled in problems solving, critical thinking, and analytical reasoning as applied to scientific problems.

- Students will be able to clearly communicate the results of scientific work in oral written and electronic formats to both scientific community and to the public.
- Students will be able to explain how the physics concepts are helpful for addressing social, economic, and environmental problems.
- Students will be able to prepare themselves for employment in industries, government or to pursue graduate work toward such advanced degrees as the M.Sc., or Ph.D. in various areas of Physics

UG Programme-Physics

SEM	Part	Course Title	Sub Code	Hrs/ Week	Credit	Marks IA	Marks EA	Total
I	I	Tamil	19T101	6	3	25	75	100
	II	English	19H101	6	3	25	75	100
	III	CC-I-Mechanics	19P101	5	4	25	75	100
		CC-II Major Practical-I	19P102L	3	-	-	-	-
		AC-I-Allied Mathematics-I	19P103A	4	4	25	75	100
		AC-II-Allied Mathematics –II	19P104A	4	4	25	75	100
	IV	VE-Value Education	19VED	2	2	25	75	100
II	I	Tamil	19T202	6	3	25	75	100
	II	English	19H202	6	3	25	75	100
	III	CC-II*- Major Practical-I	19P102L	3	4	40	60	100
		CC-III- Properties of matter and sound	19P205	6	5	25	75	100
		AC-III- Allied Mathematics –III	19P206A	5	4	25	75	100
	IV	Environmental studies	19EVS	2	2	25	75	100
		SKBC-I- Testing of Electronic Components (Lab Only)	19XP21	2	2	25	75	100
III	I	Tamil	19T303	6	3	25	75	100
	II	English	19H303	6	3	25	75	100
	III	CC-IV-Thermal Physics	19P307	5	5	25	75	100
		CC-V*- Major Practical-II	19P308L	3	-	-	-	-
		AC-IV-Allied Chemistry-I	19P309A	5	4	25	75	100
		AC-V*-Allied Chemistry Practical	19P310L	3	-	-	-	-
	IV	SKBC-II-Mini Project	19XP32	2	2	25	75	100
	V	GENDER STUDIES	19GS	-	1	25	75	100
IV	I	Tamil	19T404	6	3	25	75	100
	II	English	19H404	6	3	25	75	100
	III	CC-V*- Major Practical-II	19P308L	3	4	40	60	100
		CC-VI-Optics	19P411	5	5	25	75	100
		AC-V*-Allied Chemistry Practical	19P310L	3	4	40	60	100
		AC-VI- Allied Chemistry-II	19P412A	5	4	25	75	100
	IV	NMEC-I Bio Physics	19P4N1	2	2	25	75	100
		Soft Skill Course	19SSC	0	2	25	75	100
V	III	CC-VII*- Major Practical-III	19P513L	3	-	-	-	-
		CC-VIII*- Major Practical IV	19P514L	3	-	-	-	-
		CC-IX- Electricity and Magnetism	19P515	6	5	25	75	100
		CC-X- Atomic and Nuclear Physics	19P516	5	4	25	75	100
		CC-XI- Fundamentals of Electronics	19P517	6	5	25	75	100
		EC-I – Select from EC-I list	19P518	5	5	25	75	100
		NMEC-II – Energy Physics	19P5N2	2	2	25	75	100
		CC-VII*- Major Practical-III	19P513L	3	5	40	60	100

VI	**III**	CC-VIII*- Major Practical IV	19P514L	3	5	40	60	100
		CC-XII-Quantum Mechanics and Relativity	19P619	6	5	25	75	100
		CC-XIII-Solid State Physics	19P620	6	5	25	75	100
		EC-II- Select from EC-II list	19P621	6	5	25	75	100
		EC-III- Select from EC-III list	19P622	6	5	25	75	100
	VI	EXTENSION ACTIVITIES	19EA		1			
		Grand total		**180**	**140**	**1025**	**2775**	**3800**

Extra credit courses (Offered by college)

1	Comprehensive	1	0 hours	4 credits
2	SKBC III	1	0 hours	2 credits
			Total Credits	146

Elective Courses

Elective course-I (19P518**)**
- (a) Programming in C
- (b) Python Programming

Elective course-II (19P621**)**
- (a) Digital electronics
- (b) Communication Electronics

Elective course-III (19P622**)**
- (a) Microprocessor and its applications
- (b) 8051 Microcontroller Architecture and programming

Part 1 Tamil - Proposed Course Structure under CBCS
(For the candidate admitted from the academic year 2019-2020 onwards)

Seme ster	Course	Course Title	Ins. Hrs/ Week	Cre dits	Ex am hrs	Int. Ma rks	Ext. Mar ks	Total
I	Language course 1 **(LC 1)**	செய்யுள் (இக்காலம்), சிறுகதை, பயன்முறைத் தமிழ், தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
II	Language course 2 **(LC 2)**	செய்யுள் (இடைக்காலம்), உரைநடை, தமிழ்ச் செம்மொழி வரலாறு, மொழிபெயர்ப்பியல், தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
III	Language course 3 **(LC 3)**	செய்யுள் (காப்பியங்கள்), கட்டுரை இலக்கியம், புதினம் , தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
IV	Language course 4 **(LC4)**	செய்யுள் (பழந்தமிழ் இலக்கியம்) நாடகம், தமிழ் இலக்கிய வரலாறு, கட்டுரை வரைவியல்	6	3	3	25	75	100
Total			**24**	**12**				**400**

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இளநிலைப் பட்டப் படிப்பு (கலையியல், அறிவியல், வணிகவியல் மற்றும் வணிக மேலாண்மையியல்)

முதலாமாண்டு : முதற்பருவம்

பகுதி 1 தமிழ் - தாள் 1

செய்யுள் (இக்காலம்), சிறுகதை, பயன்முறைத் தமிழ்,   தமிழ் இலக்கிய வரலாறு

பாட நோக்கம் (Course Objectives)

தன்னம்பிக்கை, பொறுப்புணர்வு, சமுதாய அக்கறை, மனித உறவுகளைப் போற்றுதல், சுற்றுச்சூழல் விழிப்புணர்வு, உலக அமைதி, அற உணர்ச்சி, தாய்மொழிப் பற்று முதலான இன்றைய இளம் தலைமுறையினருக்குத் தேவையான அடிப்படைப் பண்புகளைக் கற்பித்தல்.

இக்காலப் படைப்பிலக்கிய வகைமைகளை, படைப்பிலக்கியச் சூழல்களை, படைப்பாளர்களை அறிமுகம் செய்தல்.

பிழையின்றித் தமிழ் எழுதத் தேவையான அடிப்படைகளைக் கற்கச் செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

அலகு – 1

1. பாரதியார் பாடல்கள் – புதுமைப்பெண்   பா.எண்கள் 3,4,5,7,8

2. பாரதிதாசன் பாடல்கள் – எந்நாளோ

3. பெருஞ்சித்திரனார் – தமிழ் நெஞ்சம்

4. தமிழ் ஒளி – மழைக் காலம்

5. முருகுசுந்தரம் – சமுதாய தர்மம்

6. பொன்னடியான் – உள்ளம் உயர….

7. முடியரசன் – மொழியுணர்ச்சி

8. முத்துலிங்கம் – எது தேசியம்

9. தமிழேந்தி – தொண்டின் பழம்

10. தாரா பாரதி – வெறுங்கை என்பது

11. இன்குலாப் – கவலையும் கண்ணீரும் நம்முடன் இருக்கட்டும்   12. நா.காமராசன் - காகிதப்பூக்கள்   13. ஈரோடு தமிழன்பன் – இப்போது நினைந்து

14. தேவதேவன் – நுனிக்கொம்பர் நாரைகள்

15. காசி ஆனந்தன் – தமிழ் மண் வளம்

அலகு – 2

1. அப்துல் ரகுமான்   - ஆறாத அறிவு

2. தணிகைச்செல்வன்   - சுகம் எங்கே

3. மீரா - உழவன்

4. மு.மேத்தா – கண்ணீரின் கதை

5. சிற்பி - தம்பி உனக்காக

6. வைரமுத்து – கூடு

7. அறிவுமதி - வலி

8. பழநிபாரதி – கண்ணில் தெரியுது வானம், இரத்தத்தின் நிறம் பச்சை

9. பிச்சினிக்காடு இளங்கோ – பகல் நீ, தஸ்லிமா நஸ்ரின் வாழ்த்துகள், ஆசைகள்   10. இளம்பிறை – மகளிர் நாள்   11. சக்தி ஜோதி -

நிலவென்று சொல்லாதே, பெண்

12. பாவலர் வையவன் – முறிந்த சிறகு, பாதை மறந்த போதை

13. தாமரை – என்னையும் அழைத்துப் போ, ஒரு கதவும் கொஞ்சம்
    கள்ளிப்பாலும்

14. ந.வீ.விசயபாரதி - தன்னம்பிக்கைத் தாமரைகள், புன்னகை மந்திரம்,
    அன்புள்ள அம்மா

15. அ.வெண்ணிலா - ஆதியில் சொற்கள் இருந்தன

அலகு : 3

சிறுகதை – சிறுகதை மலர்

அலகு : 4

பயன்முறைத் தமிழ்
பிழைகளும், திருத்தங்களும் - வலிமிகுதல், வலி மிகாமை,
மயங்கொலி எழுத்துகளின் வேறுபாடுகள் - தமிழில் பிறமொழிச்
சொற்கள்

அலகு : 5

தமிழ் இலக்கிய வரலாறு – இக்காலம்

கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் வாழ்வியல் கூறுகளை அறிந்துகொள்வதோடு,
நற்பண்புகளை வளர்த்துக்கொள்வர்.
இன்றைய இலக்கியப் படைப்புச் சூழலை அறிந்து கொள்வதால்
படைப்பிலக்கியவாதிகளாகும் ஆற்றல் பெறுவர்.
சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.
தாய்மொழியில் திறன் பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாட நூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.

2. சிறுகதை மலர் - பிரமி பதிப்பகம், திருச்சி-21.

3. பயன்பாட்டுத் தமிழ் (இலக்கணக் கையேடு), தமிழ் நாதன் பதிப்பகம், சென்னை - 110.

4. தமிழ் இலக்கிய வரலாறு,

   முனைவர் கோ.பாக்கியவதி, முனைவர் க.சுந்தரபாண்டியன்,

   பிரமி பதிப்பகம், திருச்சி-21.

B.A/B.SC/B.COM/ BCA/BBA PART II ENGLISH COURSE PATTERN (FROM 2019-2020)

Sem.	Course	Course Title	Hrs / Week	Credits	MAX.MARKS		
					Int.	Ext.	Total
I	Core Course I	English For Communication I	6	3	25	75	100
	Core Course II	English For Communication II	6	3	25	75	100
	Core Course III	English For Communication III	6	3	25	75	100
	Core Course IV	English For Communication IV	6	3	25	75	100
		TOTAL	24	12	200	300	400

Programme Educational objectives (PEO)

Programme Educational Objectives are broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve. PEO's are measured 4-5 years after graduation. The PEO is measured through employer satisfaction survey (yearly), alumni survey and placement records.

PEO 1: Learners will participate in critical conversations and prepare, organize, and deliver their work to the public

PEO 2: They will appreciate the literary works.

PEO 3: The Graduates will attain phonological and morphological aspects of English.

PEO 4: Learners can express a thorough command of English and its linguistic structures.

Program Outcome (PO)

The POs are narrower statements that describe what the students are expected to know and be able to do by the time of graduation. POs are based on relevance.

PO 1 Become knowledgeable in the subject of English for Communication and apply the principles of the same to the needs of the Employer/Institution/Enterprise/ Society.

PO 2: Gain Analytical skills in the field/area of English for Communication.

PO 3: Understand and appreciate professional ethics, community living and Nation Building initiatives.

PO 4: Develop language learning skills like Listening, Speaking, Reading and Writing.

PO 5: Making the Learners to realize their own Identity.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSOs are Statement that describe what the graduates of a specific educational

Programme should be able to

PSO1: Design solution to overcome Communication Problems.

PSO 2: Apply Ethical Principles and Commit to Professional Ethics and Responsibilities.

PSO 3: Recognize the need of Extensive Reading Skills.

PSO 4: function as a team and an individual member amicably with other co-workers.

PSO 5: Use English effectively in formal and informal situations.

PSO 6: Develop vocabulary and communicative skills.

Course Code & Title	**ENGLISH FOR COMMUNICATION - I**		
Class	**I YEAR**	**Semester**	**I**
Cognitive Level	**K – 1 Acquire** **K – 2 Understand** **K – 3 Apply** **K – 4 Evaluate** **K – 5 Analyze**		
Course Objectives	**The Course aims** • **To expose students to effective communication in the form**		

of prose

- **To make the learners aware of social issues**

- **To help them to know great personalities**

- **To make them aware of dangers from human carelessness**

- **To help them realize the need for honesty**

UNIT	Content	No. of Hours
I	1.Spoken English and Broken English: G.B.Shaw 2. Give us a Role Model : Dr. A.P. J. Abdul Kalam	
II	Water-The Elixir of Life : Sir C. V. Raman No Guarantee Please No Longer : A Newspaper Article	
III	I have a Dream : Martin Luther King Jr. The Gettysburg Address : Abraham Lincoln	
IV	Mosquitoes : Article Polluting the World :Article	
V	A Little Incident : Lu Hsun Jimmy Valentine : O. Henry	
	GRAMMAR: 1. Articles 2. Preposition 3. Adjective 4. Adverb	
Reference	Lessons will be edited and compiled.	
Course Outcomes	On completion of the course, students should be able to CO 1: communicate effectively CO 2: aware of social issues CO 3: know great personalities. CO 4: aware of dangers from human carelessness. CO 5: know the need for honesty	

Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6

CO1	S	M	S	M	M	M	S	S	M	M	S
CO2	S	M	M	M	M	S	M	S	M	M	M
CO3	S	M	S	M	M	M	S	S	M	M	S
CO4	S	M	M	M	M	S	M	S	M	M	M
CO5	S	M	S	M	M	M	S	S	M	M	S

Strongly Correlating(S)   -   3 marks

Moderately Correlating (M)   -   2 marks

Weakly Correlating (W)   -   1 mark

No Correlation (N)   -   0 mark

Semester	I	CC-I MECHANICS	Hours	5
Course Code	19P101		Credit	5

Learning Objectives
- To learn the basics of projectiles.
- To understand and find the Moment of Inertia of various bodies
- To study the working of different pendulums and Gyroscopic Motion
- To learn principles and applications of hydrostatics and hydrodynamics
- To know the basics of gravitation.

UNIT – I PROJECTILE
Vertical motion under gravity – motion of a particle projected horizontally from a point above the earth - motion of a projectile - path of the projectile is a parabola – expression for time of flight, range and height of the projectile – range of a projectile on a plane inclined to the surface of the earth.
Impulse of a force – laws of impact – direct and oblique impact of two smooth spheres – loss of kinetic energy due to direct and oblique impacts.

UNIT – II MOMENT OF INERTIA
Expression for moment of inertia – radius of gyration (k) – parallel and perpendicular axes theorems – moment of inertia of rectangular lamina, circular ring, circular lamina, solid sphere, solid cylinder and spherical shell – angular moment and angular impulse – laws of conservation of angular momentum - kinetic energy of rotation – acceleration of a body rolling down in an inclined plane.

UNIT – III RIGID BODY
Center of mass of a system of particles – Motion of two particles under their mutual action – Reduced mass – Theory of Compound Pendulum – Equivalent Simple Pendulum – Reversibility of center of oscillation and suspension - Determination of acceleration due to gravity (g) and radius of gyration (k) of a bar pendulum.
Gyroscopic Motion (qualitative study): Gyroscopic Precession – Gyroscopic Top – Spinning Top.

UNIT – IV HYDROSTATICS AND HYDRODYNAMICS

Expression for centre of pressure – centre of pressure of vertical rectangular lamina, vertical triangular lamina– change of centre of pressure with depth – equilibrium of floating bodies – stability of equilibrium – determination of metacentric height of a ship- atmospheric pressure and its variation with altitude.

Hydrodynamics: equation for continuity of flow – energy of liquid in motion – Torricelli's theorem – Bernoulli's theorem – venturimeter.

UNIT – V GRAVITAION

Kepler's laws of planetary motions – Newton's law of Gravitation – Boy's method of determination of G – Gravitational potential and field due to solid sphere and spherical shell -Variation of g with latitude, altitude, and depth – Escape velocity of the Earth and Solar System.

Student Task: (Not for Examination)

- Fabrication of working model of bifilar pendulum & determination of 'g' using it.
- Model preparation for Gyroscope & demonstration
- Atmospheric pressure determination at the Laboratory

Learning Outcome:

- Students can realize the motion of an object in gravitational field.
- They will be able to understand the role of moment of inertia of an object in its rotational motion.
- The gravitational force and its influence in our everyday life could be understood.

Book for Study

1. M. Narayanamurti and N. Nagarathnam, "Dynamics", National Publishing Company, Madras (2004).
2. R. Murugesan, Properties of Matter and Acoustics, S. Chand & Co., NewDelhi (2012)

Books for Reference:

1. D. S. Mathur, "Mechanics", S. Chand & Company Ltd., New Delhi (2003)
2. An Introduction to Mechanics (SIE) Paperback – 1 Jul 2017 by David Kleppner , Robert Kolenkow
3. Mechanics -Jan 1979 by P. Duraipandian , Laxmi Duraipandian, Muthamizh Jayapragasam
4. University Physics With Modern Physics, Hugh D. Young, Edition 14, 2017

இளநிலைப் பட்டப் படிப்பு (கலையியல், அறிவியல், வணிகவியல் மற்றும் வணிக மேலாண்மையியல்)

Seme ster	Course	Course Title	Ins. Hrs/ Week	Cre dits	Ex am hrs	Int. Ma rks	Ext. Marks	Total
I	Value Education (VE)	வாழ்வியல் கல்வியும் மனித உரிமைகளும் (Value Education and Human Rights)	2	1	3	-	100	100

முதலாமாண்டு : முதற்பருவம்

வாழ்வியல் கல்வியும் மனித உரிமைகளும்

(**Value Education and Human Rights)**

பாட நோக்கம் (Course Objectives)

தனித்திறன் மேம்பாடு, தன்னம்பிக்கை, நாட்டுப்பற்று, சமுதாயப் பொறுப்புணர்வு, மனித உறவுகளைப் போற்றும் பண்பு, அறச்சிந்தனை முதலான இன்றைய இளம் தலைமுறையினருக்குத் தேவையான அடிப்படை வாழ்வியல் பண்புகளைக் கற்பித்தல்.

கவலை, சினம், பொறாமை,சோம்பல் முதலான தீமை தரும் பண்புகளை விலக்கச் செய்தல்.உடல்நலத்தில் அக்கறை கொள்ளச் செய்தல்.

மனித உரிமைகளை அறியச் செய்தல்.

அலகு :1

வாழ்வியல் கல்வி : திறன் மேம்பாடும் உயர் பண்புகளும்

கல்வி, வாழ்வியல் கல்வியின் நோக்கம் - வாழ்வியல் கல்வியின் பரிணாம வளர்ச்சி - வாழ்வியல் கல்வியின் கூறுகள் - சுய முன்னேற்றம் - திறன் மேம்பாடு - உயர்பண்புகள் - தன்மதிப்பீடும் சுயபரிசோதனையும் - பாலினச் சமத்துவத்தை உளமாரப் பின்பற்றுதல் - மாற்றுத் திறனாளிகள், மனவளம் குன்றியோர், வயதில் பெரியவர்கள், அனுபவசாலிகள், சான்றோர்கள், குடும்ப உறுப்பினர்கள், அருகில்

வசிப்பவர்கள், சுற்றத்தார், உடன் பணியாற்றுவோர் இவர்களுக்கு மதிப்பளித்தல் - நற்பண்புகளும் நடத்தை உருவாக்கமும் - உண்மை - ஆக்கத்திறன் - தியாகம் - நேர்மை - கட்டுப்பாடு - உதவி செய்யும் மனப்பான்மை- சகிப்புத்தன்மை - அறிவியல் கண்ணோட்டம்

அலகு : 2

தேசிய, உலக முன்னேற்றத்திற்கான வாழ்வியல் கல்வி

தேசம், சர்வ தேசங்கள் குறித்த எண்ணங்கள் - நமது நாடு - அரசமைப்பு - மக்காளாட்சித் தத்துவம் - சமதர்மம் - மதச்சார்பின்மை - சமத்துவம் - சமூக நீதி, தனியுரிமை - சுதந்திரமும் சகோதரத்துவமும் சமூகப் பண்புகள் - இரக்கம் மற்றும் நேர்மை, சுயகட்டுப்பாடு, உலகளாவிய சகோதரத்துவம் - தொழில் சார் பண்புகள் - அறிவு வேட்கை - தொழிலில் நேர்மை - முறைமை - காலந்தவறாமையும் நம்பிக்கையும் - மதம் சார்ந்த பண்புகள் - சகிப்புத்தன்மை, மெய்யறிவு, நன்னடத்தை - அழகியல் பண்புகள் - இலக்கியம், நுண்கலைகள் ஆகியவற்றைப் பயில்தல், சுவைத்தல், மனதாரப் பாராட்டுதல் மதித்தல், பாதுகாத்தல், தேசிய ஒருமைப்பாடும் சர்வதேசப் புரிதலும்.

அலகு : 3

அறப்பண்புகள் மற்றும் வாழ்வியலில் உலகளாவிய பெருவளர்ச்சிகள் ஏற்படுத்தும் தாக்கங்கள்

அறிவியல் வளர்ச்சியின் தாக்கங்கள் - பன்பண்பாட்டு முரண்பாடுகளின் தாக்கங்கள் - பொருளியல் சிந்தனைகள் - மக்கள் தொடர்புச் சாதனங்கள் - இளமை உணர்ச்சி வேக நடத்தையின் நவீன அறைகூவல்கள் - இல்லறமும் நல்லுணர்வும் - ஒப்பீடும் போட்டி இடுதலும் - நேர்மறை, எதிர்மறை எண்ணங்கள் - அகந்தை - சினம் - சுயநலம் - அறைகூவல்கள்

அலகு : 4

உடல், உள்ள நலமும்

நோய் தீர்க்கும் செயல்பாடுகளும் உணவுப் பழக்கமும் உணவு முறைகளும் - பொருந்தும் உணவுகள் - பொருந்தா உணவுகள் - மனக் கட்டுப்பாடு - மனத்திண்மை - எளிய உடற்பயிற்சி - தியானம் - மனம், ஆன்மா சார்ந்த விளைவுகள் - யோகா - நோக்கங்கள் - வகைகள் - முறைகள் - ஆசனங்கள் - ஆசைகளை ஒழுங்குபடுத்துதல் - கவலை நீக்குதல் - சினம் தணிதல் - நெடுநீர், மறதி, சோம்பல் தவிர்த்தல் - தூக்கம் முறைப்படுத்துதல் - துக்கம், இழப்புகளை எதிர்கொள்ளல் - புகை, மது முதலானவைகளின் தீங்கு உணர்தல்- வாழ்த்துகளின் பயன்கள்

குறிப்பு : இந்த அலகு உடற்பயிற்சி : தியானம் - யோகா செய்முறைப் பயற்சிகளுடன் கூடியது.

அலகு : 5

மனித உரிமை, மனித உரிமைக் கருத்துகள்

தேசிய மற்றும் பன்னாட்டுக் கண்ணோட்டங்கள் - மனித உரிமையின் பரிணாமம் - மனித உரிமையின் பரந்த வகைப்பாடுகள் வாழ்தற்கான உரிமை, சுதந்திரம், கண்ணியத்துடன் வாழ்வதற்கான உரிமைகள் - கலாச்சாரம் மற்றும் கல்விக்கான உரிமைகள் - பொருளாதார உரிமைகள் - அரசியல் உரிமைகள் - சமூக உரிமைகள் - பெண்கள் மற்றும் குழந்தைகளின் மனித உரிமை - சமூகப் பழக்கங்களும் அரசியலமைப்புப் பாதுகாப்புகளும்.

கற்றல் விளைவுகள் (Course OutCome)

மாணவர்கள் வாழ்வியல் கூறுகளை அறிந்துகொள்வதோடு நற்பண்புகளை வளர்த்துக்கொள்வர். தீமை தரும் பண்புகளை அறிந்து அவற்றிலிருந்து தம்மைக் காத்துக்கொள்வர்.

உடல்நலத்தில் அக்கறை கொள்வர்.
மனித உரிமைகளை அறிந்து கொள்வர்.

பாடநூல்

வாழ்வியல் கல்வியும் மனித உரிமைகளும்,
தமிழ்த்துறை வெளியீடு,
நேரு நினைவுக் கல்லூரி, புத்தனாம்பட்டி.

முதலாமாண்டு : இரண்டாம் பருவம்

பகுதி 1 தமிழ் - தாள் 2

செய்யுள் (இடைக்காலம்), உரைநடை, தமிழ்ச் செம்மொழி வரலாறு,
மொழிபெயர்ப்பியல், தமிழ் இலக்கிய வரலாறு

பாட நோக்கம் (Course Objectives)

பக்தி இலக்கியம், சிற்றிலக்கியங்களை அறிமுகம் செய்தல்.

இக்காலத் தமிழ் உரைநடையை அறிமுகம் செய்தல்.

தமிழ்ச் செம்மொழி வரலாற்றைக் கற்கச் செய்தல்.

ஆங்கிலச் சொற்களுக்கு இணையான தமிழ்ச்சொற்களைப் பயன்பாட்டு முறையில் அறியச்செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

அலகு – 1 இடைக்கால இலக்கியங்கள்

1.தேவாரம் - திருநாவுக்கரசர் தேவாரம்

திருவையாற்றுப் பதிகம் - 3 பாடல்கள்

1. ஏருமதிக் கண்ணி யானை . . . . (பா.எண் -5)

2. விரும்பு மதிக் கண்ணி யானை .. . . . . (பா.எண் -8)

3. திங்கள் மதிக் கண்ணி யானை . . . . . (பா.எண் -10)

தனித்திருத் தாண்டகம் - 4 பாடல்கள்

1. முடிகொண்டார் முளையிளவெண் . . . . (பா.எண் -3)

2. பொக்கணமும் புலித்தோலும் . . . . . (பா.எண் -4)

3. அணிதில்லை அம்பலமா . . . . . . (பா.எண் -7)

4. கடையொன்றிற் கங்கையையுந் . . . . . (பா.எண் -10)

2.திருவாசகம் - திருப்பூ வல்லி - 3 பாடல்கள்

1. எந்தை யெந்தாய் சுற்றம் . . . . . (பா.எண் -276)

2. தேனாடு கொன்றை . . . . (பா.எண் -279)

3. வானவன் மாலயன் . . . . (பா.எண் 286)

திருச்சதகம் – 4 பாடல்கள்

1. மெய்தான் அரும்பி . . . . . (பா.எண் -5)

2. நாடகத்தா லுன்னடியார் . . . . (பா.எண் -15)

3. ஆமாறுன் திருவடிக்கே . . . . (பா.எண் -18)

4. வானாது மண்ணாது . . . . . (பா.எண் -19)

3.திருமந்திரம் - 10 பாடல்கள்

1. நான் பெற்ற இன்பம் பெறுக . . . . . (பா.எண் -85)

2. அன்பும் சிவமும் இரண்டென்ப . . . . . . (பா.எண் -270)

3. என்பே விறகா இறைச்சி . . . . (பா.எண் -272)

4. நிற்கின்ற போதே . . . . . (பா.எண் -292)

5. கல்லாத மூடரைக் காணவும் . . . . . . (பா.எண் -317)

6. உள்ளத்தின் உள்ளே   . . . . . . (பா.எண் -509)

7. உள்ளம் பெருங்கோயில்   . . . . . (பா.எண் -823)

8. உடம்பினை யானிருந்து   . . . . . (பா.எண் -725)

9. ஒன்றே குலம் ஒருவனே தேவனும் . . . . . (பா.எண் -2103)

1□. அறிவுக்கு அழிவில்லை   . . . . . . (பா.எண் 2358)

4.நாலாயிரத் திவ்ய பிரபந்தம் - 10 பாடல்கள்

 குலசேகர ஆழ்வார் - பெருமாள் திருமொழி - நான்காம் திருமொழி

திருவேங்கடத்தில் இருத்தலும் போதியது எனல்

1. ஊனேறு செல்வத்து பா.எண் 677

2. ஆனாத செல்வத்து பா.எண்   678

3. ஒண்பவள வேலை பா.எண்   680

4. மின்னனைய நுண்ணியர் பா. எண் 682

5. வான்ஆளும் மாமதிபோல் பா.எண் 683

வித்துவக்கோட்டு அம்மானை வேண்டி நிற்றல்

1. தருதுயரம் தடாயேல் பா.எண் 688

2. கண்டார் பா.எண் 689

3. மீன் நோக்கும் பா.எண் 690

4. வாளால் அறுத்து பா.எண் 691

5. வெங்களத்தின் பா.எண் 692

5.இயேசு காவியம் - மலைப்பொழிவு

6.தீன் குறள் - இரு அதிகாரங்கள் – நல்லிணக்கம், வரன் தட்சணை

7. கலிங்கத்துப் பரணி - களம் பாடியது - 10 பாடல்கள்

1. தேவாசுரம், இராமாயணம் . . . . . (பா.எண் -473)

2. உடலின் மேல் பல காயம் . . . . . (பா.எண் -476)

3. நெடுங்குதிரை மிசைக் கலணை . . . . . (பா.எண் -477)

4. விருந்தினமும் வறியவரும் . . . . . (பா.எண் -478)

5. மா மழைபோல் பொழிகின்ற   . . . . . (பா.எண் -480)

6. தன் கணவருடன் தாழும் . . . . . . (பா.எண் -482)

7. வாய் மடித்துக் கிடந்ததலை . . . . . (பா.எண் -483)

8. பொரு தடக்கை வாள் எங்கே . . . . . (பா.எண் -485)

9. ஆடல் துரங்கம் பிடித்து . . . . . (பா.எண் -486)

10.   சாதுரங்கத் தலைவனைப் போர்க் களத்தில் . . . (பா.எண்-502)

8. குற்றாலக் குறவஞ்சி - குறத்தி கூறும் நாட்டு வளம் - 5 பாடல்கள்

1. சூழ மேதி இலங்குந் துறையில் . . . . (பா.எண் -3)

2. தக்க பூமிக்கு முன்புள்ள நாடு . . . . . . (பா.எண் -5)

3. அஞ்சுநூறு மகம்கொண்ட நாடு . . . . . (பா.எண் -6)

4. மாதம் மூன்றும் மழையுள்ள நாடு . . . . . . (பா.எண் -7)

5. நீங்கக் காண்பது சேர்ந்தவர் பாவம் . . . . . (பா.எண் -8)

9. தமிழ் விடுதூது   - 110 -120 கண்ணிகள்

அலகு : 2

உரைநடை - காற்றின் கையெழுத்து - பழநிபாரதி

அலகு - 3

தமிழ்ச் செம்மொழி வரலாறு

செம்மொழி விளக்கம் - செம்மொழி வரலாறு - உலகச் செம்மொழிகள் - இந்தியச் செம்மொழிகள் - செம்மொழிக்கான தகுதிகள் அல்லது செம்மொழிப் பண்புகள் - தமிழ்ச் செம்மொழி நூல்கள்.

அலகு - 4

மொழிபெயர்ப்பியல் - ஒரு மடல்(கடிதம்) , ஒரு பத்தி ஆங்கிலத்திலிருந்து தமிழில் மொழிபெயர்த்தல்.

அலகு - 5

தமிழ் இலக்கிய வரலாறு - இடைக்காலம்

கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் ஆன்மீகச் சிந்தனையுடன் கூடிய நற்பண்புகளை வளர்த்துக்கொள்வர்.

இடைக்கால இலக்கியப் படைப்புச் சூழலை அறிந்து கொள்வதால் இலக்கிய வரலாற்று அறிவு பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

தாய்மொழியில் திறன் பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாட நூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.

2. தமிழ்ச் சொம்மொழி வரலாறு, முனைவர் மு.சாதிக்பாட்சா, இராஜா பப்ளிகேசன், திருச்சி-23.

3. மொழிபெயர்ப்புகள் (கடிதங்களும் பத்திகளும்) மகிழினி பதிப்பகம், சென்னை- 106.

4. தமிழ் இலக்கிய வரலாறு -பிரமி பதிப்பகம், திருச்சி-21.

5. காற்றின் கையெழுத்து, பழநிபாரதி, தமிழ்நாதன் பதிப்பகம், சென்னை.

Course Code & Title	ENGLISH FOR COMMUNICATION – II		
Class	**I YEAR**	Semester	**II**
Cognitive Level	K – 1 Acquire K – 2 Understand		

	K – 3 Apply **K – 4 Evaluate** **K – 5 Analyze**
Course Objectives	**The Course aims** **To expose students to the wisdom of great men** **To familiarize students with the danger of modern food and entertainment** **To make them realize to treat all equally** **To make them know to use science carefully** **To make them understand the need to help others**

UNIT	Content	No. of Hours
I	It is Personality that matters : Swami Vivekananda Pele	
II	Fun Food Keep Television at Arm's length	
III	Women not the weaker sex : M.K. Gandhi A Tree Speaks : C. Rajagopalachary	
IV	The Despair of the Ganges : A. Damodharan The Fukushima- Nuclear Disaster :	
V	The Verger : William Somerset Maugham The Selfish Giant : Oscar Wilde	
Reference	Lessons will be edited and compiled.	
Course Outcomes	On completion of the course, students should be able to CO 1: Know the wisdom of great men. CO 2: know the dangers in modern life. CO 3: accept to treat all equally CO 4:realize the need to use science carefully. CO 5: understand the need to help others.	

Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	M	M	M	S	M	S	M	M	M

CO2	S	M	S	M	M	M	S	S	M	M	S
CO3	S	M	M	M	M	S	M	S	M	M	M
CO4	S	M	S	M	M	M	S	S	M	M	S
CO5	S	M	M	M	M	S	M	S	M	M	M

Strongly Correlating(S)   -   3 marks

Moderately Correlating (M)   -   2 marks

Weakly Correlating (W)   -   1 mark

No Correlation (N)   -   0 mark

Semester	**II**	**CC-II**	**Hours**	**3**
		MAJOR PRACTICAL-I		
Course Code	**19P102L**		**Credit**	**4**

Learning Objectives:
- This laboratory course helps the students to use telescope and microscope.
- Also to understand the thermal behavior of solids and liquids.
- This course helps them to observe various physical parameters like frequency, time and focal length.

(Any 12 Experiments)

1. Determination of Young's Modulus of the material of the bar by uniform bending method – Optic lever
2. Determination of Young's Modulus of the material of the bar by non-uniform bending method using Pin and Microscope
3. Determination of surface tension of the given liquid– Capillary rise method
4. Verification of laws of vibration of stretched string- Sonometer
5. Determination of frequency of the tuning fork by Melde's string experiment- Longitudinal and Transverse modes
6. Specific heat capacity of the given liquid – Newton's law of cooling method
7. Coefficient of thermal conductivity of a bad conductor by Lee's disc method
8. Determination of focal length of the given long focus convex lens – f, R and C
9. Determination of focal length of the given long focus concave lens – f, R and C
10. Determination of resistance of the given coil using) Metre bridge (series and parallel)
11. Determination of acceleration due to gravity and radius of gyration using

compound pendulum

12. Determination of radius of curvature of the given lens by Newton's rings method

13. Determination of wavelength of monochromatic source by Newton's rings method

14. Determination of Young's Modulus of the material of the bar by cantilever arrangement – scale and telescope

15. Determination of refractive index of the material of the solid prism using spectrometer

16. Determination of Thickness of a given wire by air wedge method-using Pin and Microscope

Learning Outcome:

On successful completion of this laboratory course the students are able to

- Use effectively optical instruments like microscope and telescope.

- Also they would develop the skill of taking the readings in experiments for heat, sound, light.

- Student will get the knowledge on determining various constants and presentation skill in the form of record note submission.

Semester	II	CC-III	Hours	6
Course Code	19P205	**PROPERTIES OF MATTER AND SOUND**	Credit	4

Learning Objectives
- To learn the basics of Elastic behavior of solids.

- To understand the importance in beams
- To study the phenomena of viscosity, surface tension and the various methods to determine the parameters experimentally
- To understand the concepts of SHM and reverberation.
- To learn the methods of production of ultrasonic waves and its applications

UNIT – I ELASTICITY

Stress – Strain diagram – Elastic Moduli – Work done per unit volume strain –Relation between the elastic constants – Poisson's ratio – Expression for Poisson's ratio in terms of elastic constants–Twisting couple on a cylinder – Work done in twisting a wire – Torsional Pendulum–Determination of Rigidity modulus –Searle's static torsion apparatus.

UNIT – II BENDING OF BEAMS

Expression for bending moment – cantilever: Expression for depression– Experiment to find Young's Modulus –Non-uniform bending – Expression for depression –Experiment to find Young's modulus using microscope – Uniform bending –Expression for elevation – Experiment to find Young's modulus using microscope.

UNIT –III SURFACE TENSION

Surface Tension: Definition and dimension – molecular theory - Excess of pressure over curved liquid surface –Synclastic and anti Clastic surface – Force between two places separated by a thin layer of liquid – Experimental determination of surface tension – Jaeger's method –Variation of surface tension with temperature. Lubricants: properties and applications

UNIT – IV VISCOSITY

Streamlined and turbulent motion – Coefficient of viscosity and its dimension – Rate of flow of a liquid – Poiseuille's formula – Experimental determination of viscosity – comparison of viscosities by burette method- Motion in a viscous medium – Stokes formula – Viscosity of highly viscous liquid

UNIT – V SOUND

Equation of SHM–Period–Velocity–Energy–Composition of two SHMs along the same straight line and at right angles–Lissajous figures. Laws of Transverse waves in strings – Verification – Melde's experiment.

Reverberation – Sabine's Reverberation formula –Measurement of reverberation time – Ultrasonics – Production: Piezo-electric method, properties and uses of ultrasonics.

Student Task: (Not for Examination)

- Collect Young modulus values for different materials and in different sizes
- Determination of viscosity of lubricants available in the market for motor vehicles
- Model to demonstrate the formation of Lissajous figures with sand funnel.
- Production of ultrasonic with cell phone Piezo-buzzer in a computer for mosquito repeller

Learning Outcome:

- The students gain the knowledge on elastic behavior of solids.
- Students are able to apply their knowledge on elastic properties to beams. Students are able to evaluate the behavior of liquids with respect to surface tension and viscosity.
- Students gain the knowledge on SHM, reverberation.
- The students could know the technique of the production and uses of ultrasonic.

Book for Study
1. R. Murugesan, Sivaprasath, Properties of Matter and Acoustics, S. Chand & Co., NewDelhi.

Books for Reference
1. D. S. Mathur, Properties of Matter, S. Chand & Co., New Delhi.
2. Brijlal, Subramanyam, Properties of Matter, S. Chand & Co., New Delhi.

இரண்டாமாண்டு : மூன்றாம் பருவம்

பகுதி 1 தமிழ் - தாள் 3

செய்யுள் (காப்பியங்கள்), கட்டுரை இலக்கியம், புதினம், தமிழ் இலக்கிய வரலாறு

பாட நோக்கம் (Course Objectives)

பண்டைத் தமிழரின் அரசியல் நேர்மை, குடிமக்களின் உரிமை, குடிமக்களின் பொறுப்புணர்வு, அறச்சிந்தனைகளை அறியச்செய்தல்.

நேர்மை, பிறருக்கு உதவும் பண்பு, நன்னெறிகளைப் பின்பற்றுதல் முதலான வாழ்வியல் பண்புகளை வளர்த்தல்.

வாழ்வின் எல்லா நிலைகளிலும் திறம்படச் செயலாற்றக் கற்றுத்தருதல்.

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பெண்களை மதிக்கச் செய்தல், சொல்லாடல் திறன் வளர்த்துக்கொள்ள உதவுதல்.

மிகச் சிறந்த தமிழ் உரைநடைகளை அறிமுகம் செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

அலகு - 1

1. சிலப்பதிகாரம் : வழக்குரை காதை

2. மணிமேகலை : சிறைக்கோட்டத்தை அறக்கோட்டம் ஆக்கிய காதை 3. கம்பராமாயணம் - வாலி வதைப் படலம் – 106 பாடல்கள்

அலகு - 2

1. வில்லிபாரதம் : கன்னபருவம் – பதினேழாம் போர்ச்சருக்கம்- 104பா-ள் 2. சீறாப் புராணம் : மானுக்குப் பிணைநின்ற படலம் - 30 பாடல்கள்

3. தேம்பாவணி - வளன் சனித்த படலம் - 30 பாடல்கள்

4. இராவண காவியம் : இலங்கைக் காண்டம்-அரசியற்படலம் –40 பா-ள்

அலகு : 3 கட்டுரை இலக்கியம் - 'கட்டுரை இலக்கியம்' , பிரமி பதிப்பகம் .

அலகு : 4 புதினம் - வேரில் பழுத்த பலா, சு.சமுத்திரம்

அலகு : 5

தமிழ் இலக்கிய வரலாறு - காப்பிய காலம்

கற்றல் விளைவுகள் (Course Out Come)

மாணவர்கள் நேர்மைப் பண்பு, துணிவுடைமை, சமுதாய அக்கறை உள்ளவர்களாக வளம்பெறுவர்.
இல்லற வாழ்வில் பெண்களை மதித்தல் வேண்டும் என்ற உணர்வு பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

நல்ல தமிழ் உரைநடையில் பயிற்சி பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாடநூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. கட்டுரை இலக்கியம் - பிரமி பதிப்பகம், திருச்சி-21.
3. வேரில் பழுத்த பலா, சு.சமுத்திரம் என்.சி.பி.எச்.வெளியீடு, சென்னை.

தமிழ் இலக்கிய வரலாறு – பிரமி பதிப்பகம், திருச்சி-21.

Course Code & Title	ENGLISH FOR COMMUNICATION III		
Class	**II YEAR**	Semester	**III**
Cognitive Level	**K – 1 Acquire** **K – 2 Understand** **K – 3 Apply** **K – 4 Evaluate** **K – 5 Analyze**		

Course Objectives	**The Course aims**
	  • **To expose students to vocabulary**
	
	  • **To familiarize students with different levels of meaning.**
	
	  • **To help them to think logically**
	
	  • **To read and analyze a passage**
	
	  • **To make them competent to face an interview**		

UNIT	Content		No. of Hours
I	1. Synonyms : 100 2. Antonyms : 100 3. Words that Confuse : 50 4. Single Word Substitution : 100		
II	5. Phrasal verbs : 50 6.Idioms : 50		
III	7. Errors and How to avoid them :100 8. Spotting Errors :100 9. Jumbled Sentences :25		

IV	10. Reading Comprehension : 15 11. Dialogue Writing : 20	
V	12. Letter Writing (Application, Business& Complaints): 15 13. Report Writing : 10 14.Interview Skills 15. Group Discussion	
Reference	Lessons will be edited and compiled.	
Course Outcomes	On completion of the course, students should be able to CO 1: use words correctly. CO 2: understand different levels of meaning. CO 3: think logically. CO 4: analyze a passage. CO 5: face an interview successfully	

Mapping of COs with PSOs & POs:

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

Strongly Correlating(S)   -   3 marks

Moderately Correlating (M)   -   2 marks

Weakly Correlating (W)   -   1 mark

No Correlation (N)   -   0 mark

Semester	III	CC-IV THERMAL PHYSICS	Hours	5
Course Code	19P307		Credit	5

Learning Objectives:

- On successful completion of the course, the students will gain the knowledge of Kinetic theory of gases, thermodynamics and probability concepts
- To learn how to apply thermodynamic principles in order to interpret thermodynamic systems and predict their behaviors.
- To understand the principles of low temperature physics and radiation.
- To get the basic knowledge on heat flow through different media.
- To become familiar with the use of simple statistical mechanical models to predict thermodynamic properties.

Unit-1 KINETIC THEORY OF GASES

Three states of matter – concept of ideal or perfect gas – postulates of kinetic theory of gases -Expression for the pressure exerted by a gas-Deduction of Boyles Law-Kinetic energy per unit volume of gas- derivation of ideal gas equation – derivation of gas Laws-Degrees of freedom–Maxwell's law of equipartition of energy – van der Waal's equation of state–Estimation of critical constant–Joule Thomson effect porous plug experiment - Mean free path-Transport phenomena-viscosity.

UNIT-2 THERMODYNAMICS

Thermodynamic system-Equation of state- Zeroth and first law of thermodynamics and its significances – specific heats of gas – Work done during an isothermal and adiabatic process- slopes of Adiabatic and isothermal processes - Relation between adiabatic and Isothermal Elasticities-Reversible and Irreversible Process-Carnot's ideal heat engine – Carnot's cycle – Second law of thermodynamics – Concept of entropy – Change of entropy in reversible and irreversible processes – Principle of increase of entropy – T-S diagram.

UNIT-3 LOW TEMPERATURE & RADIATION

Production of Low temperatures – adiabatic demagnetization-superconductivity-Meissner effect- Thermal radiation -Black body – Black body in practice – Stefan Boltzmann law – distribution of energy in block body spectrum -Wien's displacement law–Rayleigh – Jeans law–Planck's radiation law –radiation pyrometer – solar constant - temperature of sun.

UNIT-4 HEAT FLOW

Specific heat – Newton's law of cooling – Dulong & Petit's law –variation of specific heat with temperature – Einstein's theory and its limitations - Debye Theory–coefficient of thermal conductivity – Lee's disc method for bad conductors.

UNIT-5 STATISTICAL PHYSICS

Statistical basis- basics of probability theory – permutations and combinations - Macro and Micro states - thermo dynamical probability – Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac distribution laws– comparison of three statistics

Student Task: (Not for Examination)
- Production of low temperatures with different mixtures of ice.
- Checking the Newton's law of cooling with domestic liquids like milk and coffee.
- Fabrication of black body and find its characteristics

Learning Outcome:

Successful completion of this course student would be able

- Demonstrate knowledge-based competencies in the fields of Thermodynamics and Statistical Mechanics, keynotes of Classical and Quantum Statistical Physics.
- Also Students will demonstrate a mastery of the core knowledge base expected of Physics professionals in areas of Thermal Physics.

Book for Study:

1. Brijlal, N. Subramanyam and P.S.Hemne, Heat Thermodynamics and Statistical Physics, (S.Chand & Company Ltd, New Delhi, 2010).
2. Thermal Physics: with Kinetic Theory, Thermodynamics and Statistical Mechanics, S.C.Garg , R.M. Bansal, C.K. Ghosh, McGraw Hill Education, Second edition, 2017

Book for Reference:

1. D.S. Mathur, Heat and Thermodynamics, (S.Chand and sons, New Dehi)
2. An Introduction to Thermal Physics, Schroedar, Pearson Education India, first edition (2014)
3. Fundamentals Of Statistical And Thermal Physics, Reif, Sarat Book Distributors (2010)

இரண்டாமாண்டு : நான்காம் பருவம்

பகுதி 1 தமிழ் - தாள் 4

செய்யுள் (பழந்தமிழ் இலக்கியம்) நாடகம், தமிழ் இலக்கிய வரலாறு, கட்டுரை வரைவியல்

பாட நோக்கம் (Course Objectives)

பழந்தமிழரின் வாழ்வியல் அறம், வாழ்வியல் நுட்பங்கள், அக வாழ்வுச் சிந்தனைகளை அறியச்செய்தல்.

தனித் திறன்களை மேம்படுத்திக் கொள்ள உதவுதல்.

கடமை உணர்ச்சி, பெரியோரை மதித்தல் முதலான உயர்பண்புகளை வளர்த்தல்.   .

தமிழர்தம் இயற்கை வளம், செல்வ வளம், இலக்கிய வளங்களை அறிமுகம் செய்தல்.

நிகழ்கால வாழ்வியல் சிக்கல்களில் தெளிவுபெறச் செய்தல், சமுதாய அக்கறை கொள்ளச்செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதியைக் கற்பித்தல்.

அலகு – 1

1. குறுந்தொகை - 10 பாடல்கள்

குறிஞ்சி

1. நிலத்தினும் பெரிதே . . . . . . (பா.எண் -3)

2. வேரல் வேலி .. . . . . (பா.எண் -18)

3. யாயும் ஞாயும் . . . . . . (பா.எண் -40)

4. இடிக்கும் கேளிர் . . . . . . (பா.எண் -58)

நெய்தல்

1. அணிற்பல் அன்ன . . . . . . (பா.எண் -49)

2. ஞாயிறு பட்ட அகல்வாய் . . . . . (பா.எண் -92)

3. கடும்புனல் தொடுத்த . . . . . . (பா.எண் -103)

மருதம்

    1. தச்சன் செய்த சிறுமா . . . . . . (பா.எண் -61)

    2. நன்நலம் தொலைய . . . . . . (பா.எண் -100)

    3. வேம்பின் பைங்காய் . . . . . . (பா.எண் -205)

2. நற்றிணை – 5 பாடல்கள்

    1. நின்ற சொல்லர் ,. . . . (குறிஞ்சி) . (பா.எண் -1)

    2. விளம்பழம் கமழும் . . . . (பாலை) . (பா.எண் -12)

    3. தடமருப்பு எருமை . . . . (மருதம்) . (பா.எண் 120)

    4. விளையாடு ஆயமொடு . . . . (நெய்தல்) . (பா.எண் -172)

    5. அம்ம வாழி தோழி . . . . .   (முல்லை) . (பா.எண் -289)

3. கலித்தொகை - 5 பாடல்கள்

    1. பாலைக் கலி - வயக்குறு மண்டிலம் . . . . . (பா.எண் 24)

    2. குறிஞ்சிக் கலி - பாடுகம் வா வாழி தோழி . . . . (பா.எண் 05)

    3. மருதக்கலி   - ஈண்டு, நீர்மிசைத் தோன்றி . . . . (பா.எண் 24)

    4. முல்லைக் கலி - தனி பெறு தண் புலத்துத் . . . . . (பா.எண் 1)

    5. நெய்தற் கலி - மா மலர் முண்டகம் . . . . . . (பா.எண் 16)

4. ஐங்குறுநூறு - 10 பாடல்கள்
வேழப்பத்து

    1. மனைநடு வயலை வேழம் . . . . (பா.எண் 11)

    2. பரியுடை நன்மான்   . . . . (பா.எண் 13)

3. ஓங்குபூ வேழத்துத் . . . . (பா.எண் 16)

4. இருஞ்சாய் அன்ன … . . . (பா.எண் 18)

5. நெகிழ்பு ஓடும் வளை . . . . (பா.எண் 20)

அன்னாய் வாழிப் பத்து

1. அன்னாய் வாழி! வேண்டு அன்னை! நம் படப்பை (பா.எண் 203)

2. அன்னாய் வாழி! வேண்டு அன்னை! அஃதெவன்கொல்?.. (பா. 204)

3. அன்னாய் வாழி! வேண்டு அன்னை! என்தோழி (பா.எண் 206)

4. அன்னாய் வாழி! வேண்டு அன்னை! நன்றும் (பா.எண் 208)

5. அன்னாய் வாழி! வேண்டு அன்னை! கானவர் (பா.எண் 208)

5. புறநானூறு - 5 பாடல்கள்

1. இரும்பனை வெண்தோடு. . . (பா.எண் 54)

2. உண்டாலம்ம இவ்வுலகம்… (பா.எண் 14)

3. யாண்டு பலவாக . . . (பா.எண் 191)

4. யாதும் ஊரே… (பாடல் எண் 192)

5. செய்குவம் கொல்லோ நல்வினை… (பா.எண் 214)

6. பத்துப்பாட்டு - பட்டினப்பாலை முழுவதும்

அலகு - 2

1. திருக்குறள் - 3 அதிகாரங்கள்

1. மடியின்மை

2. இடுக்கண் அழியாமை

3. சொல்வன்மை

2. நாலடியார் - 12 பாடல்கள்

பொறையுடைமை

1. காதலர் சொல்லுங்   . . . . (பா.எண் 73)

2. அறிவதறிந்தடங்கி . . . . (பா.எண் 74)

3. இன்னா செயினும் . . . . . (பா.எண் 76)

4. தான்கெடினும் தக்கார். . . (பா.எண் 80)

தீவினையச்சம்

1. அக்கே போல் அங்கை . . . (பா.எண் 123)

2. நெருப்பழல் சேர்ந்தக் கால் . . . (பா.எண் 124)

3. பெரியவர் கேண்மை . . . (பா.எண் 125)

4. யாஅர் ஒருவர் . . . . (பா.எண் 127)

பெரியாரைப் பிழையாமை

1. பொறுப்பரென் . . . (பா.எண் 161)

2. அவமதிப்பும் ஆன்ற . . . (பா.எண் 163)

3. நளிகடல் தண்சேர்ப்ப . . . . (பா.எண்166)

4. பெரியார் பெருமை . . . . (பா.எண் 170)

3.பழமொழி - 12 பாடல்கள்

அறிவுடைமை

1. அறிவின் மாண்பு .. . . (பா.எண் 27)

2. அறிவினர் மாண்பு(பா.எண் 28)

3. அறிவுடையாருடன் அறிவுடையார் சேர்தல் (பா.எண் 30)

4. அறிவிலாரை அறிவுடையார் புகவிடாமை(பா.எண் 31)

இன்னா செய்யாமை

1. முற்பகல் செய்யின் பிற்பகல் விளையும்(பா.எண்- 47)

2. நலியப் பெற்ற எளியர் அழுத கண்ணீர்(பா.எண் 48)

3. மதிப்பு மிக்கவரை அழிக்க முயலுதல்(பா.எண்-49)

4. நலிந்தாரை நலியாமை(பா.எண் 50)

சான்றோர் இயல்பு

1. சான்றோர் பெருமை(பா.எண் 70)

2. வறுமையினும் நின்ற நிலையில் வழுவாமை(பா.எண் 71)

3. பீடிலாவிடத்தும் பெருந்தகைமையில் வழுவாமை(பா.எண் 72)

4. இடருற்ற விடத்தும் மதிப்பிற் குறையாமை(பா.எண் 73)

4.இன்னா நாற்பது – 5 பாடல்கள்

1. அறமனத்தர் கூறும் கடுமொழி … . . . (பா.எண் 6)

2. உண்ணாது வைக்கும் பெரும் பொருள் . . . (பா.எண் 16)

3. குலத்துப் பிறந்தவன் கல்லாமை யின்னா . . . (பா.எண் 19)

4. யானையின் மன்னரைக் கண்டால் . . . (பா.எண் 22)

5. பிறன் மனையாள் பின்னோக்கும் பேதைமை யின்னா . . .
   (பா.எண் 38)

5. இனியவை நாற்பது – 5 பாடல்கள்

1. பிச்சை புக்காயினும் கற்றல் . . . . (பா.எண் 1)

2. மானமழிந்தபின் வாழாமை முன்னினதே . . . (பா.எண் 13)

3. குழவிதளர் நடை காண்டல் இனிதே . . . (பா.எண் 14)

4. வருவா யறிந்து வழங்கல் . . . (பா.எண் 22)

5. பத்து கொடுத்தும் பதியிருந்து … . . . . (பா.எண் 40)

அலகு : 3

நாடகம் - பிசிராந்தையார் - பாரதிதாசன்

அலகு : 4

கட்டுரை வரைவியல் - பொதுக்கட்டுரைகள்

அலகு : 5

தமிழ் இலக்கிய வரலாறு – சங்க காலம், சங்கம் மருவிய காலம்

கற்றல் விளைவுகள் (Course OutCome)

மாணவர்கள் வாழ்வியல் நுட்பங்களில் வல்லமை பெறுவர்.

சமுதாய அக்கறை உள்ளவர்களாக மனவளம் பெறுவர்.

சமுதாய, பொருளியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாடநூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.

2. பிசிராந்தையார் - பாரதிதாசன், தமிழ் நாதன் பதிப்பகம், சென்னை – 110

3. பொதுக்கட்டுரைகள், மகிழினி பதிப்பகம், சென்னை- 106.

4. தமிழ் இலக்கிய வரலாறு,

பிரமி பதிப்பகம், திருச்சி-21.

Course Code & Title	ENGLISH FOR COMMUNICTION IV		
Class	**II YEAR**	**Semester**	**IV**
Cognitive Level	**K – 1 Acquire** **K – 2 Understand** **K – 3 Apply** **K – 4 Evaluate** **K – 5 Analyze**		
Course Objectives	**The Course aims** • **To make the students to live meaningfully** • **To Familiarize students with various great personalities** • **To understand qualities like freedom** • **To know human values like patriotism and universal brotherhood** • **To realize the value of comradeship**		
UNIT	**Content**		**No. of Hours**
I	A Poison Tree : William Blake King Bruce and the Spider : Eliza Cook The Character of a Happy Life : Henry Wotton		
II	Ulysses : Lord Alfred Tennyson Money Madness : D. H. Lawrence I wow to thee my Country		
III	The Ocean : Lord Byron The Unknown Citizen : W. H. Auden Night of the Scorpion : Nissim Ezekiel		
IV	The Rising of the Moon : Lady Gregory The Little Man : John Galsworthy The Path Finder : Herman Ould		
V	A Tale of two cities : CharlesDickens		
Reference	Lessons will be edited and compiled.		

	On completion of the course, students should be able to
Course Outcomes	CO 1: live meaningfully.
	CO 2: know great qualities like leadership.
	CO 3: understand qualities like freedom and parenthood
	CO 4: live as a group in unity
	CO5: realize the value of comradeship

Mapping of COs with PSOs & POs:

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

Strongly Correlating(S)	-	3 marks	
Moderately Correlating (M)	-	2 marks	
Weakly Correlating (W)	-	1 mark	
No Correlation (N)	-	0 mark	

Semester	IV	CC-V	Hours	3
		MAJOR PRACTICAL-II		
Course Code	19P308L		Credit	4

Learning Objectives:
- This laboratory course helps the students to use telescope and microscope.
- Also to understand the properties of liquids
- To understand the characteristics of different types of diodes

(Any 12 Experiments)

1. Determination of rigidity modulus of the given rod using Static torsion apparatus

2. Determination of rigidity modulus of the given wire by Torsional pendulum – n and I

3. Determination of Coefficient of viscosity of the given liquid by Graduated burette method

4. Determination of Coefficient of viscosity of the given highly viscous liquid by Stokes method

5. Study the I-V characteristics of PN junction diode and Zener diode

6. Characteristics of the given transistor in common emitter configuration

7. Determination of Emissive power of a surface – Spherical calorimeter method

8. Determination of Specific heat capacity of liquid using Joule's calorimeter (Barton's correction)

9. Calibration of the given low range ammeter using Potentiometer

10. Determination of resistance and specific resistance of the given wire using Potentiometer

11. Figure of merit of the mirror galvanometer

12. Determination of refractive index of the given liquid using hollow prism-Spectrometer

13. Experiment to draw i-d curve for a prism using Spectrometer

14. Comparison of the frequencies of oscillations produced by two AFO using Lissajous figures arrangement

15. Conversion of galvanometer into ammeter , voltmeter and ohmmeter

16. Field along the axis of a coil- determination of H

Learning Outcome:

On successful completion of this laboratory course the students are able to

- Use effectively optical instruments like microscope and telescope.
- Also they would develop the skill of taking the readings in experiments for heat and light.
- Student will get the knowledge on determining various constants and presentation skill in the form of record note submission.

Semester	IV	CC-VI OPTICS	Hours	5
Course Code	19P411		Credit	5

Learning Objectives
- To study fundamentals of geometrical optics and physical optics
- To understand the types of lens and its applications
- Summarize the various types of defects in lens
- To understand the interference, diffraction and polarization phenomena

- To understand the application of light and various optical devices

UNIT – I GEOMETRICAL OPTICS – I
Fermat's principle of least time and Extreme path– thin lens - lens equation - thick lens – Cardinal points– thick lens formula –spherical lens –combination of two thick lens – Application of lens combination- Eye pieces – Ramsden's eye piece – Huygen's eye piece

UNIT – II GEOMETRICAL OPTICS II
Lens aberrations - Spherical aberration – Astigmatism – Coma – Curvature of the field - Distortion – Chromatic aberration – Achromatic Combination of two lenses in contact and in separation-Dispersion – Dispersion in a prism – dispersion without deviation and deviation without dispersion – oil immersion objective

UNIT – III INTERFERENCE
Superposition of waves – theory of interference - Interference in thin films - Wedge shaped film – Newton's rings: theory -determination of radius of curvature – Michelson's interferometer: Determination of wavelength– Fabry –Perot interferometer – Applications of interferometer for testing flatness and thickness of films – antireflection coating - interference filter.

UNIT – IV DIFFRACTION
Rectilinear propagation of light- zone plate - Fresnel's and Fraunhofer diffraction – Fresnel's diffraction at a straight edge and circular aperture–Fraunhofer diffraction at a single slit – double slit–theory of diffraction grating. Resolving power: Rayleigh criterion for resolution – Resolving power of a telescope and grating.

UNIT – V POLARIZATION
Introduction - double refraction – theory of polarized light- quarter wave plate - half wave plate - elliptically and circularly polarized light – production and detection – Analysis of polarized light - optical activity – specific rotation - Laurent's half shade polarimeter

Student Task: (Not for Examination)
- Construction of Eye pieces with PVC tubes by students
- Fabrication of Zone plate and demonstration for diffraction phenomenon

Learning Outcome:
Students are able perform following
- Describe the types of lenses and classify various defects occurs in lens
- Demonstrate the application of light and various optical devices
- Identify and analyze the optical phenomenon like interference, diffraction and polarization.

Book for Study
1. Brijlal, Subramaniyam, M.N. Avadhanulu, A text book of light, S.Chand & Co., New Delhi (2010).
2. Ajoy Ghatak, optics, McGraw Hill Education, 5 edition, April 2012

Book for Reference

1. Jenkins and White, Optics, Mc Graw Hill.(1981)
2. Karl Dieter Moller, Optics, Springer International Edition, (2010)
3. Germain Chartier, Introduction to Optics, Springer International Edition, (2005)
4. Eugene Hecht, Optics, Pearson Education, (2006)
5. Optics and Spectroscopy, Murugeshan R., Sivaprasath Kiruthiga, S Chand & Company, 2010

Semester	V	CC-IX ELECTRICITY AND MAGNETISM	Hours	6
Course Code	19P515		Credit	5

Learning Objectives

- Understand the concepts of electrostatics,

45

- To understand the working principles of capacitors and thermoelectricity
- To study and grasp the principles of magneto-statics.
- Learn the principles and applications of Electromagnetic induction, transient
- To study the LCR circuits and principles of alternating currents.

UNIT- I ELECTROSTATICS

Charges and Fields: Basic concepts – coulomb's law – Electric field – Electric field due to a point charge- electric dipole – lines of force.

Gauss's law and its applications: Electric flux – Gauss's law and its proof – differential form of Gauss's law – Applications of Gauss's law-electric field due to uniformly charged sphere, charged cylinder and parallel sheets.

Electric potential: Relation between electric field and electric potential– potential due to charged sphere- Equipotential surface-Electrical images- electric field at a point on the plane.

UNIT- II CAPACITORS, CURRENT ELECTRICITY & THERMO ELECTRICITY

Capacitors: Capacitance of a conductor – Principle of a capacitor - capacitors in series and parallel – Energy stored in a charged capacitor.

Current Electricity: Current and current density – Ohm's law – Kirchhoff's laws and its applications: Wheatstone's network, Carey Foster bridge – Potentiometer – calibration of ammeter and voltmeter.

Thermoelectricity: Seebeck effect – laws of thermo emf - Peltier effect and Thomson effect: Demonstration by S.G Starling method- relationship between Joule and Peltier effect

UNIT- III MAGNETOSTATICS

Magnetic field – Biot Savart law and its applications: magnetic induction due to a current carrying straight conductor, circular coil, solenoid – Magnetic induction inside a long solenoid, endless solenoid - Ampere's circuital law-statement and proof.

Force on a current carrying conductor in a magnetic field - force between two parallel current carrying conductor –Torque on a current loop in a uniform magnetic field – Moving coil ballistic galvanometer.

UNIT- IV ELECTROMAGNETIC INDUCTION

Faraday's law and its differential form – Self-induction – self-inductance of a long solenoid – determination of self-inductance by Anderson's bridge method – Mutual induction – Mutual inductance between two coaxial solenoids – Experimental determination of mutual inductance – coefficient of coupling - eddy current and its uses-Maxwell's equation in free space

UNIT- V TRANSIENT CURRENT AND ALTERNATING CURRENT

Transient current: Growth and decay of current in a circuit containing L & R – Discharge of a capacitor through an Inductor and Resistor in series LCR circuit.

Alternating current: Emf induced in a coil rotating in a magnetic field: Peak value of A.C and emf- mean value of A.C - root mean square value of an A.C-Form factor-effective value of an A.C – Power in series LCR circuit- Wattles current – construction of Choke coil – Transformer - construction & theory– uses of transformer.

Student Task: (Not for Examination)
- Fabrication of paper capacitors with Al foil and measurement of capacitance value.

- Miniature model preparation of a refrigerator based of thermo-electric effect to avoid the use of green house gas emission problem.
- Coil winding over a grooved wooden cylinder and measure the value of self-inductance

Learning Outcome:

By taking this course, students will be able to demonstrate knowledge and understanding of:

- the use of Coulomb's law and Gauss' law for the electrostatic force
- the relationship between electrostatic field and electrostatic potential
- the use of Faraday's law in induction problems
- the basic idea of transient and alternating current

Book for study

1. R. Murugesan, Electricity and Magnetism, S. Chand and Co., New Delhi, (1995)
2. Brijlal, Subramaniam, Electricity and Magnetism, Ratan Prakashan Mandir Education and University Publishers, Agra, (2000)

Books for Reference

1. K.K.Tewari, Electricity and Magnetism, S. Chand and Co., New Delhi, (2005)
2. D.N.Vasudeva, Fundamentals of Magnetism and Electricity, S. Chand and Co., New Delhi, (1981)
3. N.Nagaratnam, N.Lakshminarayan, Electricity and Magnetism National Publishing Company, Madras, 1997.

Semester	V	CC-X **ATOMIC AND NUCLEAR PHYSICS**	Hours	5
Course Code	19P516		Credit	5

Learning Objectives

- To learn structure of atom, atomic spectra
- To understand the Magneto-Optical and Electro-Optical phenomena

- To know the production and properties of positive rays
- To study the properties of nucleus, radioactivity.
- To understand the nuclear fission and fusion and elementary particles

UNIT – I STRUCTURE OF ATOM

Rutherford's atom model – theory of α particle scattering – The Bohr atom model – Electronic structure – origin of spectral lines – critical potentials – Frank and Hertz experiment – Sommerfeld's relativistic atom model – The selection rules – applications of the vector atom model- applications: L-S and J-J coupling- magnetic moments due to orbital motion – The Bohr Magneton-Strern Gerlach experiment

UNIT –II FINE STRUCTURE OF SPECTRAL LINES

Spectral terms and the notation of atomic states – fine structure of sodium D line – Zeeman effect – normal and anomalous Zeeman effect – Theoretical explanation – Lande's 'g' factor – Larmor's theorem – Paschen Back effect – Stark effect-experiment.

UNIT-III POSITIVE RAYS

Sources of positive rays – Thomson's parabola method – determination of e/m – Aston's mass spectrograph - Dempster's mass spectrograph and its applications – Bainbridge's Mass spectrograph

UNIT-IV NUCLEAR PHYSICS

Properties of Nucleus – size, charge, mass, spin – binding energy – packing fraction-semi empirical mass formula.

Nuclear reactions: Induced radio activity – artificial transmutation – techniques – applications of radio isotopes – discovery, production and detection of neutrons – basic properties of neutrons

UNIT –V NUCLEAR FISSION, FUSION AND ELEMENTARY PARTICLES

Nuclear forces – Nuclear models – shell model – liquid drop model – Nuclear fission - Nuclear fusion – Hydrogen – Hydrogen cycle – Carbon-Nitrogen cycle – Steller energy Plasma: confinement of plasmas – magnetic confinement.

Elementary particles: Baryons and Leptons – antiparticles – Mesons – μ, π, K Mesons – Types of strange particles

Student Task: (Not for Examination)
- Computer animation of atomic models to understand orbital concepts
- To visit IGCAR
- Collection of isotope data and their uses in medical field
- Chart preparation for nuclear fission, fusion processes.

Learning Outcome:
    After the completion of the course,
- Students will be able to describe theories explaining the structure of atoms and the origin of the observed spectra.
- And also they can able to identify atomic effect such as Zeeman Effect and Stark effect.

- They would be summarizing different types of atomic spectra.
- They should be able to explain the observed dependence of atomic spectral lines on externally applied electric and magnetic fields.
- They can analyze nuclear reaction and their application.

Books for Study
1. R.Murugesan,Kiruthiga Sivaprasath, Modern Physics, S.Chand & Co., New Delhi (2010)

Books for Reference
1. D.L.Seghal, K.L. Chopra and N.K.Seghal, Modern Physics, S.Chand & Co., New Delhi (1998)
2. J.B.Rajam, Atomic Physics, S.Chand & Co., New Delhi (2004)
3. B.L.Theraja, Modern Physics, S.Chand & Co., New Delhi (2004)
4. Brijlal and N.Subramaniyam, Atomic and Nuclear Physics, S.Chand & Co., New Delhi (1996)

Semester	V	CC-XI FUNDAMENTALS OF ELECTRONICS	Hours	6
Course Code	19P517		Credit	5

Learning Objectives
- To understand basic electric circuits theorems for circuit analysis.
- To learn the semiconductor physics and characteristics of diodes

- To familiarize the working of special purpose diodes and transistors
- To know the principle of transistor biasing and study of amplifiers and oscillators.
- To discuss basic circuits for mathematical operations using operational amplifier.

Unit –I Circuit analysis techniques

Kirchoff's current and voltage laws – series and parallel connection of independent sources – R,L and C – Network Theorems–Thevenin, Superposition, Norton, Maximum power transfer and duality – star delta conversion

Unit – II Semiconductor Physics and diode

Semiconductor: Intrinsic–Extrinsic semiconductor – n-type semiconductor – p- type semiconductor –PN junction – Properties – Biasing a PN junction- V-I characteristics of PN junction – Full wave bridge rectifier and its efficiency– ripple factor - Zener diode – characteristics- Zener diode as voltage stabilizer

Unit – III Special Purpose Diodes and transistors

Light Emitting Diode – Photo diode –operation and characteristics - Optoisolator – Transistor – Transistor action – Transistor connections - Characteristics of Common base connection – Common emitter connection – Transistor as an amplifier in CE arrangement – Transistor load line analysis –Operating point – JFET- Principles and working – Characteristics and Parameters-Difference between JFET and Bipolar transistor.

Unit –IV Transistor biasing, amplifiers and Oscillators

Transistor biasing – Faithful amplification –Voltage divider bias method – single stage RC coupled amplifier –Feedback – principles of negative voltage feedback – Gain of negative voltage feedback – Advantages of negative voltage feedback – Barkhausen criterion – Colpitt's oscillator – Hartley oscillator – Phase shift oscillator

Unit – V Operational amplifier

Operational amplifier – ideal characteristics – Applications of op-amps – Inverting amplifier –Non inverting amplifier – voltage follower – Summing amplifiers – Subtractor -Integrator – Differentiator – D/A converter – Binary weighted method

Student Task: (Not for Examination)
- Chart preparation of the transistor characteristics from standard tables (for type   of semiconductor, AF/RF use, I_c max and Vcc etc.)

Learning Outcome:
- Students should be able to analysis resistive circuits and working of diodes.
- They can be able to design amplifier and oscillator circuits.
- Students can also construct the circuits that provide mathematical operations and multivibrations.

Books for Study
1. K.Mehta, Rohit Mehta, Principles of Electronics, S.Chand & Company, New Delhi, Eleventh Edition, 2008.
2. L D.Roy Choudhury, Shail Jain, Linear Integrated Circuits, New Age International Pvt., Ltd., New Delhi, 1999.
3. Basic Electronics(Solid State),B L Theraja, S Chand; Multicolor edition,2006

Books for Reference

1. S.Salivahanan, N. Suresh Kumar, A.Vallavaraj, Electronic Devices and Circuits, Tata McGraw- Hill Publishing Company Limited, New Delhi, 2006
2. Ramkant A.Gayakward, Op-amps and Linear Integrated Circuits,Prentice Hall of India, New Delhi, Third Edition.
3. Schaum's Outline of Electric Circuits, Sixth Edition,McGraw-Hill Education, New Delhi, 2014.
4. K.Padmanabhan,P.Swaminathan, S.Ananthi,Electric circuits and Electron devices, University Science Press, New Delhi,First Edition, 2010.

Semester	VI	CC-VII	Hours	3
Course Code	19P513L	MAJOR PRACTICAL-III	Credit	5

Learning Objectives:

- This laboratory course helps the students to use spectrometer.
- Develop the basic electrical skill to operate various electrical devices
- To write c programming for different tasks

<p style="text-align:center">**GENERAL EXPERIMENTS** **(Any 8 experiments only)**</p>

1. Spectrometer i-i' curve
2. Determination of dispersive power of the material of the prism using Spectrometer
3. Determination of wavelengths of prominent lines of Mercury spectrum by setting the grating in normal incidence position -Spectrometer
4. Determination of wavelengths of prominent lines of Mercury spectrum using the grating by minimum deviation method -Spectrometer
5. Determination of Cauchy's constants using spectrometer
6. Field along the axis of a coil- determination of Magnetic moment of a bar magnet
7. M and H – absolute determination using deflection and vibration magnetometer
8. Low range voltmeter calibration using Potentiometer
9. High range voltmeter calibration using Potentiometer
10. The temperature co-efficient of the resistance of the given coil using Potentiometer
11. Determination of resistance and specific resistance of a coil using Carey Foster bridge
12. Determination of Young's Modulus of the material of the bar Koenig's method
13. Verification of KVL and KCL in electronic circuits
14. Measuring the phase difference between current and voltage for RC and LR circuit using a CRO
15. Study of the growth and decay of current in a LR circuit
16. Determination of absolute capacity of condenser using BG
17. Determination of co-efficient of self inductance of a coil by BG
18. Determination of co-efficient of mutual inductance of a pair of coils by BG

<p style="text-align:center">**SECTION- B (Any 4 experiments only)**</p>

1. 'C' programme to find the of average of numbers
2. 'C' programme to convert temperature values from Celsius to Fahrenheit/Fahrenheit to Celsius
3. 'C' programme for the preparation of inventory report
4. 'C' programme to prepare pay bill of employees of a company
5. 'C' programme for finding the roots of the given quadratic equations
6. 'C' programme to evaluate a multiple choice test
7. 'C' programme for sorting the given set of strings in alphabetical order
8. 'C' programme to count the number of characters, words and lines in a given text
9. 'C' programme to determine the standard deviation of an array of values

Learning Outcome:

On successful completion of this laboratory course

- The students are able to handle the optical instruments like spectrometer, microscope and telescope.

- Also they would develop the skill of taking the readings in experiments based on electrical and light.
- Student will be able to write program using C language and executing them in a PC.

Reference Book for Section B:

E. Balagursamy, Programming in ANSI C, Tata McGraw- Hill Publishing Company Limited, NewDelhi, 992

Semester	IV	CC-VIII	Hours	3
		MAJOR PRACTICAL-IV		
Course Code	19P514L		Credit	5

Learning Objectives:
- This laboratory course helps the students to use passive and active components
- Also to understand the basic electronic skill

- This course helps them to study the working transistor, op-amp and Timer
- To write assembly language programming for different task using 8085 microprocessor

ELECTRONICS (Any 8 Experiments)

1. Determination of Co-efficient of self inductance of a coil in series resonance circuit method
2. Determination of Co-efficient of self inductance of a coil in parallel resonance circuit method
3. Construction of dual regulated power supply using IC7805 and IC 7905
4. Construction of single stage RC coupled amplifier using transistor and frequency response study-bandwidth and amplification factor calculation
5. Construction of astable multivibrator using IC 555 timer and finding the frequency for various capacitor values
6. Construction of monostable multivibrator using IC 555 study of trigger response
7. FET Characteristics– CS configuration
8. Operational amplifier – inverting and non inverting amplifier (IC 741)
9. Construction of adder and subtractor circuits using Operational amplifier-IC 741
10. Construction of integrator and differentiator circuits using Operational amplifier-IC 741-tracing the input and output waveforms
11. Construction Hartley oscillator using transistor and determination of frequency for different values of capacitor
12. Construction Colpitt's oscillator using transistor and determination of frequency for different values of capacitor
13. Verification of De Morgan's theorems using IC
14. Study of universality property of NAND and NOR gates
15. Construction and study of Half adder and Full adder circuits
16. Construction and study Half subtractor and Full subtractor

8085 Microprocessors (Any 4 experiments only)

1) Writing and verification of an assembly language program for addition and subtraction of 8 bit data
2) Writing and verification of an assembly language program for addition and subtraction of 16 bit data
3) Writing and verification of an assembly language program for sum of N numbers.

4) Writing and verification of an assembly language program for multiplication of two 8 bit data.

5) Writing and verification of an assembly language program for division of two 8 bit data.

6) Writing and verification of an assembly language program for smallest number in a given array.

7) Writing and verification of an assembly language program for biggest number

in a given array

Learning Outcome:

On successful completion of this laboratory course
- The students are able to handle the optical instruments like capacitor, coil, and resistor.
- Also they would develop the skill of taking the readings in experiments based on electrical and light.
- They should also able to get knowledge in digital devices.
- Student will be able to write program using 8085 microprocessor.

Semester	VI	CC- XII	Hours	6
Course Code	19P619	Quantum Mechanics and Relativity	Credit	5

Objectives
- To understand the quantum behavior of physical systems.
- To learn the quantum physics through the photo electric effect.
- To grasp the concepts of dual nature of matter.
- To learn the Schrödinger formalism and LHO.
- To study the principles of Newtonian relativity and special theory of relativity.

UNIT-I ORIGIN OF QUANTUM MECHANICS

Inadequacy of classical mechanics- Difficulties with classical theory of blackbody radiation – Planck's quantum hypothesis and radiation law – quantum theory of radiation and photons –Applications of quantum theory of radiation – Compton effect – Limitation of old quantum theory.

UNIT-II QUANTUM THEORY OF PHOTOELECTRIC EFFECT

Introduction –Photo electrons – Lenard's method to determine e/m for photo electron- Richardson and Compton experiment – Laws of photo electric emission – Einstein photo electric equation – photo electric cells.

UNIT –III DUAL NATURE OF MATTER

de Broglie's concept of matter waves – the de Broglie wavelength – phase velocity and group velocity – Expression for group velocity related to velocity and phase velocity – experimental study – G P Thomson's experiment – Davision and Germer Experiment – Heisenberg's uncertainty principle.

UNIT –IV WAVE MECHANICS

Introduction – formulation of Schrödinger wave equation – time independent and dependent forms – properties of wave function – orthogonal and normalized wave functions – eigen functions and eigen values- application of Schrödinger's equation time independent form – particle in a box – linear harmonic oscillator.

UNIT – V RELATIVITY

Introduction – Concepts of space and time – frames of reference – Newtonian relativity – Galilean transformation equation – ether hypothesis – Michelson-Morley experiment – special theory of relativity – postulates – Lorenz transformation equations – length contraction – time dilation – addition of velocities – variation of mass with velocity – mass energy equivalence – relationship between the total energy- rest energy and the momentum.

Student Task: (Not for Examination)
- Video/PPT preparation for visualizing the Energy-eigen values of Simple harmonic oscillator
- Video/PPT preparation for understanding the relativity principles

Course Outcome:

- Students will be able to connect a theory with the corresponding experiment.
- Students will be able to understand the necessary and development of quantum mechanics.

- Ability will be gained by the students in understanding various concepts in relativistic theory.

Books for Study:
1. R.Murugesan, Kiruthiga Sivaprasath, Modern Physics, S.Chand & company Ltd., New Delhi, 2010.
2. Kenneth S. Krane, Modern Physics,Wiley India edition,New Delhi,2017.
3. Arthur Beiser,Shobhit Mahajan,S.Rai Choudhury,Concepts of Modern Physics,McGraw Hill education (India) private Limited,New Delhi,2015.

Books for Reference
1. P.M.Mathews and Venkatesan, Quantum Mechanics, Tata Mc Graw Hill Company, New Delhi.
2. Robert Resnick, Introduction to special theory of relativity, Wiley eastern limited, 1989.
3. B.L.Theraja, Modern Physics, S.Chand & company Ltd., New Delhi
4. Gupta, Kumar and Sharma, Quantum Mechanics, Jaiprakash Nath & Co., 23rd edition (2004).

Semester	VI	CC-XIII SOLID STATE PHYSICS	Hours	6
Course Code	19P620		Credit	5

Learning Objectives
- To study the defects and structure of crystals and to study the theory of semiconductor, super conductors
- To describe the difference between crystalline and amorphous materials.

- To describe the arrangement of atoms and ions in crystalline structures
- To Explain the use of X-ray diffraction measurements in determining crystalline structures
- To learn the basics of Nano science

UNIT- I CRYSTAL STRUCTURE AND CRYSTAL DIFFRACTION

Lattice planes and Miller Indices – Separation between lattice planes in simple FCC and BCC cubic lattice – Atomic Packing – Atomic radius – Lattice constant and density - Crystal Diffraction – Bragg's law – Reciprocal lattice – Properties – Diffraction of X-rays by a crystal – Determination of Unit Cell dimension.

UNIT- II DEFECTS AND DISLOCATIONS IN CRYSTALS

Lattice Defect – point, line and plane defect – Electrical and Transient imperfections Schottky and Frenkel defects – Extrinsic vacancies – Colour centers – Different types- their formation and Properties – Slip and Plastic deformation – Edge and Screw Dislocation – Motion of dislocation – Burger vectors – Grain boundaries.

UNIT- III MAGNETISM AND DIELECTRICS

Spontaneous Magnetization – Weiss Theory – Temperature dependence of Magnetization classical Theory of Diamagnetism – Weiss theory of Para magnetism – Ferromagnetic domains – Bloch wall – Basic ideas of anti-ferromagnetism – Ferrimagnetisms – Ferrites in computer Memories – Dielectrics - Polarization – Clausius Mosotti relation.

UNIT- IV SEMICONDUCTORS, SUPER CONDUCTORS

Band theory of solids –classification of insulators, Semiconductors, conductors – intrinsic and extrinsic semiconductor – Carrier concentration for electron - Barrier Potential Calculation – Rectifier Equation

Superconductivity: Zero Resistance – Effect of Magnetic field – Meissner Effect and persistent current – Types of super conductors – Isotope Effect- Josephson Effect (Qualitative idea only) – London equations – BCS theory of Super Conductivity (Qualitative only)

UNIT –V NANOSCIENCE

Nanotechnology: Basics-two important definitions-Applications of Nanotechnology: i) medical diagnostics-drug delivery ii) Energy: reduction of energy consumption-recycling of batteries-increasing the efficiency of production iii) Memory devices, foods, Textiles CNT: discovery-description-SWNT, MWNT-Properties- mechanical applications-electrical applications

Student Task: (Not for Examination)
- Prepare ball-stick models cubic crystal lattices.
- Animated picture of superconducting ring for persistent current
- Demonstrate the structure of CNT with the help of "Ninithi" software.

Learning Outcome:
Upon successful completion of this course it is intended that students will be able

- To get through understanding of the crystal lattice and its types.

- An insight into the Bragg's law and its importance.
- Prepare an account of various defects in a   crystal.
- Gain the knowledge on magnetic, dielectric, semiconducting and superconducting materials.
- Able to discuss the exotic properties of solids at the nano-scale and CNT and   uses
- Also they would be able to perform structure determination of simple structures.
- The basic knowledge on Nano science would be understood.

Books for Study
1. Gupta and Kumar K., Solid State Physics – Nath & Co Meerut, 1985
2. R.L. Singhal, Solid State Physics Kendarnath Ramnath & Co., Meerut, 1985.
3. V. Arumugam, Materials Science – Anuradha Agencies, Kumbakonam, 1990
4. Nanotechnology, S Shanmugam, MJP Publishers, 1st edition,2010
5. M.Wilson,KKG Smith,B.Ragase,Nanotechnology,Overseas Press, NewDelhi 2005.

Books for reference
1. A.J. Dekker, Solid State Physics, McMillan India Limited, Reprinted 1986.
2. Charles Kittel, Solid State Physics, Wiley Eastern, reprint, 1974.
3. S.O. Pillai, Solid State Physics, New Age International Pvt. Ltd., New Delhi, 6th edition.2005.
4. Mark Ratner,Daniel Ratner, Nanotechnology, Pearson Education 2003.

Semester	V		Hours	5
Course Code	19P518a	**EC-I** **Programming in C**	Credit	5

Learning Objectives:
- To learn the basic structure of C programming through data types and operators.
- To learn the different I/O functions and arrays.
- To study the functions, various structures and union.
- To get the working of pointers and array of pointers.
- To learn the file management concepts and preprocessors.

UNIT I: INTRODUCTION TO C LANGUAGE AND ITS FUNDAMENTALS

Importance of C – Basic structure of C Programs – Programming style - Executing a C program-Constants, Variables and Data types: Character set – Key words and Identifiers – Constants – Variables – Data types - Declaration of variables – Assigning values of variables. Operators and Expressions: Arithmetic, Relational, Logical, Increment/Decrement, conditional, Bit-wise, Comma operators – Arithmetic expressions – Procedures and Associativity.

UNIT II: I/O FUNCTIONS, CONTROL STRUCTURE AND ARRAYS

Input/Output function: getchar, putchar, formatted input (scanf) and formatted output (printf). **Control structures:** Decision making with if, if…else, elseif…ladder – Switch – goto – while – do…while – for statements – break – continue. **Arrays:** One dimensional and two dimensional arrays – Declaring array – storing arrays in memory – initializing arrays.

UNIT III: FUNCTIONS, STRUCTURES AND UNION

Functions: Need for user defined function – elements of user defined functions – definition of functions – Return values and their types – Function calls – Function declaration – Category of Functions – Nesting of Functions – Recursion. The scope, visibility and lifetime of variables. **Structure and Union:** Defining a Structure – Declaring Structure variables – Accessing structure members – Structure initialization - Arrays of Structures – Arrays within structures – Structures and Functions – Unions.

UNIT-IV POINTERS,

Pointers: Pointers – accessing the address of a variable – Declaring pointer variable – initialization of pointer variables – accessing a variable through its pointer – chain of pointers – pointer expressions – pointer increments and scale factor – Pointers and arrays – Pointers and character strings – Array of pointers

UNIT–V FILE MANAGEMENT AND PREPROCESSOR

File management: Defining and Opening as file – Closing a file – I/O operations on files - Error handling during I/O **operations –** Random access to files. **Preprocessor:** Macro substitution – File inclusion – Complier control directives

Student Task: (Not for Examination)
- To write programs for calculating the Physical parameters like (G, μ, ε)
- To write and execute Physics programs with graphics.

Learning Outcomes:

On the completion of this course,
- The students should able to understand the fundamentals of C programming.

- They could write the program and execute on a computer.
- Students are able to exercise good programming practices for Physics based problems

Books for Study

1. Programming in ANSI C by E. Balagurusamy, Tata McGraw Hill Ltd., New Delhi, 2004. (Unit I,II,III)
2. Let us C – by Yashavant P. Kanetkar

Books for Reference

1. C.S. Gottifried Schuam's Outline series theory and problems of programming McGraw Hill International Ltd., New York, 2003.
2. Yashavant Kanetkar, Exploring C, BPB Publishers, New Delhi, 1993
3. Yashavant Kanetkar, Let Us C, BPB Publishers, New Delhi, 2002.

Semester	II	EC-I PYTHON PROGRAMMING	Hours	5
Course Code	19P518b		Credit	5

Learning Objectives

- To understand why Python is a useful scripting language for developers.
- To learn various data structures and control statements.
- To learn how to write loops and decision statements in Python.
- To learn how to write functions and pass arguments in Python.
- To learn how to identify Python object types and inheritance.
- To define the structure and components of a Python program.

Unit-I: Introducing Python

History of Python - Features of Python – Variables - Logical And Physical Line - Typed Language – Types - Numbers - Text-String - Length Of String - String Slicing – Truth – Boolean – Comments – Operators - Relational Operators.

Unit -II: Data Structures and Control Flow

Lists – Copy – Tuples – Dictionary - Sets - Nested Conditions – for - for Tuples - The Range() Function – while - The Guessing Game - Control Transfer Statements - List Comprehensions - Pass Statements - Placeholder.

Unit - III: Functions

Positional Arguments Keyword Arguments - Specify Default Parameter Values - Functions returning Values - Fruitful Functions – Recursion - Scope Variables.

Unit -IV: OOPs and Inheritance

Classes, Objects and Instances - Python Classes - Methods - Constructor - Class Variables and Instance Variables- Inheritance - Special Methods - Data Hiding.

Unit –V: Exceptions

Expect The Unexpected –Exceptions - Exception Aren't Exceptional -Exception Defining clean Up Actions-Predefined Clean –Up actions.

Student Task: (Not for Examination)

- To write programs for calculating the Physical parameters like (G,μ,ε)
- To write and execute Physics programs with graphics.

Learning Outcomes

- Students should be able to master an understanding of scripting and the contributions of scripting languages.
- They could be master an understanding of Python especially the object-oriented concepts.
- They should also be master an understanding of the built in objects of Python,

Book for Study:

1. **"PYTHON PROGRAMMING"** by Vamsi Kurama, Pearson India Education Services Pvt.Ltd, First Impression, 2018

Books for Reference:

1. "Core Python Programming" Oreilly, Wesley J.Chun Publisher: Prentice Hall, First Edition 2000.

2. Programming in Python 3: A Complete Introduction to the Python Language, Mark Summerfield, Developer's library, 2008.
3. Core Python Programming, Dr. R. Nageswara Rao, Dreamtech, Press 2016

Semester	VI	EC-II DIGITAL ELECTRONICS	Hours	6
Course Code	19P621a		Credit	5

Learning Objectives

- To study fundamentals of number systems codes and Boolean algebra.
- To learn the various logic gates, Boolean functions and K-map method of simplification of Boolean expressions.
- To get the knowledge of adders, subtractors decoders, encoders and multiplexers
- To study the different flip-flop circuits and shift registers.
- To design and study the functions of the different types of counter

UNIT – I BINARY SYSTEMS, BOOLEAN ALGEBRA

Binary numbers - Number base conversions - Octal and Hexa decimal numbers - Complements -1's and 2's complement addition and subtraction –Binary codes - BCD code - Excess-3 code - Gray codes - Binary logic - Logic gates - Boolean algebra - Basic definitions and properties of Boolean algebra

UNIT – II DIGITAL LOGIC GATES AND BOOLEAN FUNCTIONS

Digital logic gates - IC digital logic families - Boolean functions - Demorgan's theorem - SOP - POS - Minterms and Maxterms.- Karnaugh Map method - Two and Three variable maps - Four variable map - Product of sums simplification - Don't care conditions

UNIT – III COMBINATIONAL LOGIC

Introduction - Design procedure - Half and Full adders - Half and Full Subtractors - Code conversion, BCD-to-Excess-3 code - Universal gates - Ex-OR gate - BCD adder - Magnitude comparator - Decoders - Demultiplexers - Encoders - Multiplexers

UNIT – IV FLIP FLOPS AND REGISTERS

Flip flops - Basic flip flop circuit - Clocked RS flip flop - D flip flop –race around condition - JK flip flop – T-Flip flop - Timing diagram - Master slave flip flops - Registers - Shift registers - Serial transfer - Serial addition

UNIT – V COUNTERS

Design of counters - Ripple counters - Binary ripple counter – design of modulo N counter - BCD Ripple counter - Synchronous counters - Binary up-down counter.

Student Task: (Not for Examination)
- Other number systems can be used for conversion (base 5, 7)
- Gray code wheel can be fabricated for easy conversion.
- IC based counters with different modulus can be wired and tested

Learning Outcome:
Students are able to
- Identify the function of digital devices
- Describe the needs of static and dynamic charges and prepare to design electrical devices for storing it
- Write down the evolution of digital technology
- Identify the basic hardware components and assess its function

Book for Study
1. M.Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Private Limited, New Delhi, 1996.
2. V. Vijayendran, Digital fundamentals –Viswanathan, S., Printers & Publishers Pvt Ltd
3. Principles of Digital electronics by K.Meena, PHI Learning Pvt Ltd, New Delhi, 2009

Book for Reference
1. Leach and Malvino, Digital Principles and Applications, Tata McGraw Hill Publishing Company Limited, New Delhi, Second reprint, 2002.

2. R.P.Jain, Digital Electronics and Systems, Tata Mc Graw Hill, New Delhi, 2004

3. Rajeev Ratan, Deepak Batra, Digital Electronics, Acme Learning Pvt., Ltd., New Delhi, First Edition, (2009)

4. S Salivahanan and S Arivazhagan, Digital Circuits and Design, Vikas Publishing House Pvt Ltd, New Delhi, 2002

Semester	VI	**EC-II** **Communication Electronics**	Hours	6
Course Code	19P621b		Credit	5

Learning Objectives:

- To know the amplitude modulation principles and demodulators.
- To understand the frequency of modulation, phase modulation demodulators.
- To learn the principles of satellite communication
- To study the fiber optic communication.
- To grasp the principles of telephone systems and mobile communication.

Unit-I Amplitude Modulation and Single sideband Modulation

Amplitude modulation principles- Amplitude modulation with sine waves- mathematical representation of AM- Amplitude modulation with digital signals- modulation index and percentage of modulation-side bands and the frequency domain- Amplitude modulators- Amplitude demodulators

Unit-II Frequency Modulation

Frequency modulation principles- phase modulation-sidebands and modulation index- frequency modulation versus amplitude modulation- frequency modulators-phase modulators-frequency demodulators

Unit-III Introduction to Satellite communication

Satellite orbits-satellite angles- satellite repeaters- Geosynchronous satellite-station keeping-attitude control- satellite position- satellite launching- satellite communications systems-satellite subsystems

Unit-IV Fiber optic communications

Light wave communications systems- Fiber optics communication system-Fiber optic cables-construction- types of fiber optics cable: step index- graded index- cable variation- cable attenuation- splicing-connectors-optical transmitters and receivers

Unit-V Telephone systems and its Applications

The telephone system- Subscriber interface- facsimile- image processing- data compression-fax machine operation- cellular Telephone System- paging systems

Students Task: (Not for Examination)

- Various parts of communication blocks can be prepared in a chart.
- Demonstration of light passage through fiber optic cables can be done with available optic fibers with LED

Learning Outcome:

- After the completion of the course the student will be able to acquire knowledge in modulations.
- They are also able to know the different types communication like satellite, fiber, and telephone systems.

Books for study
1. Communication electronics principles and Applications, Louis E. Frenzel Edition, Tata McGraw Hill Publishing company Limited

Books for References:
1. Principles of communication Engineering-Umesh singha Tech India publication, NewDelhi-110005
2. Electronic communication- Dennis Roddy. John coolen-Fourth Edition prentice Hall of india private Ltd, New Delhi- 110001, 1995.

Semester	VI	EC-III MICROPROCESSOR AND ITS APPLICATIONS	Hours	6
Course Code	19P622a		Credit	5

Learning Objectives
- To learn the architecture, instruction formats and addressing modes of 8085 Microprocessors
- To become familiar with the various types of instructions.
- To understand the principles of assembly language programming concepts.
- To study the various interfacing ICs.
- To learn the interfacing of analog and digital devices for microprocessor based systems

UNIT – I MICROPROCESSOR ARCHITECTURE
Intel 8085 Architecture – address bus, Data bus and control bus–pin configuration of 8085 - Instruction cycle – Instruction and data formats – various Addressing modes – flags.

UNIT-II INSTRUCTION SET
8085 instructions – Data transfer instruction – Arithmetic instructions – Logical instructions- Branch instructions – Stack, I/O and Machine control instructions

UNIT – III ASSEMBLY LANGUAGE PROGRAMS
Addition of two 8-bit numbers – 8-bit subtraction – Decimal addition – To find the largest number and smallest number in a data array – Sum of N numbers – Multiplication – Division – Multi byte addition

UNIT – IV PERIPHERAL DEVICES AND INTERFACING
I/O Ports – Programmable Peripheral Interface (IC 8255) – Architecture – control word – Programmable Communication interface (IC 8251) – Programmable Counter/Timer (IC 8253).

UNIT–V MICROPROCESSOR APPLICATIONS
Microprocessor based data acquisition system- Interfacing of A/D converter – Interfacing of D/A converter-Blinking of LED – Interfacing of 7-Segment LED display (Display of decimal numbers) – Frequency measurement – Temperature measurement-Stepper motor control.

Student Task: (Not for Examination)
- 8085 architecture with animation for data flow through buses can be prepared for demonstration.
- LED interface in a kit can be made with the internal time delay routine for on/off with 1 sec time delay

Learning Outcome:
- Students will be able to write programs to run on 8085 microprocessor based systems and Design system using memory chips and peripheral chips for 8 bit 8085 microprocessor.
- Also students will be able to understand and devise techniques for faster execution of instructions, improve speed of operations and enhance performance of microprocessors

Books for Study
1. B.Ram, Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai Publications, New Delhi, Sixth Edition, 2005.
2. Ramesh. S. Gaonkar, Microprocessor Architecture, Programming and Application with the 8085, Penram International Publishers (India), Fourth Edition, 2000.

Books of Reference
1. S.P.Chowdhry, Sunetra Chowdhry, Microprocessor and Peripherals, SCITECH, Kolkotta, 2005.

Semester	VI	EC-III 8051 MICROCONTROLLER ARCHITECTURE AND PROGRAMMING	Hours	6
Course Code	19P622b		Credit	5

Learning Objectives:

- To learn the architecture, of various sub-units of 8051 microcontroller.

- To study the instruction set learn to write simple programmes.
- To become familiar with the I/O port programming in microcontroller.
- To learn the programming modes of 8051 timer.
- To understand the Serial Port Programming and interrupts of microcontroller.

UNIT-I: 8051 Microcontroller Architecture

Microcontroller Versus General Purpose Microprocessor - Microcontroller for Embedded Systems – Criteria For Choosing a Microcontroller – Overview of the 8051 – Internal Architecture – Registers – Internal RAM – 8051 Register Banks and Stack – Program Counter – Addressing Modes.

UNIT-II: Instruction Set

Instruction Set – Data Transfer Instructions – Arithmetic – Logical – Boolean Variables Manipulation – Program Branching – addressing modes– Simple Programs: Addition – Subtraction – Multiplication-Division –DPTR pointer register and external memory – stack operation.

UNIT-III: I/O Port Programming

I/O Port Pins and their Functions – I/O Bit Manipulation Programs - Stepper Motor Interface -ADC with 8051 Microcontroller – LCD Interfacing – DAC Interfacing

UNIT-IV: Timer Programming

Programming 8051 Timers – TMOD Register – TCON Register – Mode 1 Programming – Mode 2 Programming – Program for Generating Square Wave Generator using Mode 1 and Mode 2 – Counter Programming – Pulse Measurement

Unit –V: Serial port programming and interrupts

Basics of Serial Communications – Serial Port Programming – SBUF Register – SCON Register – Simple Program: Transfer and Receive Data Serially – 8051 Interrupts – IE Registers – Interrupt Priority – Simple Program Using Interrupts.

Student Task: (Not for Examination)

- 8051 architecture with animation for data flow through buses can be prepared for demonstration.
- DAC Interfacing with kit.

Learning Outcomes

- Students are able to acquire different learning Outcomes in cognitive, psychomotor and affective domains to demonstrate the following course Learning Outcomes:
- Explain the need of microcontroller, Describe architecture and operation of microcontroller 8051, Develop assembly language programs using instruction set of 8051, Develop programs using I/O port, Timers and serial ports

Book for Study

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. Mckinlay,"8051 Microcontroller and Embedded Systems using Assembly and C", Pearson Education 2007.

Book for References
1. K.UmaRao, AndhePallavi, "The 8051 Microcontrollers Architecture, Programming and Applications", Pearson, Second impression 2011.

Semester	II	SKBC – I TESTING OF ELECTRONIC COMPONENTS Lab only	Hours	2
Course Code	19XP21		Credit	2

Learning Objectives

- To study and test the values of resistors.
- To study and test the values of capacitors and inductors.
- To acquire the skills in handling electronic instruments
- To know the principles of testing of active co
- To get the basic skill of fabrication of PCB

Unit 1: Resistors
Wires – Standard Wire gauge resistances – Values – Fuse wires – ampere ratings – Colour codes of fixed resistors – Variable resistor box checking.

Unit 2: Capacitors and Inductors
Different types of capacitors – Value assignments – Different types of inductors – Value assignments - Checking of capacitors – Capacitors in series connection – Capacitors in parallel connection – Gang capacitor – Decade Condenser box – Checking – Charging & discharge curves.

Unit 3: Familiarization of Instruments
Multimeter: Resistance measurements – Continuity checking – Voltage measurement – current measurement – diode, transistor checking – Capacitor measurement.
CRO: Various Control knobs – frequency measurements by Lissajou's figure method – time period and frequency measurement – external, internal trigger schemes.
AFO: Sine, Square, pulse wave forms – frequency ranges – amplitude variation.

Unit 4: Checking of Active Components
Diode types – Zener diode – B.D. values – transistors – frequency, power types – general notation – AC, BC types – FET – types – checking – Checking with CRO.

Unit 5: PCB design
PCB – basic ideas – layout drawing – preparation of PCB for LCR, transistor – 5V power supply

Learning Outcome:
On completion of this course students will be able
- To handle various electronic components.
- And also they can apply the skills in handling electronic instrument. Students are able to get the basic skill of fabrication of PCB

Book for Study
Study material on electronic components (Theory and practice), Department of Physics, NMC, Puthanampatti (2015)

Semester	II	SKBC II Mini Project(Group Project)	Hours	2
Course Code	19XP32		Credit	2

Learning Objectives:

- To impart skill on selecting and executing working models.
- To impart leadership quality in collective working and team spirit.

Syllabus:

The following fields for mini project submission (Group Projects)

- Electronics

- Fabrication of metal objects

- Heat and thermodynamics

- Electric working models

- Cell phone based physics application

- Smart phone App development

- Space models

- Computer based modules

- Automobile based projects

Learning Outcome:
- Students acquire the focused attention on a particular task in a stipulated time.
- Students could develop the organizational skill and leadership quality.
- Students will get the exposure on the outside world for checking the availability of
- Components and means of purchasing the quality products with technical details.

Semester	V	NMEC-I	Hours	2
Course Code	**19P4N1**	**BIO PHYSICS**	Credit	2

Learning Objectives
- To study the basics of bio-physics and to learn principles of biomechanics, biochemistry
- To learn the various chromatographic methods for separations.
- To study the bio-molecules through different physic-chemical methods.
- To grasp the properties of bio-molecules by model building
- To know the function of heart beat, electrocardiogram and pumping of activity of heart

Unit 1: INTRODUCTION TO BIO-PHYSICS
Biophysics as a separate field– Branches of Bio physics – basic concepts of Bio physics. Energy Pathways in Biology-Bio potential – action potential nervous system

Unit 2: SEPARATION TECHNIQUES
Introduction to chromatography- classification of chromatography – paper and thin layer chromatography – column chromatography –Ion chromatography - high performance liquid chromatography – gas chromatography

Unit 3: PHYSICO CHEMICAL TECHNIQUES TO STUDY BIO MOLECULES
Introduction – hydration of macromolecules – role of friction – diffusion – sedimentation – in ultra centrifuge – applications.

Unit 4: MODEL BUILDING
Patterson's synthesis–Free energy – high energy phosphate – bio energetic of coupled reactions – photo synthesis– membrane transport – membrane permeability – passive and active transport – glucose transport into intestinal epithelial cells.

Unit 5: BIO MECHANICS
Introduction – muscle cells – properties and functions – various types – striated muscles – heart – heart beat and heart beat control – stroke volume – electrocardiogram – arterial blood pressure - electrical activity of the heart– pumping activity of heart

Learning Outcomes:
- The students should be able to interpreting elastic nature of muscles and its bio motion.
- The knowledge of chromatography could be understood.
- The students are able to analyses glucose transport into the intestinal.

Book for Study
1. G.R Chatwal –Bio Physics – Himalaya Publishing House, Bombay. (1st edition 2005)

Book for Reference
1. S.Palanisamy and Shanmugavelu, Principles of Biophysics, Palani Paramount Publication, 2002 Edition.
2. Vasanta Pattabi and N.Gautam, Biophysics, Narosa Publishing House, 2005.
3. S. Thiraviaraj, Biophysics, Saras Publication, 1993 Editor.

Semester	IV	**NMEC-II**	**Hours**	2
Course Code	**19P5N2**	**Non-conventional Energy Resources**	**Credit**	2

Learning Objectives
The course should enable the students to:
- To understand the different forms of non-conventional energy resources.
- To study the various methods of using solar energy.
- To learn the basic working of wind energy convertor systems.
- To grasp the principles of using bio-mass.
- To study the nature of geothermal energy and different forms of using it.

Unit 1: Introduction Energy Sources
Primary and secondary energy source-Non renewable energy sources and their availability-renewable energy resources- advantages of renewable energy

Unit 2: Solar Energy
Solar energy collectors-Flat Plate Collectors: advantages-solar air Heaters: Applications-solar pond: Applications.

Unit 3: Wind Energy
Wind Energy Conversion System (WECS)-Basic components of WECS- classification-advantages-disadvantages- applications of wind energy.

Unit 4: Energy from Biomass
Biogas generation- Biogas Plants-Types of Biogas Plants- advantage-disadvantages-Biomass as energy source-pyrolysis-Hydrolysis-ethanol from wood by acid hydrolysis

Unit 5: Geothermal Energy
Nature of Geothermal fields-Geothermal Sources-Hydrothermal Resources: Vapour Dominated System-Liquid Dominated Systems-Advantages and disadvantages over other energy- applications

Learning Outcome:
Upon completion of the course, the student will be able to gain following:
- Describe the environmental aspects of non-conventional energy resources,
- Know the necessity of renewable energy resources,
- Appreciate the need of solar energy, Wind Energy and the various components used in energy generation and know the classifications,
- Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications,
- Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations,
- Acquire the knowledge of geothermal principles and applications.

Book for Study

1. Nonconventional energy sources, G.D.Rai, Khanna publishers, 4th Edition, 1997

Book for Reference

1. J.C. Meveigh, Sun power – An introduction to the Application of Solar Energy,– Bigton polytechnique, Pergamon Press, 1977.
2. M.P. Agarwal, Solar Energy –S.Chand & Company Ltd, New Delhi. (1989)
3. Renewable Energy: power for a sustainable future by Godfery Boyle, Alden Oess Ltd, Oxford, 1996

Semester	III	AC-I APPLIED PHYSICS – I (For B.Sc.,Computer Science Students- 2019 onwards)	Hours	5
Course Code	19S309A		Credit	4

Learning Objectives
- This course designed to impart the knowledge of semiconducting devices such as diodes, transistors
- To give clear understanding of op-amp and its importance.
- To study the various number systems and principles of Boolean algebra
- To know the idea for the simplification of Boolean expression using K Maps
- To learn the working of adders, subtractors, flip-flops,encoders,decoders and counters.

Unit – I: Diodes
V-I characteristics of PN junction - Zener diode –characteristics- Zener diode as voltage stabilizer - Light Emitting Diode – Photo diode –operation and characteristics – Transistor :Characteristics of Common emitter connection – Transistor as an amplifier in CE arrangement-JFET- Principles and working – Characteristics and Parameters-Difference between JFET and Bipolar transistor.

Unit – II: Operational amplifier
Operational amplifier – ideal characteristics – Inverting amplifier –Non inverting amplifier – voltage follower – Summing amplifiers – Subtractor -Integrator – Differentiator.

UNIT – III: BINARY SYSTEMS, BOOLEAN ALGEBRA
Binary numbers - Number base conversions - Octal and Hexa decimal numbers - Complements -1's and 2's complement addition and subtraction -Boolean algebra - Basic definitions and properties of Boolean algebra.

UNIT – IV:DIGITAL LOGIC GATES AND BOOLEAN FUNCTIONS
Digital logic gates - Universal gates De Morgan's theorem -Karnaugh Map method of simplification of Boolean expression – Product of sums simplification -Two, three and four variable map methods - - Don't care conditions.

UNIT – V: COMBINATIONAL AND SEQUENTIAL LOGIC
Half and Full adders - Half and Full Subtractors - Decoders - Demultiplexers - Encoders – Multiplexers-Flip flops - Basic flip flop circuit - D flip flop -JK flip flop Shift registers
- Ripple counters – 4-bit binary ripple counter -Binary up-down counter

Learning Outcome:
- Students should be able to apply the idea of transistors
- Students can be evaluating the electronic devices for specific applications.
- Students can be able to perform various conversion processes in digital electronics.
- They can analyze and design various combinational and sequential circuits.

Books for Study

1. V. K.Mehta, Rohit Mehta, Principles of Electronics, S.Chand& Company, New Delhi, Eleventh Edition, 2008.
2. L D.Roy Choudhury, Shail Jain, Linear Integrated Circuits, New Age International Pvt., Ltd., New Delhi, 1999.
3. M.Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Private Limited, New Delhi, 1996.
4. V. Vijayendran, Digital fundamentals –Viswanathan, S., Printers & Publishers Pvt Ltd

Books for Reference

1. S.Salivahanan, N. Suresh Kumar, A.Vallavaraj, Electronic Devices and Circuits, Tata McGraw- Hill Publishing Company Limited, New Delhi, 2006
2. Leach and Malvino, Digital Principles and Applications, Tata McGraw Hill Publishing Company Limited, New Delhi, Second reprint, 2002.
3. R. P. Jain, Digital Electronics and Systems, Tata Mc Graw Hill, New Delhi, 2004
4. Rajeev Ratan, Deepak Batra, Digital Electronics, Acme Learning Pvt., Ltd., New Delhi, First Edition, (2009)

Semester	III	**AC-II**	**Hours**	3+3
Course Code	**19S310L**	**APPLIED PHYSICS PRACTICAL– II** (For B.Sc., Computer Science Students- 2019 onwards)	**Credit**	**4**

Learning Objectives:

- The objective of the course is to provide the student hands-on experiences in analog digital electronics and microcontroller through laboratory experiments that explore the knowledge on electronics.
- They can get knowledge on hardware processing.

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LIST OF EXPERIMENTS
(Any 12 experiments)

</div>

1. V-I characteristics of Semiconductor Diode

2. V-I characteristics of Zener Diode-Determination of breakdown voltage.

3. Characteristics of LED

4. Construction and study of Inverting and Non-Inverting amplifier using operational amplifier

5. Construction of adder and subtractor circuits using Op-Amp

6. Study of logic gates using ICs

7. Verification of De-Morgan's theorem

8. Universality of NAND gate.

9. Universality of NOR gate.

10. Construction and verification of Half adder and full adder circuits

11. Construction and verification of Half subtractor and Full subtractor circuits

12. Study of R-S flip flop

13. Study of JK and D flip flops

14. Addition and subtraction of two 8-bit numbers using microcontroller 8051 kit

15. Multiplication and division using microcontroller 8051 kit

16. Interfacing of LED to a microcontroller 8051 kit

17. Interfacing of LCD to a microcontroller 8051 kit

18. Interfacing of stepper motor to a microcontroller 8051 kit

19. Generation of waveform using timers to a microcontroller 8051 kit

20. Counting of pulses to a microcontroller 8051 kit

21. Find the biggest number in a given array using 8051 microcontroller kit

22. Find the smallest number in a given array using 8051 microcontroller kit

Learning Outcome:

Having successfully completed the course, the student will be able to:

- Understand the concepts and use research equipment (microscope, oscilloscope, etc.)
- Design and conduct experiments that probe materials properties.
- Work independently and function as a team.
- Develop communication skills (oral, graphic and written).

Semester	IV	**AC-III** **APPLIED PHYSICS – II** **(For B.Sc., Computer Science Students)**	**Hours**	**5**
Course Code	**19S412A**		**Credit**	**4**

- **Learning Objectives:**

- To learn the architecture, of various sub-units of 8051 microcontroller.

- To study the instruction set of microcontroller.
- To become familiar with the I/O port programming in microcontroller.
- To learn the working modes of 8051 timer and applications of timer.
- To understand the Serial Port Programming and interrupts of microcontroller.

UNIT-I: Microcontroller Architecture

Microcontroller Versus General Purpose Microprocessor - Microcontroller for Embedded Systems – Criteria For Choosing a Microcontroller – Overview of the 8051 – Internal Architecture – Registers – Internal RAM – 8051 Register Banks and Stack – Program Counter – Addressing Modes.

UNIT-II: Instruction Set

Instruction Set – Data Transfer Instructions – Arithmetic – Logical – Boolean Variables Manipulation – Program Branching – Simple Programs: Addition – Subtraction – Multiplication-Division – addressing modes – DPTR pointer register and external memory – stack operation – subroutines.

UNIT-III: I/O Port Programming and interfacing

I/O Port Pins and their Functions – Interface 0804 with 8051 Microcontroller – LCD Interfacing – DAC Interfacing

UNIT-IV: Timer 8051 and application of timer

Programming 8051 Timers – TMOD Register – TCON Register – Mode 1 Programming – Mode 2 Programming – Program for Generating Square Wave Generator using Mode 1 and Mode 2 – Counter Programming

UNIT-V Serial Port Programming

Basics of Serial Communications – Serial Port Programming – SBUF Register – SCON Register – Simple Program: Transfer and Receive Data Serially – 8051 Interrupts – IE Registers – Interrupt Priority

Books for Study:

1. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. Mckinlay,"*8051 Microcontroller and Embedded Systems using Assembly and C*", Pearson Education 2007.
2. MykePredko, "*Programming and customizing the 8051 microcontroller*", Tata McGraw Hill 2001.
3. Michael J. Pont, "*Embedded C",* Pearson Education, First Edition,2013.

Books for Reference:

1. K.UmaRao, AndhePallavi, "The 8051 Microcontrollers Architecture, Programming and Applications", Pearson, Second impression 2011.
2. Kenneth.J.Ayala, "The 8051 Microcontroller", Thomson, Third Edition 2007.
3. ZdraUkoKarakehayou, KnudSmedChristengen,"Embedded System Design with 8051 Microcontroller", Marcel Dekker Inc, First Edition, 2010.

Course Outcomes:

After the completion of this course the student will be able to

- Understand the basic working of 8051, which is the basic of all microcontroller
- Know the working nature of microcontroller architecture, and programming techniques.
- Know the fundamentals of port programming and interfacing techniques
- Learn the techniques of serial port programming in 8051 and on interrupts.

Semester	III	**AC-I**	Hours	5
Course Code	19Y309A	**ALLIED PHYSICS –I** (For B.Sc.,Chemistry Students)	Credit	4

Learning Objectives

- To study the basic principles on properties of solid and liquid, force, gravitation, thermal and optical phenomena.
- Understand the properties of solid, liquid and gas
- To understand the significance scales and vector parameters in physics
- To analyze the properties of light
- To determine the nature of gravity.

UNIT –I PROPERTIES OF MATTER

Elasticity: Stress-strain-Hook's law-different moduli of elasticity-Poisson's ratio – bending of beam – Young's modulus by non-uniform bending
Viscosity: Coefficient of viscosity – Poiseuille's formula – comparison of viscosities: burette method– terminal velocity
Surface tension: definition-unit and dimension-Molecular theory of surface tension – surface energy-Jaegar's method

UNIT-II WAVES AND OSCILLATIONS

Simple harmonic motion – composition of two simple harmonic motions at right angles – Lissajou's figures – uses- Transverse vibration of a stretched string –Sonometer
Ultrasonics- production: piezoelectric method- application and uses

UNIT – III MECHANICS

Gravitation fields and potentials- Newton's law of gravitation – Experimental determination of G by Boy's method - variation of 'g' with altitude, depth and latitude–Gravitational field – intensity of the field – Gravitational potential and potential energy
Kepler's law – deduction of Newton's law of gravitation from Kepler's laws

UNIT-IV THERMAL PHYSICS

Postulates of the kinetic theory of gases – Van der Walls equation of state – derivation of critical constants - Joule-Kelvin effect – Joule-Thomson porous plug experiment - liquefaction of gases - Linde's process
Laws of thermodynamics – Heat engine-entropy – change of entropy in reversible and irreversible processes

UNIT –V OPTICS

Interference: Introduction - Interference in thin films.
Diffraction: Determination of wavelength of light using transmission grating.
Polarization: Introduction – polarization by reflection – optical activity – Laurent's Half shade polarimeter

Learning Outcome

Students can be able to

- Identify the properties of solid , liquid and gas
- Analyze scalar and vector parameters in physics
- Describe the dynamics of planets and objects under various gravitational forces
- Apply and analyze the properties of optical range for industrial and research developments

Books for study

1. R.Murugeshan, Allied Physics, S.Chand & Co., Ltd., New Delhi, Revised edition, 2005. (Unit I,II,IV and V)
2. D. S. Mathur, "Mechanics", S. Chand & Company Ltd., New Delhi (2003).(Unit-III)

Books for Reference

1. D. S. Mathur, Properties of Matter, S. Chand & Co., New Delhi.
2. P.K.Srivastava, Mechanics, New Age International Publishers, New Delhi, 1997

Semester	I & III	**AC-II ALLIED PHYSICS –I** (For B.Sc., Mathematics (I Semester) and Chemistry (III Semester) Students)	Hours	3
Course Code	19M104L /19Y310L		Credit	4

Learning Objectives:

The objective of the course is

- To provide the student hands-on experiences in analog and digital electronics through laboratory experiments that explore the knowledge on electronics.
- They can get knowledge on hardware processing. They also learn usage of telescope and microscope.

(Any 12 experiments)

1. Young's Modulus – Non uniform bending

2. Surface tension – drop weight method

3. Comparison of viscosities of two liquids- Burette method

4. Specific heat capacity of a liquid- Newton's law of cooling

5. Sonometer- verification of laws

6. Newton's rings- Determination of radius of curvature

7. Spectrometer- Refractive index of prism

8. Spectrometer- Grating at normal incidence

9. Carey foster's bridge- specific resistance of a coil

10. Metre bridge- determination of resistance

11. Potentiometer – ammeter calibration

12. Characteristics of PN junction diode

13. Characteristics of Zener diode

14. Bridge rectifier

15. Transistor characteristics –CE configuration

16. Logic gates using IC'S

17. NAND gate as a Universal gate

18. NOR gate as a Universal gate

19. De Morgan's theorem

20. Verification of Boolean algebra

Learning Outcome:

Having successfully completed the course, the student will be able to:

- Understand the concepts and use research equipment (microscope, oscilloscope, etc.)
- Work independently and function as a team.
- Develop communication skills (oral, graphic and written).
- Apply a methodology for materials selection to scientific problems.

Semester	IV	**AC-III** **ALLIED PHYSICS –II** **(For B.Sc.,Chemistry Students)**	**Hours**	**5**
Course Code	19Y412A		**Credit**	**4**

Objective

- To understand the nature of static, dynamic charges and evaluate devices with various capacities;
- To study the principles of current electricity and EMI.
- To learn the concepts of atomic and nuclear physics.
- To study the physics of semiconductors and various electronic devices.
- To understand the various number systems, logic gates and adder, subtractor circuits

UNIT - I ELECTROSTATICS

Basic concepts – coulomb's law – Electric field – Electric field due to a point charge – lines of force – electric flux – Gauss's law and its proof- Applications of gauss law: uniformly charged sphere- electric potential - Capacitance of conductor – principle of capacitor - capacitors in series and parallel – Energy stored in a charged capacitor.

UNIT – II CURRENT ELECTRICITY AND ELECTROMAGNETIC INDUCTION

Current and current density – ohm's law – Kirchoff's laws and its applications: Wheatstone's network - Carey foster bridge. Introduction – Faraday's law - self-induction – self-inductance of a long solenoid – determination of self-inductance by Rayleigh's method – Mutual induction – Experimental determination of mutual inductance.

UNIT-III ATOMIC PHYSICS AND NUCLEAR PHYSICS

Vector atom model – quantum numbers associated with the vector atom model– The Pauli Exclusion principle – Magnetic dipole moment due to orbital motion of the electron – The stern and Gerlach experiment.The liquid drop model – mass defect – binding energy – ionization chamber -uses–Nuclear fission – energy released in fission – chain reaction – atom bomb– Nuclear fusion – source of solar energy.

UNIT IV BASIC ELECTRONICS

Conductors, insulators and semiconductor-types of semiconductor-PN junction diode-Zener diode – experiment to study the characteristics of PN junction and Zener diode – Light Emitting Diode – transistor –Characteristics –common emitter configuration.

UNIT –V DIGITAL ELECTRONICS

Binary numbers – Number base conversions – Octal and Hexa decimal numbers – digital Logic gates –Boolean algebra – Basic definitions –properties of Boolean algebra – Universality of NAND and NOR gate – De Morgan's theorem – Half adder and Full adder – Half subtractor and Full subtractor.

Learning Outcome

Students are able to

- Identify the function of digital devices
- Describe the needs of static and dynamic charges and prepare to design electrical devices for storing it
- Write down the evolution of digital technology
- Identify the basic hardware components and assess its function

Books for Study

1. R.Murugesan, Electricity and Magnetism, S.Chand and Co., New Delhi, 1995.(Unit I,II)
2. R.Murugeshan, Allied Physics, S.Chand & Co., Ltd., New Delhi, Revised edition, 2005. (Unit III,IV and V)

Books for Reference

1. Brijlal, Subramaniam, Electricity and Magnetism, Ratan Prakashan Mandir Education and University Publishers, Agra, (2000)
2. K.K.Tewari, Electricity and Magnetism, S. Chand and Co., New Delhi, (2005)
3. M.Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Private Limited, New Delhi, 1996.
4. K.Mehta, Rohit Mehta, Principles of Electronics, S.Chand & Company, New Delhi, Eleventh Edition,2008.

Semester	I	**AC-I**	**Hours**	**4**
Course Code	19M103A	**ALLIED PHYSICS –I** (For B.Sc., Mathematics Students)	**Credit**	**4**

Learning Objectives

- To study the basic principles on properties of solid and liquid, force, gravitation, thermal and optical phenomena.
- Understand the properties of solid, liquid and gas
- To understand the significance scales and vector parameters in physics
- To analyze the properties of light
- To determine the nature of gravity.

UNIT –I PROPERTIES OF MATTER

Elasticity: Stress-strain-Hook's law-different moduli of elasticity-Poisson's ratio – bending of beam – Young's modulus by non-uniform bending Viscosity: Coefficient of viscosity – Poiseuille's formula – comparison of viscosities: burette method– terminal velocity Surface tension: definition-unit and dimension-Molecular theory of surface tension – surface energy-Jaeger's method

UNIT-II STATICS

Scalars and Vectors and force-Velocity vs Speed- Forces as Vectors- Resultants of Force Systems-moment of a force- centre of gravity-centre of gravity of simple uniform bodies -centre of gravity of a solid hemisphere

UNIT – III GRAVITATION

Gravitation fields and potentials: Newton's law of gravitation – Experimental determination of G by Boy's method - variation of 'g' with altitude, depth and latitude–Gravitational field – intensity of the field – Gravitational potential – Kepler's law – deduction of Newton's law of gravitation from Kepler's laws

UNIT-IV THERMAL PHYSICS

Postulates of the kinetic theory of gases – Van der Walls equation of state – derivation of critical constants - Joule-Kelvin effect – Joule-Thomson porous plug experiment – liquefaction of gases: Linde's process - laws of thermodynamics –Heat engine-entropy – change of entropy in reversible and irreversible processes

UNIT –V OPTICS

Physical optics: Interference in thin films. Diffraction: determination of wavelength of light using transmission grating. Polarization: polarization by reflection – optical activity – Laurent's Half shade polarimeter

Learning Outcome

Students can be able to
- Identify the properties of solid , liquid and gas
- Analyze scalar and vector parameters in physics
- Describe the dynamics of planets and objects under various gravitational forces
- Apply and analyze the properties of optical range for industrial and research developments

Books for study
1. R. Murugeshan, Allied Physics, S.Chand & Co., Ltd., New Delhi, Revised edition, 2005.
2. D. S. Mathur, "Mechanics", S. Chand & Company Ltd., New Delhi (2003).

Books for Reference
3. D. S. Mathur, Properties of Matter, S. Chand & Co., New Delhi.
4. P. K. Srivastava, Mechanics, New Age International Publishers, New Delhi, 1997

Semester	II	**AC-III**	**Hours**	**4**
Course Code	19M206A	**ALLIED PHYSICS –II** **(For B.Sc., Mathematics Students)**	**Credit**	**4**

Objective
- To study the dynamics of Simple Harmonic Motion
- To understand the nature of static, dynamic charges and evaluate devices with various capacities.
- To learn the basics of electronic components
- To summarize the evolution of digital technology
- To understand the concept of various number systems, Boolean algebra, logic gates,adder, and subtractor circuit ICs

UNIT - I DYNAMICS AND SIMPLE HARMONIC MOTION

Velocity-acceleration-relative velocity-angular velocity-Newton's laws of motion-equation of motion--rectilinear motion under constant acceleration-Simple harmonic motion – composition of two simple harmonic motions at right angles – Lissajou's figures – uses.

UNIT – II ELECTROSTATICS

Basic concepts – coulomb's law – Electric field – Electric field due to a point charge – lines of force – electric flux – Gauss's law and its proof- Applications of gauss law: uniformly charged sphere- Electric potential-Capacitance of a conductor – principle of capacitor - capacitors in series and parallel – Energy stored in a charged capacitor.

UNIT – III CURRENT ELECTRICITY AND ELECTROMAGNETIC INDUCTION

Current and current density – ohm's law – Kirchhoff's laws and its applications: Wheatstone's network - Carey foster bridge. Introduction – Faraday's law - self-induction – self-inductance of a long solenoid – determination of self-inductance by Raleigh's method – Mutual induction – Experimental determination of mutual inductance

UNIT IV BASIC ELECTRONICS

Zener diode – experiment to study the characteristics of zener diode – Light Emitting Diode – transistor –Characteristics –common emitter configuration – Transistor amplifier – oscillators – condition for oscillators- phase shift oscillators.

UNIT –V DIGITAL ELECTRONICS

Binary numbers – Number base conversions – Octal and Hexa decimal numbers – digital Logic gates –Boolean algebra – Basic definitions – properties of Boolean algebra – Universality of NAND and NOR gate – De Morgan's theorem – Half adder and Full adder – Half subtractor and Full subtractor

Learning Outcome

Students are able to

- Identify the function of digital devices
- Describe the needs of static and dynamic charges and prepare to design electrical devices for storing it
- Write down the evolution of digital technology
- Identify the basic hardware components and assess its function

Books for Study

1. R. Murugesan, Electricity and Magnetism, S.Chand and Co., New Delhi, 1995.
2. R. Murugeshan, Allied Physics, S.Chand & Co., Ltd., New Delhi, Revised edition, 2005.

Books for Reference

3. Brijlal, Subramaniam, Electricity and Magnetism, Ratan Prakashan Mandir Education and University Publishers, Agra, (2000)
4. K.K.Tewari, Electricity and Magnetism, S. Chand and Co., New Delhi, (2005)
5. .M.Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Private Limited, New Delhi, 1996.
6. K.Mehta, Rohit Mehta, Principles of Electronics, S.Chand & Company, New Delhi, Eleventh Edition,2008