GURU NANAK COLLEGE (AUTONOMOUS)

(Affiliated to the University of Madras and Accredited at 'A++' Grade by NAAC)
Guru Nanak Salai, Velachery, Chennai – 600 042

SCHOOL OF SCIENCES
B.Sc., PHYSICS

(SEMESTER PATTERN WITH CHOICE BASED CREDIT SYSTEM)

Syllabus

(For the UG Batch of 2024-27 and thereafter)

CONTENTS

LOCF - LEARNING OUTCOME BASED CURRICULUM FRAMEWORK

1.   Preamble - About the Programme

Study of physics is very important for a student of science. Physics, a core discipline is the fundamental and foremost to all-natural sciences. It is that branch of science that provides answers to the questions largely depending on the behavior of non-living things in nature. Starting from producing fire by rubbing two stones to the theory of relativity, is a vast ocean of knowledge. In every appliance, we come across in everyday life, starting from a small pin to a rocket, basic principles of physics are used. A pin is based on the principle of wedge and the ascent of a rocket is based on the principle of newtons third law of motion. Physics provides the base for a deeper understanding of nature and enable to follow new development not only in basic science but also in applied technology. Physics interact with the society and other discipline such as Medicine, Chemistry, Agriculture, Engineering etc. in many important ways. The physics education is to provide the student with a broad understanding of the physical principles of the universe, to help them develop critical thinking and quantitative reasoning skills to empower them to think creatively. Elective courses focus on overall professional development by inculcating leadership and communication skills. The curriculum for B.sc degree in physics based on learning outcome-based curriculum of framework (LOCF) model covers a fascinating range of fundamental topics. The learning outcome of the subject are intended to provide a deeper understanding of principles of physics combined with developing the required practical skills. As the curriculum framed is based on the syllabus of the national level entrance examinations like Joint Admission Test for masters (JAM)and Joint Entrance screening test (JEST), it will support the students to complete in   competitive examinations for their post-graduation studies. They can enrich their knowledge in the field of their choice by taking up IDE paper. This program gives the provision to the students to undergo an internship program during the course of the study. Students in turn can each academic credit. This program provides entrepreneurship required for building their career in the appropriate fields of interest.

2.   VISION

Inculcate the conceptual knowledge in Physics and make them skillful using "State of Art" teaching methodology. Provide a transformative learning and research ambiance with the inclusion of all the weaker sections of the society by igniting and nurturing enthusiasm,

interests and passion in the study of physics to generate new knowledge and to serve the globe. Igniting the spirit of learning to gain scientific skills and keep up with ongoing scientific development and exploring its area of research, thriving towards excellency ascribed with ethical values.

3. MISSION

1. To impart quality education in theoretical as well as experimental physics with special emphasis on 'learning by doing' to promote Science and technology.

2. To kindle the young minds to be the champions of physics and discover their talents through dedication to teaching commitment towards students and innovative instructional methods like PowerPoint presentations and visual aids.

3. To provide an exciting learning opportunity for non-physics and non-science programme that provides a basic understanding of physics and problem-solving skills.

4. To organize outreach activities to promote scientific culture.

4. PROGRAMME EDUCATIONAL OUTCOME (PEO)

PEO 1: Values of Life, Ethics & Social Concern

The graduates exhibit truth, loyalty, and love as integral moral principles, thereby contributing to a society characterized by enhanced well-being and fundamental goodness in behavior.

PEO 2: Employability & Entrepreneurship

The graduates apply analytical, logical, and critical problem-solving skills in professional contexts, elevating employability and cultivating entrepreneurial capabilities through upskilling.

PEO 3: Regional/National/Global Relevance & Competency

The graduates foster advanced analytical skills and a heightened appreciation for current Regional/National/Global perspectives, enabling informed and sustainable decision-making in a dynamic environment.

PEO 4: Skill Enhancement, Self-Directed & Lifelong Learning

The graduates independently engage in skill-based learning, utilizing infrastructure and

opportunities for continuous upskilling, enabling self-evaluation and lifelong excellence attainment.

PEO 5: Research Skills & Innovation

The graduates proficiently apply scientific reasoning, fostering creativity, strategic thinking, and effective problem-solving skills. They demonstrate a core competency in generating innovative ideas for advancements and inventions.

5. PROGRAMME OUTCOME (PO)

PO 1: Interpret the motion and behavior of matter through space and time, using related concepts.

PO 2: Establishes the "validity of Physical theories in a Scientific Method".

PO 3: Develop a methodical approach to compare the implications of a theory with the conclusions drawn from its related experiments.

PO 4: Analyse the Observations to test the validity of a theory in a logical, unbiased, and repeatable way.

PO 5: Update the students to the need of the hour through Integrated electronics and Microprocessors and Microcontrollers.

6. PROGRAM SPECIFIC OUTCOME (PSO)

PSO1: Prepare the students for higher studies and research through Numerical analysis and Mathematical methods involved in Physics.

PSO2: Subject wisdom gained for multitasking that is required for facing challenges in the competitive world.

PSO3: Apply appropriate techniques and modern tools to complex scientific activities, and Develop skills in communicating Physics-related topics by learning beyond syllabus.

PSO4: Communicate explicitly and exchange ideas with regard to theoretical and experimental aspects, the impacts of Physics on environment and society.

PSO5: Acquired the ability to design knowledge and demonstrate their understanding of the scientific methods and processes.

7.   PEO – PO mapping

	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
PO 1	5	5	5	5	5
PO 2	5	5	5	5	4
PO 3	5	5	4	5	5
PO 4	5	5	5	4	5
PO 5	5	5	5	5	5

8.   PO – PSO mapping

	PO 1	PO2	PO3	PO4	PO5
PSO 1	3	3	3	3	3
PSO 2	3	3	3	3	2
PSO 3	3	3	2	3	3
PSO 4	2	3	3	3	3
PSO 5	3	3	3	3	3

9.   Choice Based Credit System (CBCS)

The College follows the CBCS with Grades under the Semester pattern. Each course is provided with a credit point based on the quantum of subject matter, complexity of the content and the hours of teaching allotted. This is done after a thorough analysis of the content of each subject paper by the members of the Board of Studies and with the approval of the Academic Council. Students are also offered a variety of Job oriented Elective, Multidisciplinary skill-based courses as part of the curriculum. Students can earn extra credits by opting for Massive Open Online Courses (MOOCs) and Certificate Courses.

The evaluation method under CBCS involves a more acceptable grading system that reflects the personality of the student. This is represented as Cumulative Grade Point Average (CGPA) and Grade Point Average (GPA) which are indicators of the Academic Performance of the student. It provides students with a scope for horizontal mobility and empowers them with the flexibility of learning at their convenience.

Eligibility for Admission

Candidates admitted to the first year of the UG programme should have passed the higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an examination accepted as equivalent thereof by the Syndicate of the University of Madras.

Duration of the Course

The UG programme is of three years duration with six semesters and the PG programme is of two years duration with four semesters. The period from June to November is termed as the odd semester and the period from December to April is referred to as the even semester. Each semester must compulsorily have 90 working days before the students appear for the final End Semester Exam.

Course of Study

The main course of study for the Bachelor's Degree shall consist of the following:

Foundation Courses

PART - I:Tamil/ Hindi /Sanskrit/French

PART - II: English

Core Courses

PART - III: Consisting of (a) Main subject (b) Allied Subjects (c) Elective subjects related to the main subject of study and project work.

PART – IV: Those who have not studied Tamil up to XII standard and have taken a non- Tamil language under Part – I, shall opt for Basic Tamil in the first two semesters.

Those who have studied Tamil up to XII standard, and taken a non -Tamil language under Part – I, shall opt for Advanced Tamil in the first two semesters.

Others, who do not come under either of the clauses mentioned above, can choose a Non-Major Elective (NME) in the first two semesters.

Soft Skills (I, II, III & IV Semesters)

Self-Study (Compulsory) Course (III Semester)

Environmental Studies (IV Semester)

Value Education (V Semester)

Summer Internship (After IV Semester)

PART - V: Compulsory Extension Services

A Student shall be awarded one credit for compulsory extension service. A student must enroll in NSS / NCC /Sports & Games/ Citizen Consumer Club / Enviro Club or any other service organization in the College and should put in compulsory minimum attendance of 40 hours, which shall be duly certified by the Principal of the College. If a student lacks 40 hours compulsory minimum attendance in the extension services in any Semester, s/he shall have to compensate the same, during the subsequent Semesters.

Course Structure

The UG programme consists of 15-19 Core courses with 3-4 credits for each paper, 3 Elective courses and 4 Allied courses with 4-5 credits for each paper in addition to 4 Soft Skill courses with two credits each. Internship as a compulsory component carries 2 credits.

10. Consolidated Credit Structure for all the 3 years

	No. of Paper	Credits
Languages	8	24
Core (Including Practical)	20	80
Elective (Including Non-Major Elective)	5	19
Soft Skills	4	8
Internship	-	2
Project	1	2
Self-Study	1	2
EVS	1	2
Value Education	1	2
Extension activity	-	1
Total		142

11.   Credit distribution for each semester

Semester I		Subject	Credit	Hours / Week	Marks		Total
Course Component					Internal	External	
Part I	Language	Language–I	3	6	50	50	100
Part II	English	English–I	3	4	50	50	100
Part III	Core Theory – 1	Mechanics and Properties of Matter	4	5	50	50	100
	Core Practical - I	Practical General - I	*	3	*	*	*
	Allied - I	Allied Chemistry - I	3	5	50	50	100
	Allied Practical- I	Allied Chemistry Practical-I	*	3	*	*	*
Part IV	Non-Major Elective-I	Basic Tamil-I /Advanced Tamil-I/ Elective Paper offered by the respective programme**	2	2	50	50	100
	Soft Skills-I	Communication Skill and Personality Development Skills	2	2	50	50	100
Total			**17**	**30**			
Semester II		Subject	Credit	Horus / Week	Marks		Total
Course Component					Internal	External	
Part I	Language	Language–II	3	6	50	50	100
Part II	English	English– II	3	4	50	50	100
Part III	Core Theory - 2	Thermal Physics & Acoustics	4	5	50	50	100
	Core Practical - I	Practical General I	4	3	50	50	100
	Allied - II	Allied Chemistry – II	3	5	50	50	100
	Allied Practical- I	Allied Chemistry Practical -II	4	3	50	50	100
Part IV	Non-Major Elective-II	Basic Tamil-II/ Advanced Tamil-II/ Elective Paper offered by the respective programme**	2	2	50	50	100
	Soft Skills-II	Interview Skills and Resume Writing	2	2	50	50	100
Total			**25**	**30**			

Semester III		Subject	Credit	Hours / Week	Marks		Total
Course Component					Internal	External	
Part I	Language	Language–III	3	6	50	50	100
Part II	English	English–III	3	4	50	50	100
Part III	Core Theory - 3	Optics and Spectroscopy	4	5	50	50	100
	Core Practical - 2	Practical General - II	*	3	*	*	*
	Mini Project	Mini Project	2	2	50	50	100
	Allied –II	Mathematics - I	5	8	50	50	100
Part IV	Soft Skills-III	Digital Proficiency and Multimedia Skills	2	2	50	50	100
	Self-Study (Compulsory Course) Can choose any one	Indian Heritage and Knowledge System/ Contemporary World and Sustainable Development	2	--	50	50	100
Total			**21**	**30**			
Semester IV		Subject	Credit	Horus / Week	Marks		Total
Course Component					Internal	External	
Part I	Language	Language–IV	3	6	50	50	100
Part II	English	English– IV	3	4	50	50	100
Part III	Core Theory - 4	Electricity and Electromagnetism	4	5	50	50	100
	Core Practical- 2	Practical General - II	4	3	50	50	100
	Allied - II	Mathematics - II	5	8	50	50	100
Part IV	EVS	Environmental Studies	2	2	50	50	100
	Soft Skills-IV	Foundations of Quantitative Aptitude	2	2	50	50	100
Total			**23**	**30**			

Semester V		Subject	Credit	Hours / Week	Marks		Total
Course Component					Internal	External	
Part III	Core Theory - 5	Atomic Physics	4	4	50	50	100
	Core Theory - 6	Nuclear Physics and Particle Physics	4	5	50	50	100
	Core Theory - 7	Solid State Physics and Electronics	4	5	50	50	100
	Core Theory - 8	Numerical Methods	4	4	50	50	100
	Inter -Disciplinary Elective -1	Everyday Physics	5	5	50	50	100
	Core Practical- 3	Practical General - III	*	2	*	*	*
	Core Practical - 4	Practical Electronics - I	*	2	*	*	*
	Core Practical - 5	Micro Processor and Integrated Electronics - Practical	*	2	*	*	*
Part IV	Value Education	Value Education	2	1	50	50	100
	Internship	Internship	2	-	-	-	100
Total			25	30			
Semester VI		Subject	Credit	Horus / Week	Marks		Total
Course Component					Internal	External	
Part III	Core Theory - 9	Relativity and Quantum Mechanics	4	6	50	50	100
	Core Theory - 10	Mathematical Physics	4	6	50	50	100
	Elective-2	Integrated Electronics	5	6	50	50	100
	Elective-3	Microprocessor Fundamentals	5	6	50	50	100
	Core Practical- 3	Practical General - III	4	2	50	50	100
	Core Practical - 4	Practical Electronics - I	4	2	50	50	100
	Core Practical - 5	Micro Processor and Integrated Electronics - Practical	4	2	50	50	100
Part IV	Extension Activity	Extension Activity	1	-	-	-	-
Total			31	30			
TOTAL			142				

Examination

Continuous Internal Assessment (CIA) will be for 50 percent and End Semester Examination (ESE) will be for 50 percent.

Continuous Internal Assessment (CIA)

Every semester will have a mid-semester examination which will be conducted on completion of 45 working days in each semester. A Model exam for three hours duration will be conducted on completion of 80 working days in each semester. For the courses coming under Part IV, ESE will be conducted in MCQ pattern. Internship credits will be given in semester V after verification of documents by the respective Heads.

The schedule for these tests is as follows:

CIA	Schedule	Syllabus Coverage
Mid Semester Examination	After **45** working days of the Semester	60%
Model Examination	After **80** working days of the Semester	95%

The components for the CIA (Theory & Practicals) are as follows:

Internal Components			
Assessment Type	**Nature**	**Maximum Marks**	**% of Weightage**
CIA	Mid Semester Examination	50	10
Model	Model Examination	100	10
	Assignment		10
	Class activities		15
	Attendance		5
	Total		50

% of General Attendance	Marks Awarded
90-100	5
75-89	4
60-74	3
<60	0

The class activity relates to a programme of accepted innovative techniques such as Seminar, Quiz, Portfolio creation, PowerPoint presentation, Objective tests, Role play, Group discussion, Case Study etc. The mode of evaluation of the class activity will be fixed before the commencement of the semester and an approval will be obtained from the Head of the programme/wing. The students will be informed of the various methods of evaluation once the semester begins.

A record of all such assessment procedures will be maintained by the department and is open for clarification. Students will have the right to appeal to the Principal in case of glaring disparities in marking. CIA marks for practical subjects will be awarded by the respective faculty based on the performance of the student in the model practical examination, observation notebook, submission of record books, regularity and attendance for the practical classes. The attendance particulars for practical classes will be maintained by the concerned faculty. The marks for attendance will be awarded as per the following:

End Semester Examinations (ESE)

After the completion of a minimum of 90 working days each semester, the End Semester Examinations will be conducted. Examinations for all UG and PG programmes will be held for all courses in November/December and April/May. Practical examinations will be conducted only during the end of the odd / even semester before, during or after the commencement of the theory exam. The schedule for ESE Practicals will be notified by the Controller of Examinations in consultation with the Dean (Academics).

12.   Mode of Evaluation

METHODS OF EVALUATION		
Internal Evaluation	Mid Sem Exam (10)	50 Marks
	Model Exam (10)	
	Assignment (10)	
	Class activity (15)	
	Attendance (5)	
External Evaluation	End Semester Examination	50 Marks
Total		100 Marks

13.   Method of assessment

Remembering (K1)	• The lowest level of questions requires students to recall information from the course content • Knowledge questions usually require students to identify information in the textbook. • Suggested Keywords: **Choose, Define, Find, How, Label, List, Match, Name, Omit, Recall, Relate, Select, Show, Spell, Tell, What, When, Where, Which, Who, Why**
Understanding (K2)	• Understanding off acts and ideas by comprehending organizing, comparing, translating, interpolating and interpreting in their own words. • The questions go beyond simple recall and require students to combined at altogether • Suggested Keywords: **Classify, Compare, Contrast, Demonstrate, Explain, Extend, Illustrate, Infer, Interpret, Outline, Relate, Rephrase, Show, Summarize, Translate**
Application (K3)	• Students have to solve problems by using / applying a concept learned in the classroom. • Students must use their knowledge to determine a exact response. • Suggested Keywords: **Apply, Build, Choose, Construct, Develop, Experiment with, Identify, Interview, Make use of, Model, Organize, Plan, Select, Solve, Utilize**

Analyze (K4)	• Analyzing the question is one that asks the students to breakdown something into its component parts.
	• Analyzing requires students to identify reasons causes or motives and reach conclusions or generalizations.
	• Suggested Keywords:
	Analyze, Assume, Categorize, Classify, Compare, Conclusion, Contrast, Discover, Dissect, Distinguish, Divide, Examine, Function, Inference, Inspect, List, Motive, Relationships, Simplify, Survey, Take part in, Test for, Theme
Evaluate (K5)	• Evaluation requires an individual to make judgment on something.
	• Questions to be asked to judge the value of an idea, a character, a work of art, or a solution to a problem.
	• Students are engaged in decision-making and problem–solving.
	• Evaluation questions do not have single right answers.
	• Suggested Keywords:
	Agree, Appraise, Assess, Award, Choose, compare, Conclude, Criteria, Criticize, Decide, Deduct, Defend, Determine, Disprove, Estimate, Evaluate, Explain, Importance, Influence, Interpret, Judge, Justify, Mark, Measure, Opinion, Perceive, Prioritize, Prove, Rate, Recommend, Rule on, Select, Support, Value
Create (K6)	• The questions of this category challenge students to get engaged in creative and original thinking.
	• Developing original ideas and problem-solving skills
	• Suggested Keywords:
	Adapt, Build, Change, Choose, Combine, Compile, Compose, Construct, Create, Delete, Design, Develop, Discuss, Elaborate, Estimate, Formulate, Happen, Imagine, Improve, Invent, Make up, Maximize, Minimize, Modify, Original, Originate, Plan, Predict, Propose, Solution, Solve, Suppose, Test, Theory

SEMESTER - I

PROGRAMME: B. Sc., PHYSICS	BATCH: 2024- 27
PART: III	COURSE COMPONENT: CORE - 1
COURSE NAME: MECHANICS AND PROPERTIES OF MATTER	COURSE CODE:
SEMESTER: I	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make the students understand dynamics behind collisions and oscillations.

COURSE OUTCOMES:

1. Understand the basic mechanism behind collisions and material properties.

2. Identify the materials suitable for construction of buildings, based on the moduli of elasticity.

3. Analyse the materials strength in terms of their size and shape.

4. Detail fluid dynamics that give the fundamental knowledge over many practical applications.

5. Calculate the dynamic properties of materials experimentally.

UNIT 1: Impulse and Impact (15 Hours)

Impulse – impact – Laws of impact – direct impact and oblique impact between two smooth spheres – loss of kinetic energy – motion of two interacting bodies – reduced mass.

Rigid body dynamics

Compound pendulum – theory – equivalent simple pendulum – reversibility of centres of oscillation and suspension – determination of g and k – centre of mass – velocity and acceleration of centre of mass – determination of motion of individual particle – system of variable mass.

UNIT 2: Centre of gravity and centre of pressure (15 Hours)

Centre of gravity of solid tetrahedron, solid and hollow hemisphere – Centre of pressure – vertical rectangular lamina – vertical triangular lamina.

Hydrodynamics

Equation of continuity of flow – Venturimeter – Euler's equation of unidirectional flow – Torricelli's theorem – Bernoulli's theorem and its applications.

UNIT 3: Elasticity   (15 Hours)

Hooke's Law – Stress – Strain - Elastic constants – Expressions for Poisson's ratio in terms of elastic constants – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion – torsional pendulum – rigidity modulus and moment of inertia.

UNIT 4: Bending of beams   (15 Hours)

Cantilever – expression for bending moment – expression for depression – cantilever oscillations – Expression for time period – Experiment to find Young's modulus – Non-uniform bending – Experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope.

UNIT 5: Fluid dynamics   (15 Hours)

Surface tension: Definition – Excess of pressure over curved surface – Application to spherical and cylindrical drops and bubbles – variation of surface tension with temperature – Jaeger's method

Viscosity: Definition – Coefficient of viscosity – Rate of flow of liquid in a capillary tube – Poiseuille's formula – variation of viscosity of a liquid with temperature – Application.

PRESCRIBED BOOKS:

1.   Mechanics – Part I and II by Narayanamoorthy, National Publishing Company.

2.   Mechanics by D.S.Mathur, S.Chand & Co., 2nd Edition (2001).

3.   Mechanics by P. Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, S.Chand & Co., New Delhi (1988).

4.   Properties of Matter by Brij Lal and N.Subramaniam, S. Chand & Co., New Delhi (1994).

5.   Properties of Matter by R.Murugeshan, S. Chand & Co., New Delhi (2001).

REFERENCE BOOKS:

1. General Properties of Matter by C.J. Smith, Orient Longman Publishers (1960).

2. Fundamentals of Physics by D. Halliday, R.Rensick and J. Walker, 6th edition, Wiley, NY (2001).

3. Mechanics and General Properties of Matter by P.K. Chakrabarthy, Books and Allied (P) Ltd. (2001).

4. Fundamentals of General Properties of Matter by H.R.Gulati, S. Chand & Co., New Delhi (1982).

E-LEARNING RESOURCES:

1. Physics Classroom - Impulse and Momentum
https://www.physicsclassroom.com/class/momentum

2. MIT Open Course Ware - Engineering Dynamics
(https://ocw.mit.edu/courses/mechanical-engineering/2-003sc-engineering-dynamics-fall-2011/)

3. NCERT - Physics Textbook (https://ncert.nic.in/textbook.php?leph1=6-6)

4. IIT - NPTEL - Solid Mechanics (https://nptel.ac.in/courses/112/104/112104092/

5. Hyper Physics -Center of Gravity (http://hyperphysics.phy-astr.gsu. edu/hbase/ cm.html)

6. Wikipedia - Bending Moment (https://en.wikipedia.org/wiki/Bending_moment)

GUIDELINES TO THE QUESTION PAPER SETTERS
QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL	12	7	6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	3	3	2	3	2
CO2	3	3	3	3	2
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	2	3	3	3	3
Ave.	2.8	3	2.8	3	2.6

PSO-CO-question paper mapping

		COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1		Understand the basic mechanism behind collisions and material properties.	PSO1, PSO2, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO2		Identify the materials suitable for construction o buildings, based on the moduli of elasticity.	PSO1, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO3		Analyse the materials strength in terms of their size and shape.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4		Detail fluid dynamics that give the fundamental knowledge over many practical applications.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO5		Calculate the dynamic properties of materials experimentally.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6

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

PROGRAMME: B.Sc., PHYSICS	BATCH: 2024-27
PART: IV	COURSE COMPONENT: NME - 1
COURSE NAME: ASTROPHYSICS	COURSE CODE:
SEMESTER: I	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
THEORY	

COURSE OBJECTIVE:

To employ the methods and principles of physics in the study of astronomical objects and phenomena.

COURSE OUTCOMES:

1.   Complete study of astronomical instruments.

2.   Detailed learning of Solar system.

3.   Knowledge on members of the Solar system.

4.   Understanding of evolution of stars.

5.   To know the basic theories of universe and galaxy.

UNIT 1: Astronomical instruments   (06 hrs)
Optical telescopes-refracting telescope-reflecting telescope- types of reflecting telescopes – detectors and image processing.

UNIT 2: Solar system   (06 hrs)

The Sun- physical and orbital data-photosphere-chromosphere-corona-solar prominences – sunspot - solar flare- mass of the sun- solar constant- temperature of the sun- sources of solar energy-solar wind.

UNIT 3: Members of the solar system   (06 hrs)
Mercury – Venus- Earth – Mars – Jupiter- Saturn- Uranus- Neptune- Pluto- Moon – Bode's law – asteroids- comets – meteors.

UNIT 4: Stellar evolution (06 hrs)

Birth and death of a star –brightness of a star – stellar distance- Chandrasekar limit- white dwarfs- Neutron stars – black holes- Supernovae.

UNIT 5: Theories of the Universe and Galaxies (06 hrs)

Origin of the Universe - the big bang theory- the steady state theory- the oscillating universe theory – Huble's law. Galaxies – types of galaxies- Milky way.

BOOKS FOR STUDY:

1. Astrophysics - a modern perspective by K.S.Krishnaswamy, New Age International (P) Ltd, New Delhi (2002).

2. An introduction to Astro physics by Baidyanath Basu, second printing, Prentice – Hall of India (P) Ltd, New Delhi (2001).

BOOKS FOR REFERENCE:

1. Modern Physics by R.Murugeshan, 11th edition, S.Chand & Company Ltd, New Delhi (2003).

2. Astronomy by S.Kumaravelu, Janki Calendar Corporation, Sivakasi (1993).

3. Astronomy by Baker and Fredrick, 9th edition, Van Nostrand reinhold Co, New York (1964).

4. Illustrated World of Science Encyclopedia –Vol I to VIII, Creative World Publications, Chicago

5. Modern Physics by Kenneth S.Krane, John Wiley & Sons Inc., NY (1983).

E-LEARNING RESOURCES:

1. http://www.phy.olemiss.edu/~perera/astr325/Lec23.pdf

2. https://unacademy.com/content/upsc/study-material/ncert-notes/science-class-8-the-solar- system/

3. https://www.askiitians.com/revision-notes/class-8-science/stars-and-the-solar-system/

4. https://www.lcps.org/cms/lib4/VA01000195/Centricity/Domain/10740/Star%20Notes %20- %20Evolution%20of%20Massive%20Stars.pdf

5. https://faculty.kfupm.edu.sa/PHYS/aanaqvi/Introductory-Nuclear-Physics-new-Krane.pdf

SEMESTER - II

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: CORE - 2
COURSE NAME: THERMAL PHYSICS AND ACOUSTICS	COURSE CODE:
SEMESTER: II	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To enlighten the students on thermodynamics and transmission of heat

COURSE OUTCOMES:

Learning outcome: On completion of the course, the student will be able to

1. Understand different measurement techniques in thermometry, laws of thermodynamics and heat engines.

2. Calculate Transmission of heat through different media.

3. Understand the basic oscillatory motion.

4. Measure the intensity of sound and hence can analyse the Acoustics of buildings.

5. Produce ultrasonics experimentally in different ways.

UNIT 1: Thermometry and Calorimetry (15 Hours)

Platinum resistance thermometer – Calendar and Griffith's bridge – Thermistor – Specific heat capacity – Specific heat capacity of solids – Dulong and Petit's law – Specific heat capacity of liquid – method of mixtures – Barton's correction – Specific heat capacity of gases – C_p and C_v by Regnault's and Callendar & Barne's methods.

Low temperature physics:

Joule-Kelvin effect – porous plug experiment – liquefaction of gases – Linde's method of liquefying air

UNIT 2: Thermodynamics   (15 Hours)

Thermodynamic equilibrium – zeroth law of thermodynamics – first law of thermodynamics – Reversible and irreversible processes – second law of thermodynamics-Heat engine – Carnot's engine – Carnot's theorem – Internal combustion engines – petrol and diesel engines – thermodynamics scale of temperature- Entropy – entropy and available energy – temperature – entropy diagram for Carnot's cycle - III Law of thermodynamics – Nernst's heat theorem.

UNIT 3: Conduction and Radiation   (15 Hours)

Thermal conductivity – rectilinear flow of heat – thermal conductivity of a good conductor – Forbe's method – thermal conductivity of a bad conductor – Lee's disc method – radiation – blackbody radiation – Wien's law – Stefan's law – Newton's law of cooling from Stefan's law – Solar constant – Pyrometer – Pyroheliometer.

UNIT 4: Waves and oscillations   (15 Hours)

Simple harmonic motion - combination of two SHMs in a straight line – at right angles – Lissajous's figures – free, damped, forced oscillations and resonance – intensity and loudness of sound – intensity level – decibel – noise pollution.

UNIT 5: Ultrasonics   (15 Hours)

Ultrasonics – production – piezo electric crystal method – magnetostriction method – applications. Acoustics of buildings – reverberation – Absorption coefficient – Sabine's formula – Acoustics aspects of halls and auditoriums.

PRESCRIBED BOOKS:

1. Heat and Thermodynamics by D.S.Mathur, 3rd edition Sulthan Chand & Sons, New Delhi (2007).

2. Heat and Thermodynamics by Brijlal and N. Subramanyam, S.Chand & Co, New Delhi (2000).

3. Heat by Narayanamoorthy and KrishnaRao, Triveni Publishers, Madras (2000).

4. Text book of Sound by V.R.Khanna and R.S.Bedi, 1st edition, Kedharnaath Publish & Co, Meerut (1998).

5. Waves and Oscillations by Brijlal and N. Subramanyam, Vikas Publishing house, New Delhi (2001).

6. Text book of Sound by Ghosh, S.Chand & Co, New Delhi (1996).

REFERENCE BOOKS:

1.   Heat and Thermodynamics by Zemansky, McGraw – Hill Book Co. Inc., New York.

2.   Fundamentals of Physics by Resnick Halliday and Walker, 6th edition, ,
        John Willey and Sons, Asia Pvt.Ltd., Singapore.

3.   Fundamentals of Thermodynamics by Carroll M.Leonard, Prentice-Hall
        of India (P) Ltd., New Delhi (1965).

4.   Heat and Thermodynamics by J.B.Rajam and C.L.Arora, 8th edition, S.Chand & Co.
        Ltd., New Delhi (1976).

5.   Principles of Thermodynamics by Jin Sheng Hsieh, 1st edition, McGraw – Hill
        Kogakusha Ltd., Tokyo (1975).

6.   Thermodynamics by Warren Giedt, 1st edition, Van Nostrand Reinhold Company,
        NewYork (1971).

E-LEARNING RESOURCES:

1.   https://youtu.be/6XqVfT6DdF0?si=4mLEWl_zVjFf-VGD

2.   https://www3.nd.edu/~powers/ame.20231/notes.pdf

3.   http://www.nkrgacw.org/nkr%20econtent/Physics/II%20B.sc.,
        20PHYSICS/Properties%20of%20Matter19UPH03/Unit%205%20 (Ultrasonics).pdf

4.   https://www.austincc.edu/mmcgraw/files_2425/Chap_15Ha- Oscillations.pdf

5.   https://byjus.com/physics/heat-transfer-conduction-convection- and-radiation/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO mapping

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO5**
CO1	3	3	3	3	3
CO2	3	2	2	3	3
CO3	3	3	2	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Ave.	**3**	**2.8**	**2.6**	**3**	**3**

PSO-CO-question paper mapping

	Course outcome	PSOs Addressed	Cognitive Level (K1 to K6)
CO1	Understand different measurement techniques in thermometry, laws of thermodynamics and heat engines.	PSO1, PSO4, PSO5	K1, K2, K3, K4,K5
CO2	Calculate Transmission of heat through different media.	PSO1, PS02, PSO4, PSO5	K1, K2,K3, K4,K5
CO3	Understand the basic oscillatory motion.	PSO1, PSO2, PSO3, PSO4	K1, K2, K3, K4, K5
CO4	Measure the intensity of sound and hence can analyse the Acoustics of buildings.	PSO1, PSO2, PSO3, PSO5	K1, K2, K3, K4, K5,K6
CO5	Produce ultrasonics experimentally in different ways	PSO1, PSO2, PSO3, PSO4	K1, K2, K3, K4, K5

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: PRACTICAL - 1
COURSE NAME: PRACTICAL GENERAL - I	COURSE CODE:
SEMESTER: II	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
PRACTICAL	

COURSE OBJECTIVE:

To make the students skillful in experimentally analysing the physical concepts through practical

COURSE OUTCOMES:

1. A working knowledge of fundamental physics and basic mechanics principles.

2. The ability to identify, formulates, and solve physics problems.

3. The ability to formulate, conduct, analyzes and interprets experiments in physics.

4. Have the ability to plan, design, carry out and interpret their findings in scientific experiment.

5. To understand theoretical principles of optics in the experimental methods.

List of Experiments

1. Young's modulus – Non-uniform bending – Pin & microscope

2. Young's modulus – Uniform bending – Optic lever

3. Rigidity modulus – Torsional pendulum (without identical masses)

4. Rigidity modulus and moment of inertia – Torsional pendulum (With identical masses)

5. Surface tension and interfacial surface tension – drop weight method

6. Coefficient of viscosity of liquid – Graduated burette (radius of capillary tube by Mercury pellet method)

7. Sonometer – Verification of laws and frequency of tuning fork

8. Sonometer – Relative Density of a solid and liquid

9. Specific heat capacity of a liquid – Newton's law of cooling

10. Specific heat capacity of liquid – Method of mixtures (Half-time correction)

11. Focal length, Power, R and refractive index of a long focus convex lens

12. Focal length, Power, R and refractive index of a concave lens

13. Spectrometer – refractive index of a liquid

14. P.O. Box – Temperature coefficient of resistance

15. Potentiometer – Internal resistance

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: IV	COURSE COMPONENT: NME-2
COURSE NAME: FUNDAMENTALS OF PHYSICS	COURSE CODE:
SEMESTER: II	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
THEORY	

COURSE OBJECTIVE:

To consolidate the basic concepts of physics in an elementary way.

COURSE OUTCOMES:

1.   Enlightened about the mechanics.

2.   Principle and application of instruments.

3.   Soundwaves and working of the instruments.

4.   Consequences of Geophysics and applications of medical physics.

5.   Communication satellites and electromagnetic waves- Applications.

UNIT 1 : Mechanics   (6 hrs)

Force – Weight – Work – Energy – Power – Horsepower – Centrifuge – Washing machine

UNIT 2 : Heat   (6 hrs)

Variation of boiling point with pressure – Pressure cooker – Refrigerator – Air conditioner – Principle and their capacities – Bernoulli principle – Aero plane

UNIT 3 : Sound and Optics   (6 hrs)

Sound waves – Doppler effect – Power of lens – Long sight and short sight – Microscope – Telescope – Binocular – Camera

UNIT 4 : GeoPhysics and Medical Physics   (6 hrs)

Earthquake – Richter scale – thunder and lightning – Lightning arrestors – Cosmic showers – X-rays – Ultrasound scan – CT scan – MRI scan

UNIT 5 : Space science and Communication   **(6 hrs)**

Newton's law of gravitaion – Weather forecasting and communication satellites – Indian satellites – Electromagnetic spectrum – Radio waves – AM and FM transmission and reception.

BOOKS FOR STUDY

1.   The Learner's series – Everyday science – Published by INFINITY BOOKS, New Delhi

2.   The Hindu speaks on Science, Vol I & II, Kasturi & Sons, Chennai.

BOOKS FOR REFERENCE

1.   Fundamentals of Physics by D. Halliday, R.Rensick and J. Walker, 6th edition, Wiley, NY (2001).

2.   Physics, Vols I, II, III by D.Halliday, R.Resnick and K.S.Krane, 4th Edition, Wiley, New York (2001).

3.   The Feymann Lectures on Physics Vols I, II, III by R.P. Feynmann, R.B. Leighton & M. Sands,Narosa, New Delhi(1998).

E-LEARNING RESOURCES:

1.   https://www.slideshare.net/anamikadady1/science-communication-48781918

2.   https://www.scribd.com/document/320561810/Optics-and-Sound

3.   https://www.cliffsnotes.com/study-guides/physics/thermodynamics/heat#:~:text=Heat%20is%20a%20measure%20of,or%20increase%20of%20heat%2C%20respectively.&text=The%20heat%20capacity%20of%20a,an%20object%20by%20one%20degree.

4.   https://www.vssut.ac.in/lecture_notes/lecture1423904717.pdf
5.https://portal.abuad.edu.ng/lecturer/documents/1587138047MLS_314_LECTURE_NOTE_(2019-2020).pdf

SEMESTER - III

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: CORE-3
COURSE NAME: OPTICS AND SPECTROSCOPY	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make the students understand the particle and wave aspects of light and the defects of lenses

COURSE OUTCOMES:

Learning outcome: On completion of the course, the student will be able to

1.   Distinguish Geometrical and Physical aspects of light.

2.   Construct optical instruments.

3.   Understand the defects associated with the lens and correcting methods.

4.   Analyse the UV-IR spectrums.

5.   Get the knowledge of Spectroscopy that helps to extract the dynamic information about the molecule.

UNIT I: GEOMETRICAL OPTICS   (15 Hours)

Spherical aberration in lenses - Methods of minimizing Spherical aberration– Condition for minimum Spherical aberration in the case of two lenses separated by a distance - Chromatic aberration in lenses – Condition for Achromatism of two thin lenses (in and out of contact) - Dispersion produced by a thin prism -Achromatic prism- Combination of prisms to produce - Dispersion without deviation - Deviation without dispersion.

UNIT II: INTERFERENCE   (15 Hours)

Analytical treatment of interference – expression for intensity – condition for maxima and minima in terms of phase and path difference - Air wedge- principle and construction – determination of diameter of thin wire – test for optical flatness - Michelson's Interferometer Theory and its applications – determination of wavelength; thickness of thin transparent material and resolution of interferometer.

UNIT III: DIFFRACTION (15 Hours)

Fresnel's diffraction –Fraunhoffer diffraction - single slit, double slit (simple theory). Plane diffraction grating - Determination of wavelengths using grating - normal incidence – Dispersive power of a grating. Rayleigh's criterion for resolution – limit of resolution of the eye – resolving power of microscope - resolving power of a grating – difference between resolving power and dispersive power.

UNIT IV: POLARISATION (15 Hours)

Double Refraction - Nicol prism – polarizer and analyser – Polaroids and their uses - Quarter wave plate- Half wave plate – plane, circularly and elliptically polarized light - Half wave plate production and detection of plane, circularly and elliptically polarized light. Optical activity - Specific rotatory power – determination using Laurent's half shade polarimeter.

UNIT V: SPECTROSCOPY (15 Hours)

Electromagnetic spectrum – Characterization of electromagnetic radiation – Classification of Molecules: Microwave spectroscopy - rotational energy levels of rigid diatomic molecule - selection rules - Infrared spectroscopy - vibrational spectra of diatomic molecule- vibrational spectra of simple polyatomic molecules - selection rules for IR spectra – Raman Effect: stokes and antistokes lines with necessary theory - Experimental study of Raman Effect - Application of Raman effect in molecular structure. Laser: Ruby laser – He-Ne.

PRESCRIBED BOOKS:

1. Textbook of Optics by Brijlal and Subramanian - R.Murugesan, 23rd edition (2006) S. Chand & Co., New Delhi

2. Optics & Spectroscopy by R. Murugeshan-, S. Chand & Co.,(2010) New Delhi

3. Optics by Ashok Kumar, Khanna D.R & Gulati H.R., S. Chand & Co., New Delhi (2011).

4. Molecular structure, and spectroscopy by Aruldhas, Prentice Hall of India Pvt. Ltd.,2nd edition New Delhi (2007).

5. Fundamentals of Spectroscopy by C.N. Banwell and M. McCash – 4th Edition McGraw Hill education , Indian Edition (2017).

REFERENCE BOOKS:

1. Fundamentals of Physics by D. Halliday, R.Resnick and J. Walker –10th Edition, Wiley New York (2013)

2. CRC Handbook of Physics & Chemistry, 80th Ed., CRS Press, NY, 1999.

3. Optics by Ajay Ghatak, Tata McGraw- Hill publishing Co. Ltd., New Delhi (2020).

E-LEARNING RESOURCES:

1. https://ocw.mit.edu/courses/2-71-optics-spring-2009/resources/lecture-13-3d-wave-phenomena-introduction- to-electromagnetics/

2. https://ocw.mit.edu/courses/2-71-optics-spring-2009/resources/lecture-15-huygens-principle-interferometers-   fresnel-diffraction/

3. https://ocw.mit.edu/courses/2-71-optics-spring-2009/resources/lecture-17-fraunhofer-diffraction-fourier-   transforms-and-theorems/

4. https://www.youtube.com/watch?v=a7sw1yqtIaQ

5. https://www.youtube.com/watch?v=xsq9Yqwrh2w

GUIDELINES TO THE QUESTION PAPER SETTERS
QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
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C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	3	2	2
II	3	1	1
III	2	1	1
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V	2	1	1
TOTAL	12	7	6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	2	3	3	3	3
CO2	3	2	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	2	3
CO5	2	3	3	3	3
Ave.	2.6	3	3	2.8	3

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Distinguish Geometrical and Physical aspects of light.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4,K5,K6
CO2	Construct optical instruments.	PSO1, PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	Understand the defects associated with the lens and correcting methods.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Analyse the UV-IR spectrums.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO5	Get the knowledge of spectroscopy that helps to extract the dynamic information about the molecule.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

SEMESTER - IV

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: CORE - 4
COURSE NAME: ELECTRICITY AND ELECTROMAGNETISM	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make them understand the nature of Direct and Alternating current through different active and passive elements.

COURSE OUTCOMES:

Learning Outcome: On the completion of the course students will be able to: Understand fundamental laws of electricity and magnetism

1. Know more about Electrolysis and thermoelectricity.

2. Analyse the DC and AC circuits with different components like resistors and reactors (Inductor and Capacitor).

3. Basic properties of ferro magnetic substances.

4. Discuss the elements of earth's magnetic field.

5. Solve the problems related to magnetic effects of electric current.

UNIT 1: DC Circuits   **(15 Hours)**

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

Unit II: AC Circuits   **(15 Hours)**

AC Voltage and current - Power factor and current values in and AC circuit containing LCR circuit - series and Parallel resonant circuits - AC motors - single phase, three phase - star and delta connections - electric fuses - circuit breakers - Induction Motors.

UNIT III: Magnetic effect of electric Current: (15 Hours)

Magnetic field around a current carrying conductor. Biot and Savart's law - Magnetic field intensity at a point on the axis of a circular coil carrying current - magnetic field intensity due to a solenoid carrying current - effect of iron core in a solenoid - moving coil ballistic galvanometer - theory - damping correction. Determination of the absolute capacity of a condenser using B.G.

UNIT IV Electromagnetic Induction: (15 Hours)

Faraday's experiments on electromagnetism - Faraday's laws of Electromagnetic Induction - Lenz's law - Deduction of Faraday's law from Lorentz force - vector potential. Eddy currents - inductors and inductance - determination of self-inductance of a coil using Anderson method - mutual inductance - experimental determination of absolute mutual inductance - coefficient of coupling.

UNIT V Applications of Electromagnetic induction: (15 Hours)

Earth inductor - uses of earth inductor - measurement of horizontal component of the earth's magnetic field - measurement of vertical component of earth's magnetic field- calibration of B.G. measurement of intense magnetic field using search coil and BG - induction coil and its uses.

PRESCRIBED BOOKS:

1. Electricity & Magnetism by M.Narayanamurthy & N.Nagarathnam, NPC pub., Revised edition.

2. Electricity and Magnetism by Brijlal and Subrahmanyam; S.Chand & Co., New Delhi, (2000).

3. Electricity & Magnetism by D.Chattopadhyay and P.C. Rakshit, Books and Allied (P) Ltd.(2001).

4. Fundamentals of electricity and magnetism by B.D. Dugal and C.L. Chhabra, Shobanlal Nagin, S. Chand & Co., 5th edition, New Delhi(2005).

5. Electricity and Magnetism by R. Murugeshan, S.Chand & Co., New Delhi, (2008).

REFERENCE BOOKS:

1. Electricity & Magnetism by K.K.Tewari, S.Chand & Co., New Delhi (2002).

2. Introduction to Electrodynamics by D.J.Griffiths, Printice Hall of India Pvt. Ltd., 3rd Edition, New Delhi(2003).

3. Fundamentals of Physics, D.Halliday, R.Resnick and J.walker, Wiley, 6th Edition, New York (2001).

E-LEARNING RESOURCES:

1. https://archive.nptel.ac.in/courses/115/106/115106122/

2. http://www2.warwick.ac.uk/fac/sci/physics/teach/ module-home/px207.

3. www.core.org.cn/ocw web/physics/8-311 spring 2004/lecture notes.

4. https://physicaeducator.files.wordpress.com/2017/11/electricity_and_magnetism- by-purcell-3ed-ed.pdf

5. https://www.youtube.com/watch?v=M1v_77kswqg

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
TOTAL				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	3	3	2	3	3
CO2	3	2	3	3	3
CO3	3	3	3	3	3
CO4	3	3	2	3	3
CO5	3	3	3	3	3
Ave.	3	2.8	2.6	3	3

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Know more about Electrolysis and thermoelectricity	PSO1, PSO2, PSO4, PSO5	K1, K2, K3, K4,K5,K6
CO2	Analyse the DC and AC circuits with different components like resistors and reactors (Inductor and Capacitor)	PSO1, PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	Basic properties of ferro magnetic substances	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Discuss the elements of earth's magnetic field.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO5	Solve the problems related to magnetic effects of electric current	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: PRACTICAL-II
COURSE NAME: PRACTICAL GENERAL-II	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
PRACTICAL	

COURSE OBJECTIVE:

To make the students skillful in experimentally analyzing the physical concepts through practical.

COURSE OUTCOMES:

1. Understand physical characteristics of SHM and obtaining solution of the oscillator using experiment.

2. Study the elastic modulus and behavior of the materials.

3. Analyze the specific heat capacity, refractive index, as per the standard procedure.

4. Understand the knowledge in electrical devices such as ammeter and voltmeter.

5. To understand theoretical principles of optics in the experimental method through plane transmission grating, prism.

(Any Fifteen Experiments)

1. Young's modulus - cantilever - depression - (Static method)-(Scale and telescope)

2. Young's modulus - cantilever oscillations - (Dynamic method)

3. Rigidity modulus - Static torsion

4. Compound pendulum - g and k

5. Sonometer - A.C. Frequency – Steel wire with Electromagnet and Brass wire with permanent magnet.

6. Melde's string - frequency, Relative Density of a solid and liquid

7. Thermal conductivity of a bad conductor - Lee's disc method

8. Spectrometer - μ of a glass prism - i-d Curve

9. Spectrometer - Grating N and λ - normal incidence method

10. Spectrometer - Grating N and λ - minimum deviation method

11. Air wedge - Thickness of a wire

12. m and B_H - deflection magnetometer Tan C position and vibration magnetometer

13. Carey Foster bridge - Temperature coefficient of resistance of a coil

14. Potentiometer - Calibration of low range voltmeter

15. Potentiometer - Ammeter calibration.

16. Figure of merit of galvanometer (Mirror Galvanometer Or Table Galvanometer)

17. * C.R.O. Study of wave forms - Lissajou's figures - frequency determination

18. * Study of resistors, Choke, capacitors and transformer

19. * Construction of battery eliminator - various voltages - with filter circuit and IC voltage regulator.

20. * Two transistor Radio receiver

* Not for Examination

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: EVS
COURSE NAME: ENVIRONMENTAL STUDIES	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
THEORY	

COURSE OBJECTIVE:

This course introduces the concepts of Environmental Studies.

COURSE OUTCOMES:

On completion of the course the students will be able

1. Know the importance of environmental studies and methods of conservation of natural resources.

2. Describe the structure and function of an ecosystem.

3. Identify the values and conservation of bio-diversity.

4. Explain the causes, effects and control measures of various types of pollutions.

5. Select the appropriate methods for waste management.

UNIT-1:

The Multidisciplinary nature of environmental studies Definition; Scope and importance, Need for public awareness.

UNIT-2:

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. - Role of an individual in conservation of natural resources. - Equitable use of resources for sustainable lifestyles.

UNIT-3: Ecosystems

Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem. Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem: -

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT-4: Biodiversity and its Conservation

- Introduction-Definition: genetic, species and ecosystem diversity.

- Biogeographical classification of India.

- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

- Biodiversity at global, National and local levels.

- India as a mega-diversity nation.

- Hot-spots of biodiversity.

- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

- Endangered and endemic species of India.

- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-5: Environmental Pollution:

Definition - Causes, effects and control measures of:

a.   Air pollution

b.   Water pollution

c.   Soil pollution

d.   Marine pollution

e.   Noise pollution

f.   Thermal pollution

g.   Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

- Role of an individual in prevention of pollution. - Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT-6: Social Issues and the Environment

- From Unsustainable to Sustainable development.

- Urban problems related to energy. - Water conservation, rain water harvesting, watershed management.

- Resettlement and rehabilitation of people; its problems and concerns. Case studies.

- Environmental ethics: Issues and possible solutions.

- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

- Wasteland reclamation.

- Consumerism and waste products.

- Environment Protection Act.

- Air (Prevention and Control of Pollution) Act.

- Water (Prevention and Control of Pollution) Act.

- Wildlife Protection Act.

- Forest Conservation Act.

- Issues involved in enforcement of environmental legislation.

- Public awareness.

UNIT-7: Human Population and the Environment

- Population growth, variation among nations.

- Population Explosion-Family welfare Programme.

- Environment and human health.

- Human Rights.

- Value Education.

- HIV/AIDS.

- Women and Child Welfare.

- Role of information Technology in Environment and human health.

- Case Studies. UNIT-8: Field Work (Practical).

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.

- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.

- Study of common plants, insects, birds.

- Study of simple ecosystems-pond, river, hill slopes, etc.

UNIT-8: Field Work (Practical)

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.

- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.

- Study of common plants, insects, birds.

- Study of simple ecosystems-pond, river, hill slopes, etc.

PRACTICAL

Visit to vermicomposting units or any other such non-polluting eco-friendly site or planting/caring of vegetation/ trees could be taken.

REFERENCE BOOKS:

a)   Environmental Studies - S.N. Chary

b)   A text book on Ecology and Environmental Science – M. Prasanthrajan

SEMESTER - V

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: CORE - 5
COURSE NAME: ATOMIC PHYSICS	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To detail the particle photon interaction and thereby inculcating the knowledge of atoms and molecules

COURSE OUTCOMES:

1. Acquire the knowledge to measure the specific charge of electron by different methods.

2. Gain the knowledge on Photoelectric effect and its applications.

3. Study the atomic structure and emission of spectral lines.

4. Learn the "Photon to Electron" and "Electron to Photon" through Photo electric effect and X rays.

5. Acquire the knowledge on X ray spectroscopy.

UNIT-I: DISCHARGE PHENOMENON THROUGH GASES   (15 Hours)

Specific charge of an electron – Dunnington's method – Magnetron method - Positive rays – Aston's, Dempster's mass spectrographs.

UNIT-II: PHOTO ELECTRIC EFFECT   (15 Hours)

Richardson and Compton experiment – Laws of photo electric emission – Einstein photo electric equation – Millikan's experiment – Verification of photoelectric equation – photo electric cells –photo emissive cells – photo voltaic cells – photo conducting cell – photomultiplier.

UNIT-III: ATOMIC STRUCTURE   (15 Hours)

Vector atom model – Pauli's exclusion principle – explanation of periodic table – various quantum numbers – angular momentum and magnetic moment – coupling schemes – LS and JJ coupling – special quantization – Bohr magnetron – Stern and Gerlach experiments.

UNIT-IV: IONISATION POTENTIAL AND SPLITTING OF ENERGY LEVELS (15 Hours)

Excitation and ionization potential – Frank and Hertz's experiment – selection rules – intensity rule and interval rule – Zeeman effect – Larmor's theorem – Debye's explanation of normal Zeeman effect – Anamalous Zeeman effect – theoretical explanation, Lande's 'g' factor and explanation of splitting of D1 and D2 lines of sodium - Paschen Back effect – Stark effect (qualitative study only).

UNIT-V: X-RAYS   (15 Hours)

Bragg's Law – X ray spectroscopy – characteristic X ray spectra – Satellite and Auger effect – continuous X ray spectra – Moseley's Law – uses of X rays – Compton effect – experimental verification of Compton effect.

PRESCRIBED BOOKS:

1.   Modern Physics by D.L.Sehgal, K.L.Chopra and N.K.Sehgal. Sultan Chand & Sons Publication, 7th Edition, New Delhi (1991)

2.   Modern Physics by R. Murugeshan, KiruthigaSivaprasanth, S. Chand & Co., New Delhi(2008).

3.   Atomic and Nuclear Physics by N. Subramanyam and BrijLal, S. Chand & Co. 5th Edition, New Delhi (2000)

REFERENCE BOOKS:

1.   Concepts of Modern Physics by A.Beiser, Tata McGraw-Hill, New Delhi (1997)

2.   Modern Physics by J.H. Hamilton and Yang, McGraw-Hill Publication, (1996)

3.   Fundamentals of Physics by D. Halliday, R.Resnick and J. Walker, Willey., 6th Edition, New York (2001)

E-LEARNING RESOURCES:

1.   https://archive.nptel.ac.in/courses/115/105/115105100/

2.   https://ncert.nic.in/ncerts/l/kech102.pdf

3.   https://www.britannica.com/science/atomic-physics

4.   https://en.wikipedia.org/wiki/Bragg%27s_law

5.   https://www.youtube.com/watch?v=migIuUWtSHc

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	2	1	2
II	3	2	1
III	3	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	3	2	3	3	3
CO2	2	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Ave.	**2.8**	**2.8**	**3**	**3**	**3**

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	The knowledge to measure the specific charge of electron by different methods.	PSO1, PSO3, PSO4, PSO5	K1, K2, K3, K4,K5,K6
CO2	Introducing Photoelectric effect and its applications.	PSO1, PSO2,PSO3, PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	A Complete study of atomic structure and emission of spectral lines.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	A detailed learning of "Photon to Electron" and "Electron to Photon" through Photo electric effect and X rays.	PSO1, PSO2, PSO3, PSO5	K1, K2, K3, K4, K5,K6
CO5	Good knowledge on X ray spectroscopy.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: CORE - 6
COURSE NAME: NUCLEAR PHYSICS AND PARTICLE PHYSICS	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To facilitate the students to understand nuclear reactions based on nuclear models

COURSE OUTCOMES:

Learning Outcomes: On completion of the course the students will have a

1.   Learn the Nucleus with their empirical models.

2.   Gain the knowledge on overall view of Nuclear reactions and nuclear reactors with radioactive laws and radiation measuring techniques.

3.   Analyse the sound knowledge in elementary particles and their conservation laws.

4.   Acquire the knowledge about particle- antiparticle, decay processes and their outcomes.

5.   Discuss the basic idea of interaction between fundamental particles.

UNIT-I: GENERAL PROPERTIES OF NUCLEI   **(15 Hours)**

Nuclear size, charge, mass, mass defect and binding energy – packing fraction – Nuclear Spin – Magnetic dipole moment – electric quadrupole moment- nuclear models – liquid drop model – Weizacker semi empirical mass formula – Shell model and magic numbers.

UNIT-II: RADIO ACTIVITY   **(15 Hours)**

Natural radioactivity – Law of disintegration – half time and mean life period – units of radio activity - transient and secular equilibrium –radio carbon dating – age of earth – Geiger nuttal law – α ray spectra – Gamow's theory of α decay (qualitative study only) - Radio Activity- Neutrino theory of Beta decay.

UNIT-III: RADIATION DETECTORS AND PARTICLE ACCELERATORS   **(15 Hours)**

Ionisation chamber – G.M. counter – quenching and resolving time – Scintillation counter -

Linear accelerator – Cyclotron – Synchrocyclotron – Betatron.

UNIT-IV: NUCLEAR REACTIONS   (15 Hours)

Conservation laws – nuclear reaction – kinematics – Q value – threshold energy – artificial radio activity – radio isotopes and its uses – nuclear fission – chain reaction – nuclear reactor – nuclear fusion – thermonuclear reactions – sources of stellar energy.

UNIT-V: ELEMENTARY PARTICLES   (15 Hours)

Classification of elementary particles – elementary particle quantum numbers – isospin and strangeness – conservation laws.

PRESCRIBED BOOKS:

1. Modern Physics by R. Murugeshan, S. Chand & Co., New Delhi, Revised Edition (18th Edition).

2. Atomic and Nuclear Physics by N. Subramanyam and Brijlal, S. Chand & Co, New Delhi (2006)

3. Nuclear Physics by Tayal D.C., Himalaya Publishing House, Mumbai (2006).

4. Nuclear Physics by R.C. Sharma, K.Nath& Co. Meerut (2000).

REFERENCE BOOKS:

1. Nuclear physics by R.R.Roy and B.P. Nigam, New Age International (p) Ltd., New Delhi (1997)

2. Fundamentals of Elementary Particles Physics by Longo, Mc Graw- hill

3. Elements of Nuclear Physics by ML.Pandya and RPS Yadav, KedarnathRamnath, Meerut.

E-LEARNING RESOURCES:

1. https://archive.nptel.ac.in/courses/115/103/115103101/

2. https://archive.nptel.ac.in/courses/115/104/115104043/

3. https://www.youtube.com/watch?v=1nizHY2yPEQ

4. https://www.youtube.com/watch?v=bQEzNoKTJt4

5. https://www.imsc.res.in/~murthy/Papers/notes-hep-v2.pdf

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	3	3	2	3	3
CO2	3	3	2	2	3
CO3	3	3	3	3	3
CO4	3	3	2	3	3
CO5	3	3	3	3	3
Ave.	**3**	**3**	**2.8**	**2.8**	**3**

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Detailed learning of Nucleus with their empirical models	PSO1, PSO2, PSO4, PSO5	K1, K2, K3, K4,K5,K6
CO2	Overall view of Nuclear reactions and nuclear reactors with radioactive laws and radiation measuring techniques	PSO1, PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	Sound knowledge in elementary particles and their conservation laws	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Knowledge about particle-antiparticle decay processes and their outcomes.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO5	Basic idea of interaction between fundamental particles.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: CORE - 7
COURSE NAME: SOLID STATE PHYSICS AND ELECTRONICS	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make the students to understand the crystal structure and defects omit; provide the students with theoretical knowledge on semiconductors to handle electronic components with ease.

COURSE OUTCOMES:

Learning Outcomes: On completion of the course the students will be able to:

1.   Detail the Crystal structure and associated defects.

2.   Knowledge of X-ray diffraction and the defects in solids.

3.   Introduction of Dielectric materials and the detailed knowledge of dielectric properties.

4.   Understand of Semiconductor devices and their applications.

5.   Special semiconductor devices and their applications.

Unit I : Crystal Structure   (15 Hours)

Crystal lattice – primitive and unit cell – seven classes of crystal – Bravais Lattice – Miller Indices – Structure of crystals – simple cubic, hexagonal close packed structure, face centred cubic structure, body centred cubic structure – Sodium chloride structure, Zinc Blende structure, Diamond structure.

Unit II : Defects in Solids   (15 Hours)

X ray diffraction – Bragg's law in one dimension – Experimental methods – Laue Method, powder crystal method and rotating crystal method.

Defects in solids - Point defects - Frenkel and Schottky defects - Equilibrium concentrations - Line defects - Edge dislocation and screw dislocation - Surface defects - Grain boundary - Effects of Crystal imperfections.

Unit III: Dielectric Properties   (15 Hours)

Dielectric materials - Polarization, susceptibility and dielectric constant - Local field or internal

field - Clausius - Mossoti relation - Sources of polarizability - Electronic polarizability - Ionic polarizability - Orientational polarizability - Frequency and temperature effects on polarization - Dielectric breakdown – Dielectric Properties, Dielectric loss.

UNIT-IV: SEMICONDUCTORS   (15 Hours)

Bonds in semiconductor – Energy levels – Energy bands – Valence and conduction bands – Band gap – Forbidden energy gap – classification of solids in terms of forbidden energy gap - Fermi level – Pure semiconductor – - PN junction barrier voltage across the junction – Biasing of PN junction - Law of mass action, Impurity in semiconductors

UNIT-V: SPECIAL SEMICONDUCTOR DEVICES AND APPLICATIONS   (15 Hours)

Field Effect Transistor (FET) – characteristics – Uni-junction transistor (UJT) – characteristics – relaxation oscillator – Frequency of oscillation – SCR characteristics – SCR as a switch – SCR rectifier.

PRESCRIBED BOOKS:

1.   Materials Science by M.Arumugam, Anuradha Agencies Publishers.(2018)

2.   Solid State Physics by R L Singhal, Kedarnath Ram Nath & Co., Meerut (2018)

3.   Introduction to Solid State Physics by Kittel, Willey Eastern Ltd(2012).

4.   Materials Science and Engineering by V. Raghavan, Prentice Hall of India Private Limited, New Delhi(2015).

5.   Electronics by M. Arul Thalapathi, Comptek Publication (2005)

6.   Hand Book of Electronics by Gupta and Kumar – PragathiPrakashan – Meerut (2020)

7.   Applied Electronics by A. Subramanyam – National Publishing Co. (1997)

8.   Principles of Electronics by V.K. Mehta, Rohit Mehta S. Chand & Co. (2021).

REFERENCE BOOKS:

1.   Basic Electranics by B.L Theraja, S. Chand & Co., (2008)

2.   Electronic Devices by Mittal.G.K. Pubishers Pvt. Ltd., (1993)

3.   Solid state Electronics by Ambrose and Vincent Devaraj, Meera Publication.

4.   Modern Physics by R. Murugeshan and KiruthigaSivaprasath, S. Chand & Co,. (2017)

5.   Applied Electronics by R.S.Sedha, S. Chand & Co,. (2022)

6.   Solid State Physics by S.O.Pillai, New Age International (P) Ltd.,10th edition (2022).

7.   Solid State Physics by A. J.Dekker, Macmillan India(2008).

8.   Solid State Physics by HC Gupta, Vikas Publishing House Pvt. Ltd., New Delhi (2001).

E-LEARNING RESOURCES:

1.   https://youtu.be/EkuE1RZD6EY

2.   https://youtu.be/inUAGOzb9nA

3.   https://youtu.be/uOQ6r-0NB5U

4.   http://www.physics.brocku.ca/courses/4p7d.

5.   http://folk.uio.no//dragos//solid/fys230-Exerciser.html.

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	30
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	30
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	40
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	2	1	2
II	3	2	1
III	3	1	1
IV	2	2	1
V	2	1	1
TOTAL	12	7	6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	3	3	3	3	3
CO2	2	3	3	3	3
CO3	2	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Ave.	2.6	3	3	3	3

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Detail the Crystal structure and associated defects.	PSO1, PSO2, PSO3, PSO4,	K1, K2, K3, K4,K5,K6
CO2	Knowledge of X-ray diffraction and the defects in solids.	PSO1, PSO2,PSO3, PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	Introduction of Dielectric materials and the detailed knowledge of dielectric properties	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Understand of Semiconductor devices and their applications	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO5	Special semiconductor devices and their applications.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: CORE – 8
COURSE NAME: NUMERICAL METHODS	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make the students understand the basic concepts of computational mathematics

COURSE OUTCOMES:

1.   Learn the methodology involved in computer computations.

2.   Solve simultaneous equations using matrix method.

3.   Understand statistics using curve fitting

4.   Find the solution of an algebraic, transcendental and differential equations.

5.   Do integration using interpolation techniques

UNIT 1: Simultaneous Linear Algebraic Equations   (15 Hours)

Method of triangularisation - Gauss elimination method - Inverse of a matrix - Gauss - Jordan method

UNIT 2: Numerical Solution of Algebraic, Transcendental and Differential Equation (15 Hours) Bisection method – Regula falsi method - Newton - Raphson method - - Horner's method - Solution of ordinary differential equation - Euler's method.

UNIT 3 : Interpolation   (15 Hours)

Finite differences – operators Δ, ∇, δ, E, D – relation between operators –linear interpolation – interpolation with equal intervals – Newton forward interpolation formula – Newton backward interpolation formula.

UNIT 4 : Curve Fitting   (15 Hours)

Principles of least squares - fitting a straight line - linear regression - fitting an exponential curve.

UNIT 5 : Numerical Integration   (15 Hours)

Trapezoidal Rule - Simpson's 1/3 rule and 3/8 rule - Applications - Weddle's rule.

PRESCRIBED BOOKS:

1.   Numerical methods - M.K.Venkatraman, National Publishing Company, (1990).

2.   Numerical methods by V. Rajaraman, Prentice - Hall India Pvt. Ltd., (2003).

3.   Numerical methods by P. Kandasamy, K. Thilagavathy and K. Gunavathy, S. Chand & Co. (2002).

REFERENCE BOOKS:

1.   Numerical methods for Scientific and Engineering computation by Jain Iyenger and Jain, New Age International (P) Ltd.,(2004).

2.   Numerical methods by S.S.Sastry, Prentice Hall of India Pvt. Ltd., New Delhi(2003).

E-LEARNING RESOURCES:

1.   http://www.sst.ph.ic.ac.uk/angur/lectures/compphys/compphys.html.

2.   http://www.library.cornell.edu/nn/(Numerical receipier online book in C & Fortran).

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	30
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	30
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	40
			TOTAL	100

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	2	1	2
II	3	2	1
III	3	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	3	3	2	3	3
CO2	3	3	2	2	3
CO3	3	3	3	3	3
CO4	3	3	2	2	2
CO5	3	3	3	3	3
Ave.	3	3	2.6	2.6	2.8

PSO-CO-question paper mapping

		COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1		To learn the methodology involved in computer computations.	PSO1, PSO2, PSO3, PSO4	K1, K2, K3, K4,K5
CO2		To solve simultaneous equations using matrix method.	PSO2, PSO3, PSO4, PSO5	K1, K2,K3, K4,K5
CO3		To understand statistics using curve fitting	PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4		To find the solution of an algebraic, transcendental and differential equations.	PSO1, PSO2, PSO3 PSO4	K1, K2, K3, K4, K5
CO5		To do integration using interpolation techniques	PSO1, PSO2, PSO4, PSO5	K1, K2, K3, K4, K5

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: ELECTIVE-1 IDE
COURSE NAME: EVERYDAY PHYSICS	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 5	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make the students understand physics in day to day appliances.

COURSE OUTCOMES:

1. Acquire the knowledge on working mechanism of home appliances – Principle.

2. Analyse the principle and application of Instruments.

3. Learn the fabrication of Switch board and fuse.

4. Describe the basic principles of multimeter- Transformer.

5. Gain the knowledge on servicing of domestic appliances.

UNIT 1 (15 Hours)

Physics behind Home appliances – Light bulb – Fan – Hair drier – Television – Air Conditioners – microwave ovens – Vacuum cleaners – Dishwasher – Washing machines

UNIT 2 (15 Hours)

Basic principles – Tape recorder – Taps – Lifts – Submarines – Jet planes – Helicopters – Rockets – fax machines – Pagers – Cellular phones

UNIT 3 (15 Hours)

Demonstration – making a switch board with multiple points – wiring – one lamp controlled by one switch/Two switches – fixing a fuse – soldering – P.C.B Preparation

UNIT 4 (15 Hours)

Study of resistors, chokes, Capacitors and Transformers – multimeter – Basic principles – measurement of resistance, Voltage AC & DC

UNIT 5 (15 Hours)

Servicing of domestic appliances – iron box – mixie – grinder – motor – emergency lamp

PRESCRIBED BOOKS:

1. The Learner's series – Everyday science – Published by Infinity Books, New Delhi

2. The Hindu speaks on Science, Vol I & II, Kasturi Ranga Publishers, Chennai

REFERENCE BOOKS:

1. Fundamentals of Physics by D. Halliday, R.Rensick and J. Walker, 6th edition, Wiley, NY (2001).

2. Physics, Vols I, II, III by D.Halliday, R.Resnick and K.S.Krane, 4th Edition, Wiley,New York (1994).

3. The Feymann Lectures on Physics Vols I, II, III by R.P. Feynmann, R.B. Leighton & M. Sands, Narosa, New Delhi (1998).

E-LEARNING RESOURCES:

1. http://homework.uoregon.edu/pub/class/appliance1.html

2. https://byjus.com/physics/rocket-propulsion/

3. https://www.electronics-notes.com/articles/basic_concepts/current/alternating-direct-current-ac-dc-electricity.php

4. https://www.vedantu.com/question-answer/a-grinder-motor-is-designed-to-operate-at-a-class-10-physics-cbse-5f9a623eb6f1596dfc9aa9f7

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL	12	7	6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	3	3	3	3	3
CO2	3	2	3	3	3
CO3	3	3	3	3	2
CO4	3	2	2	3	3
CO5	3	3	3	3	3
Ave.	3	2.6	2.8	3	2.8

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Working of home appliances – Principle.	PS01, PSO2,PSO3, PSO4, PSO5	K1,K2,K3, K4, K5,K6
CO2	Principle and application of Instruments.	PSO1, PS02, PSO3, PSO4, PSO5.	K1, K2,K3, K4,K5,K6
CO3	Fabrication of Switch board, fuse.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO4	Basic principles of multimeter- Transformer.	PSO1, PSO2, PSO3, PSO4, PSO5.	K1, K2, K3, K4, K5,K6
CO5	Servicing of Domestric Appliances.	PSO1, PSO2, PSO3, PSO4, PSO5.	K1, K2, K3, K4, K5,K6

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: VALUE EDUCATION
COURSE NAME: VALUE EDUCATION	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 2	TOTAL HOURS: 15
THEORY	

COURSE OBJECTIVE:

To teach and inculcate the importance of value-based living and to give students a deeper understanding about the purpose of life.

COURSE OUTCOMES:

On completion of the course the students will be able

1. Inculcate the value system in their real life scenarios.

2. Implement the role of culture and civilization, roles and responsibilities in the society.

3. Effectively follow Salient values for life such as forgiveness, ability to sacrifice, self - esteem, teamwork and creative thinking.

4. Reflect the human rights, social values and welfare of the citizen.

5. Consider the relation between values and personal behavior affecting the achievement of a sustainable future.

UNIT 1: Education and Values   **(3 hrs)**

Definition, Concept, Classification, Theory, Criteria and Sources of values Aims and objectives of value education Role and Need for value education in the contemporary society, Role of education in transformation of values in society Role of parents, teachers, society, peer group and mass media in fostering values

UNIT 2: Value Education and Personal Development   **(3 hrs)**

Human Values: Truthfulness, Sacrifice, Sincerity, Self-Control, Altruism, Scientific Vision, relevancy of human values to good life. Character Formation towards Positive Personality Modern challenges of adolescents: emotions and behavior Self-analysis and introspection: sensitization towards gender equality, differently abled, Respect for - age, experience, maturity, family members, neighbors, strangers, etc.

UNIT 3: Human rights and Marginalized people   **(3 hrs)**

Concept of Human Rights – Principles of human rights – human rights and Indian constitution Rights of Women and children – violence against women – Rights of marginalized People like women, children, minorities, transgender, differently abled etc.

Social Issues and Communal Harmony Social issues – causes and magnitude - alcoholism, drug addiction, poverty, unemployment – communal harmony –concept – religion and its place in public domain –secular civil society.

UNIT 4: Value Education towards National and Global Development **(3 hrs)**

Constitutional Values :(Sovereign, Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom, Fraternity) Social Values: (Pity and Probity, Self-Control, Universal Brotherhood).

Professional Values :(Knowledge Thirst, Sincerity in Profession, Regularity, Punctuality, Faith). Religious and Moral Values: (Tolerance, Wisdom, character).

Aesthetic Values: (Love and Appreciation of literature, fine arts) Environmental Ethical Values National Integration and international understanding.

Need of Humanistic value for espousing peace in society. Conflict of cross-cultural influences, cross- border education

UNIT 5: Guru Nanak Devji's Teachings **(3 hrs)**

- Relevance of Guru Nanak Devji's teachings' relevance to Modern Society The Guru Granth sahib

- The five Ks Values and beliefs Rights and freedom (Right of equality, Right to Education, Right to Justice, Rights of women,

- Freedom of religion, Freedom of culture, Freedom of assembly, Freedom of speech) Empowerment of women Concept of Langar Eminent Sikh personalities

REFERENCES BOOKS:

1.   Dr.Abdul Kalam. My Journey-Transforming Dreams into Actions. Rupa Publications, 2013.

2.   Steven R Covey, 8th Habit of Effective People (From Effectiveness to Greatness), Free Press, NewYork, 2005.

3.   Prem Singh, G.J. (2004). 'Towards Value Based Education', University News. Vol. 42

(45): P.11-12.

4.   V.R. Krishna Iyer. Dialectics & Dynamics of Human Rights in India (Tagore Law Lectures) The Yesterday, Today and Tomorrow, Eastern Law Ho use (1999, Reprint 2018)

5.   http://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf

SEMESTER - VI

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: CORE - 9
COURSE NAME: RELATIVITY AND QUANTUM MECHANICS	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make the students understand the transition from classical to quantum mechanics with applications.

COURSE OUTCOMES:

On completion of the course the students will be able to

1. Understand the space - time concept through relativity.

2. Acquire the knowledge on arrive at duality through matter waves.

3. Describe the derive time dependent and independent Schrodinger equations.

4. Explain the use of different operators in solving quantum mechanical problems.

5. Find the eigen values and eigen functions of free particle.

UNIT-I: RELATIVITY   (15 Hours)

Frames of reference – Galilean transformation – Michelson - Morley experiment – Postulates of special theory of relativity – Lorentz transformation – Length contraction – time dilation – addition of velocities – variation of mass with velocity – Mass energy relation.

UNIT-II: WAVE NATURE OF MATTER   (15 Hours)

Phase and group velocity – relationship between phase and group velocity – expression of De-Broglie's wavelength – Davisson and Germer's experiment – G.P. Thomson experiment – Wave Nature of Matter- Heisenberg's uncertainity principle and its consequences of non - existence of electrons inside the nucleus - existence of protons and neutrons inside the nucleus.

UNIT-III: SCHRODINGER EQUATION   (15 Hours)

Postulates of wave mechanics – Schrodinger time independent wave equation – Schrodinger time dependent wave equation – properties of the wave function - significance of the wave functions. – Eigenfunctions and Eigenvalues.

UNIT-IV: OPERATIONS AND ANGULAR MOMENTUM IN QUANTUM MECHANICS (15 Hours)

Linear operators - Self adjoint operators – commutativity and compatibility – orbital angular momentum operators and their commutation relations – Spin, Pauli's spin matrices for electron.

UNIT-V: SOLUTIONS OF SCHRODINGER EQUATION (15 Hours)

Free Particle solution – Particle in a box – Potential well of finite depth (one dimension) – Linear harmonic oscillator – rigid rotator.

PRESCRIBED BOOKS:

1. Modern physics by R. Murugeshan and Kiruthigasivaprasath, S.Chand& Co (2017)

2. A Text Book of Quantum Mechanics by P.M. Mathews and S.Venkatesan, Tata McGraw – Gill, New Delhi (2005).

3. Quantum Mechanics by V.K. Thankappan, New Age International (P) Ltd Publisher, New Delhi (2014).

4. Quantum Mechanics by K.K. Chopra and G.C. Agarwal, Krishna Prakasam Media (P) Ltd, Meerut, first edition (1998).

REFERENCE BOOKS:

1. Mechanics and Relativity by Brijlal and Subramanyam S. Chand & Co, New Delhi (2017)

2. Quantum Mechanics by A. Ghatak and Loganathan, (2012) Macmillan India (P) Ltd.

3. Concepts of Modern Phyics by A.Beiser, Tata McGraw – gill, 5th Edition, New Delhi (1997)

E-LEARNING RESOURCES:

1. https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016/resources/de-broglie-wavelength-in-different-frames/

2. https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016/resources/the-wave-for-a-free-particle/

3. https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016/resources/momentum-operator-energy-operator-and-a-differential-equation/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

Units	Section - a	Section - b	Section - c
I	2	1	2
II	3	2	1
III	3	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	2	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	2	3	3	3	3
Ave.	**2.6**	**3**	**3**	**3**	**3**

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Understand the space - time concept through relativity	PSO1,PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4,K5,K6
CO2	Arrive at duality through matter waves.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	Derive time dependent and independent Schrodinger equations	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Use different operators in solving quantum mechanical problems	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO5	Find eigen values and eigen functions of free particle.	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: CORE - 10
COURSE NAME: MATHEMATICAL PHYSICS	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To familiarize students with essential mathematical methods for solving advanced problems in theoretical physics.

COURSE OUTCOMES:

Upon completion of the course, the student should be able:

1. Acquire the knowledge on advanced mathematical methods and theories on various mathematical and physics problems.

2. Develop the skill of problem-solving ability.

3. Explain the use of Matrices to solve simultaneous equations.

4. Discuss to solve quantum mechanical problems using special functions and polynomials.

5. Understand the Fundamentals Classical mechanics and statistical mechanics for their higher studies.

UNIT 1: Matrices and Special Functions   **(15 Hours)**

Characteristic equation of a matrix - Eigenvalues and Eigenvectors - Hermition and Unitary matrices - Properties of their eigenvalues and eigenvectors - Diagonalisation of matrices. Special functions - Gamma and Beta functions - Series solutions of Legendre, Bessel and Hermite equations

UNIT 2: Elementary Complex Analysis   **(15 Hours)**

Functions of a Complex variable - Continuity and differentiability - single and multivalued functions Analytic function - Cauchy - Riemann conditions (necessity and sufficiency). Cauchy - Riemann Conditions in the Polar (r, θ) coordinates.

UNIT 3: Vector Analysis   **(15 Hours)**

Scalar and Vector fields - Gradient, Divergence and Curl - Equations of motion in the vector notation Spherical, Cylindrical co-ordinates -transformation equation - equations of motion (components) in cartesian coordinates and spherical polar coordinates - equation of motion (components) in the polar coordinates.

UNIT 4 : Classical Mechanics   **(15 Hours)**

Generalised coordinates - configuration space - Lagrange's equation - simple applications : to find equations of motion using a lagrangian; central potential and conservation of angular momentum - Hamilton function and Hamilton's equations - harmonic oscillator.

UNIT 5: Statistical Physics   **(15 Hours)**

Quantum statistics of identical particles - Maxwell - Boltzmann, Bose - Einstein and Fermi - Dirac statistics - Derivation of Planck's radiation formula from Bose - Einstein statistics.

PRESCRIBED BOOKS:

1.   Mathematical Physics by Sathya Prakash, Sultan Chand and Sons, New Delhi (1996)

2.   Classical Mechanics by J.C. Upadhyaya, Himalaya Publishing House, Mumbai(2003).

3.   Introduction to Statistical Mechanics by S.K. Sinha Narosa Publication(2007).

4.   Heat Thermodynamics and Statistical Physics by Brijlal N.Subrahmanyam, P.S. Hemne S.Chand & Co., New Delhi.(2007).

REFERENCE BOOKS:

1.   Mathematical Physics by B.D. Gupta, Vikas Publishing House Pvt. Ltd., New Delhi(1996).

2.   Advanced Engineering Mathematics by E.Kreyszig, Eighth Edition, Wiley Publishers, New York(1989).

3.   Classical Mechanics by H.Goldstein, Special Indian student edition, Narosa Publishing House, New Delhi(1985)

E-LEARNING RESOURCES:

1. http://phy.syr.edu/~trodden/courses/math methods. 2.

2. http://www.mpipks_dresden.mpg.de/~jochen/methoden/outline/html.

GUIDELINES TO THE QUESTION PAPER SETTERS
QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	2	1	2
II	3	2	1
III	3	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	**3**	**3**	**3**	**2**	**3**
CO 2	**3**	**3**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**2**	**3**
CO 4	**3**	**3**	**3**	**2**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**
Ave.	**3**	**3**	**3**	**2.4**	**3**

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	To use advanced mathematical methods and theories on various mathematical and physics problems.	PSO1, PSO2, PSO3, PSO4	K1, K2, K3, K4,K5
CO2	To develop the skill of problem-solving ability.	PSO1, PSO2, PSO3, PSO4	K1, K2,K3, K4,K5
CO3	Use Matrices to solve simultaneous equations	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Solve quantum mechanical problems using special functions and polynomials.	PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Understand the Fundamentals Classical mechanics and statistical mechanics for their higher studies	PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: Practical - 3
COURSE NAME: PRACTICAL GENERAL - III	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
PRACTICAL	

COURSE OBJECTIVE:

To make the students skillful in experimentally analysing the physical concepts through practical.

COURSE OUTCOMES:

1. Gain the knowledge on experimental procedures and correlate the outcomes with corresponding theoretical results based on mechanics, light.

2. Acquire the acknowledge in electrical devices such as ammeter, voltmeter and Ballistic galvanometer etc.,

3. Observe and calculating the standard values of BH using deflection and vibrating magneto meter.

4. Analyze the applications of plane transmission grating and prism in calculating wavelength and refractive index.

5. Understand the working of thermocouple in finding the thermos-emf.

(Any Fifteen Experiments)

1. Young's modulus - Non uniform Bending - Koenig's method.

2. Kundt's Tube – Determination of velocity of sound in solid - Young's modulus.

3. Spectrometer - Small angled prism - Normal incidence and emergence refractive index of the material of prism.

4. Spectrometer - (i - i') curve - refractive index.

5. Spectrometer - Cauchy's constant.

6. Newton's rings - R1, R2 and μ of convex lens.

7. Newton's rings - Refractive index of liquid.

8. Field along axis of a circular coil - Deflection magnetometer - BH and M.

9.   Field along axis of a circular coil - vibration magnetic needle - BH.

10.   Potentiometer - Calibration of high range voltmeter

11.   Potentiometer - Temperature coefficient of resistance of a thermistor

12.   Potentiometer - Emf of a thermocouple.

13.   Thermo-emf - Mirror galvanometer (or) spot galvanometer

14.   B.G - Figure of merit (quantity of charge)

15.   B.G - Comparison of EMFs

16.   B.G - Comparison of capacitances

17.   B.G - Internal resistance of a cell

18.   B.G - High Resistance by leakage

19.   B.G - Absolute capacitance

20.   B.G - Comparison of mutual inductances

21.   B.G - Absolute mutual inductance

22.   B.G - Self-inductance - Anderson method.

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: PRACTICAL-4
COURSE NAME: PRACTICAL ELECTRONICS I	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
PRACTICAL	

COURSE OBJECTIVE:

To make the students skillful in experimentally analysing the physical concepts through practical.

COURSE OUTCOMES:

1. Identify the basic electronic devices like diode, transistor, LED, UJT AND FET; observe the characteristics of diodes like PN, Zener diode.

2. Acquire the knowledge to use IC in different applications like, to verify laws and theorems of Boolean algebra, to study basic combinational circuits.

3. Analyze transistor amplifiers and their frequency responses.

4. Understand the need and requirements to obtain frequency response from a transistor 5.designing the circuit and verifying the results for convertors and counters using IC.

(Any Fifteen Experiments)

1. A.C. Circuit – LCR – Series resonance

2. A.C. Circuit – LCR – Parallel resonance

3. Bridge rectifier - Zener regulated power supply - 9V characteristics.

4. R-C Coupled Single Stage Amplifier - Frequency Response

5. R-C Coupled Amplifier with feedback.

6. Emitter follower

7. Transistor - Phase Shift Oscillator

8. Transistor - Wien's Bridge Oscillator

9. FET characteristics

10. FET amplifier

11. UJT characteristics

12. UJT Relaxation oscillator

13. SCR characteristics

14. Transistor - Astable multivibrator

15. Transistor - Bistable multivibrator

16. NAND / NOR as universal gates.

17. Half Adder – Full adder – Ex-OR(7486)

18. Half Subtractor – Full subtractor – Ex - OR(7486)

19. 4 bit ripple counter using 7473/7476

20. 4 bit shift register using 7473/7476

21. Decode counter using 7490

PROGRAMME: B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT:PRACTICAL-5
COURSE NAME: MICROPROCESSOR AND INTEGRATED ELECTRONICS-PRACTICAL	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
PRACTICAL	

COURSE OBJECTIVE:

To make the students skillful in experimentally analysing the physical concepts through practical.

COURSE OUTCOMES:

1. Understand the OP-AMP and 555 timer operations.

2. Observe the basic operations of logics gates.

3. Understand the working mechanism and use of different IC.

4. Analyse the use of microprocessor kit.

5. Develop the program writing skills for mathematical operations.

(Any Fifteen Experiments)

1. Op amp 741 - Inverting , Non - Inverting amplifier, unity follower.

2. Op amp 741 - Summing and difference amplifier

3. Op amp 741 – Differentiator, integrator

4. OP amp 741 – Solving simultaneous equations

5. Op amp 741 – Wein's Bridge oscillator

6. Op amp 741 - Phase Shift oscillator

7. 555 - Timer - Schmitt Trigger

8. 555 - Timer - Astable operation

9. 555 - Timer - Monostable

10.   D/A Converter – 4 bit, binary weighted resistor method

11.   Microprocessor – 8085 – 8 bit Addition

12.   Microprocessor – 8085 – 8 bit Subtraction

13.   Microprocessor – 8085 – 8 bit Multiplication

14.   Microprocessor – 8085 – 8 bit Division

15.   Microprocessor – 8085 – Addition of N Number of single byte numbers

16.   Microprocessor – 8085 – Sorting of given set of numbers in ascending order

17.   Microprocessor – 8085 – Sorting of given set of numbers in descending order

18.   Microprocessor – 8085 – Finding the largest no. in a given set of numbers.

19.   Microprocessor– 8085–Finding the smallest no. in a given set of numbers.

PRESCRIBED BOOKS:

1.   Practical Physics by D. Chattopadhyay, P.C. Rakshit, New Central Book Agency (p) Ltd. Kolkata(2007).

2.   Practical Physics and Electronics by C.C.Ouseph, U.J.Rao and Vijayendran, S.Viswanathan (Printers & Publishers) Pvt., Ltd (2007).

3.   Practical Physics by C L Arora, S. Chand & Co., New Delhi (2008)

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: ELECTIVE-2
COURSE NAME: INTEGRATED ELECTRONICS	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make the students understand the working of different segments of computational system like memory, Arithmetic logic unit.

COURSE OUTCOMES:

On completion of the course the students will have:

1. Gain the knowledge on different number systems and the skill to simplify the logics using Karnaugh map and Boolean algebra.

2. Acquire the knowledge on storing and retrieving a data through mux and demux.

3. Develop the skill to customize the counters to the need through serial and parallel counters.

4. Describe the simultaneous equations and differential using Operational amplifier.

5. Understand the digital to analog (DAC) and analog to digital (ADC).

UNIT 1 : Fundamental Digital Electronics **(15 Hours)**

Number systems – binary – hexadecimal – Binary addition – subtraction (1's and 2's compliment method) – multiplication - division - BCD – Conversion – simplification of logic circuits - using

(i) Boolean algebra, (ii) Karnaugh map – Demorgan's theorems - NAND and NOR as universal building blocks.

UNIT 2 : Combinational Logic Circuits **(15 Hours)**

Half adder, full adder, half subtractor and full subtractor – 4 bit adder/subtractor - decoder, encoder - multiplexer - demultiplexer.

UNIT 3 : Sequential Logic Circuits **(15 Hours)**

 R.S flip flop, D flip flop and JK flip flops - JK Master Slave flip flop - synchronous and ripple counters - BCD counter – Up/Down counters - shift registers - serial and parallel registers - ring and twisted ring counter.

UNIT 4 : OP-AMP Basic Applications **(15 Hours)**

Characteristics parameters – differential gain – CMRR – Slew rate – bandwidth - applications – inverter, non-inverter, integrator, differentiator, summing, difference and averaging amplifier - solving simultaneous equations - comparator - square wave generator - Wien's bridge oscillator - Schmitt trigger

UNIT 5 : Timer, DAC/ADC **(15 Hours)**

Timer 555 - Internal block diagram and working – a stable multivibrator - schmitt trigger. D/A converter - binary weighted method - A/D converter - successive approximation method.

BOOKS FOR STUDY

1. Digital Principles and Application by Malvino Leach, Tata McGraw Hill, 4th Edition (1992).

2. Digital Fundamentals by Thomas L. Floyd, Universal Book Stall, New Delhi (1998).

3. Introduction to Integrated Electronics by V.Vijayendran, S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai(2005).

4. OP - AMPs and Linear Integrated Circuits by Ramakant A. Gayakwad, Prentice Hall of India (1994).

BOOKS FOR REFERENCE

1. Digital Electronics by Practice Using Integrated Circuits - R.P.Jain - Tata McGraw Hill(1996).

2. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain - New Age International (P) Ltd. (2003).

3. Electronics - Analog and Digital by I.J. Nagrath - Prentice - Hall of India, New Delhi (1999).

4. Integrated Electronics by J.Millman and C.Halkias, Tata McGraw Hill, New Delhi (2001)

E-LEARNING RESOURCES:

1.   https://archive.nptel.ac.in/courses/108/105/108105132/

2.   https://archive.nptel.ac.in/courses/117/106/117106086/

3.   http://www.dear.harward.edu/courses/es154.

4.   http://www.phys.ualberta.ca/~gingrich/phys395/notes/phys395.html.

GUIDELINES TO THE QUESTION PAPER SETTERS
QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	2	1	2
II	3	2	1
III	3	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	**3**	**3**	**2**	**3**	**3**
CO 2	**3**	**3**	**2**	**3**	**3**
CO 3	**3**	**3**	**2**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**2**
CO 5	**3**	**3**	**3**	**3**	**3**
Ave.	**3**	**3**	**2.6**	**3**	**2.8**

PSO-CO – Question Paper Mapping

	COURSE OUTCOME	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Through knowledge on different number systems and the skill to simplify the logics using Karnaugh map and Boolean algebra	PSO1, PSO2, PSO4, PSO5	K1, K2, K3, K4,K5,K6
CO2	Detailed knowledge in storing and retrieving a data through mux and demux	PSO1, PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	The skill to customize the counters to the need through serial and parallel counters	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	The ability to solve simultaneous equations and differential using Operational amplifier	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO5	The Understanding of digital to analog (DAC) and analog to digital (ADC)	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: ELECTIVE - 3
COURSE NAME: MICROPROCESSOR FUNDAMENTALS	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To study the architecture of the microprocessor 8085 and micro controller 8051 gain knowledge about the hardware and software of microcomputers and relate the functions of 8085 to the present generation computers and to develop their own software for specific tasks.

COURSE OUTCOMES:

At the end of each chapter the students will be able to

1: Describe the functions of each pin and internal hardware of 8085 microprocessor.

2: Write simple programs with different logics for specific tasks.

3: Develop the knowledge of interfacing peripheral devices to 8085 microprocessor and the use of microcontrollers in the day to day applications.

4: Distinguish the software of personal computers from 8085 microprocessor.

5: Appreciate the use of interrupts and switching of program sequence to discharge specific tasks.

UNIT-I: ARCHITECTURE   **(15 Hours)**

Architecture of 8085 – registers, flags, ALU, address and data bus, demultiplexing address/databus - Control and status signals – Control bus, programmer's model of 8085 – pin out diagram – Functions of different pins

UNIT-II: PROGRAMMING TECHNIQUES   **(15 Hours)**

Instruction set of 8085 – data transfer arithmetic, logic, branching and machine control group of instructions – addressing modes – register indirect, direct, immediate and implied addressing modes.

Assembly language and machine language – Programming techniques – addition, subtraction,

multiplication, division, ascending descending order, largest and smallest (single Byte).

UNIT-III: INTERFACING MEMORY TO 8085 (15 Hours)

Memory interfacing – Interfacing 2k x 8 ROM and RAM – Timing diagram of 8085 (MOV Rd, Rs – MVI Rd, data 8)

UNIT-IV:INTERFACING I/O PORTS TO 8085 (15 Hours)

Interfacing input port and output port to 8085 - Flashing LEDs

UNIT-V: INTERRUPTS (15 Hours)

Interrupts in 8085 - Hardware and Software interrupts – RIM, SIM instructions and priorities - Microcontroller 8051- Introduction, Pin configuration and its salient features.

PRESCRIBED BOOKS:

1. Fundamental of microprocessor 8085 by V.Vijayendran, S. Viswanathan publishers

2. Microprocessor Architecture Programming and application with 8085 by R.S.Gaonkar, 5th Edition

3. Fundamental of microprocessor 8086 by V.Vijayendran, S. Viswanathan publishers

REFERENCE BOOKS:

1. Introduction to microprocessor – Aditya Mathur

E-LEARNING RESOURCES:

1. https://archive.nptel.ac.in/courses/108/103/108103157/

2. https://elearn.nptel.ac.in/shop/nptel/microprocessors-and-microcontrollers/

3. https://archive.nptel.ac.in/content/storage2/courses/106108100/pd   f/Lecture_ Notes/ LNm1.pdf

4. https://rajdhanicollege.ac.in/ admin/ckeditor/ckfinder/userfiles/fil   es/interrupts%20of% 208085%20microprocessor.pdf

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	2	1	2
II	3	2	1
III	3	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	3	2	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Ave.	**3**	**2.8**	**3**	**3**	**3**

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Describe the functions of each pin and internal hardware of 8085 microprocessor	PSO1, PSO2, PSO4, PSO5	K1, K2, K3, K4,K5,K6
CO2	Write simple programs with different logics for specific tasks	PSO1, PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	Develop the knowledge of interfacing peripheral devices to 8085 microprocessor and the use of microcontrollers in the day to day applications	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Distinguish the software of personal computers from 8085 microprocessor	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO5	Appreciate the use of interrupts and switching of program sequence to discharge specific tasks	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

ALLIED PHYSICS

(For B.Sc., Mathematics & Chemistry)

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: ALLIED-1
COURSE NAME: ALLIED PHYSICS-I	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make the students familiarize with physical concepts to have detailed learning in their core subjects.

COURSE OUTCOMES:

1. Understand the basis of SHM and ultrasonic.
2. Acquire the knowledge on complete study of thermodynamics and entropy.
3. Gain the knowledge on basic idea of magnetic effects of current and AC circuits.
4. Explain the over view of effects in lenses and corrective measures.
5. Understand the basics on Geometrical optics.

UNIT 1: Waves and Oscillations   **(15 Hours)**

Simple harmonic motion – composition of two simple harmonic motion at right angles (periods in the ratio 1:1) – Lissajou's figures – uses – laws of transverse vibrations of strings – Melde's string – transverse and longitudinal modes – determination of a.c frequency using sonometer (steel and brass wires) – ultrasonics – production – application and uses – reverberation – factors for good acoustics of hall and auditorium.

UNIT 2 : Properties of matter   **(15 Hours)**

Elasticity : Elastic constants – bending of beam – Young's modulus by non- uniform bending – energy stored in a stretched wire – torsion in a wire – determination of rigidity modulus by torsional pendulum – static torsion. Viscosity : Coefficient of viscosity – Poissuelle's formula – comparison of viscosities - burette method – Stoke's law – terminal velocity – viscosity of highly viscous liquid – lubrication. Surface tension : Molecular theory of surface tension – excess of pressure inside a drop and bubble – variation of surface tension with temperature – Jaeger's method.

UNIT 3 : Thermal Physics (15 Hours)

Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory and application – liquefaction of gasses – Linde's process – Helium I and II – adiabatic demagnetization. Thermodynamic equilibrium – laws of thermodynamics – entropy change of entropy in reversible and irreversible processes.

UNIT4: Electricity and Magnetism (15 Hours)

Capacitor – energy of a charged capacitor - loss of energy due to sharing of charges – magnetic field due to a current carrying conductor – Biot Savart's Law – Field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an ac circuit – circuit control and protective devices – switch and its types – fuses circuit breaker and relays.

UNIT 5 : Geometrical optics (15 Hours)

Refraction – Refractive index by microscopy – air cell – refraction at grazing incidence and grazing emergence in prisms – combination of two small angled prisms to produce dispersion without deviation and deviation without dispersion – direct vision prism – constant deviation prism – defects of images – coma – distortion – spherical and chromatic aberration in lenses.

PRESCRIBED BOOKS:

1. Allied Physics by R. Murugesan, S.Chand & Co, New Delhi (2008).

2. Waves and Oscillations by Brijlal and N. Subramanyam, Vikas Publishing house ,New Delhi.

3. Properties of Matter by Brij Lal and N.Subramaniam, S. Chand & Co., New Delhi(1994).

4. Heat and Thermodynamics by J.B.Rajam and C.L.Arora, S.Chand & Co., 8th edition, New Delhi(1976).

5. Optics and Spectroscopy by R. Murugesan, S.Chand & Co, New Delhi (2005).

REFERENCE BOOKS:

1. Fundamentals of Physics by Resnick Halliday and Walker, John Willey and Sons, Asia Pvt.Ltd., 10th edition, Singapore.

2. Text book of Sound by V.R.Khanna and R.S.Bedi, Kedharnaath Publish & Co, 1st edition, Meerut (1998).

3. Electricity and Magnetism by N.S. Khare and S.S. Srivastava, Atma Ram & Sons, 10th Edition, New Delhi (1983).

4. Optics by D.R. Khanna and H.R. Gulati, S. Chand & Co., New Delhi (1979).

E-LEARNING RESOURCES:

1. https://www.vssut.ac.in/lecture_notes/lecture1430261805.pdf

2. https://kanchiuniv.ac.in/coursematerials/Physics%20book_Final %20(1).pdf

3. https://www.academia.edu/34090760/LECTURE_NOTES_ON_P HS_222_THERMAL_ PHYSICS

4. https://www.youtube.com/watch?v=yophVacNTss

5. https://www.youtube.com/watch?v=FhzfImi-pws

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	2	1	2
II	3	2	1
III	3	1	1
IV	2	2	1
V	2	1	1
TOTAL	12	7	6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	3	2	3	3	2
CO 3	3	3	3	3	3
CO 4	3	2	3	3	3
CO 5	3	3	2	3	3
Ave.	3	2.6	2.8	3	2.8

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	To understand the basis of SHM and ultrasonics	PSO1, PSO2, PSO4, PSO5	K1, K2, K3, K4,K5,K6
CO2	Complete study of thermodynamics and entropy.	PSO1, PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	Basic idea of magnetic effects of current and AC circuits	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Over view of defects in lenses and corrective measures	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO5	Understanding the basics on Geometrical optics	PSO1, PSO2, PSO3 PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: ALLIED-1I
COURSE NAME: ALLIED PHYSICS-II	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To make the students familiarize with physical concepts to have detailed learning in their core subjects

COURSE OUTCOMES:

1. Explain the overall view of Physical optics and optical instruments.

2. Gain the knowledge on basic study of atomic and nuclear aspects.

3. Understand the Nuclear model and nuclear reaction.

4. Analyse the basic idea of relativity and quantum mechanics.

5. Understand the electronics and Digital electronics.

UNIT 1: Physical Optics   (15 Hours)

Velocity of light – Michelson's method. Interference : Colours of thin films –air wedge – determination of diameter of a thin wire by air wedge – test for optical flatness – Diffraction – Fresnel's explanation of rectilinear propagation of light – theory of transmission grating – Normal incidence – polarization – double refraction - optical activity – polarimeter.

UNIT 2 : Atomic Physics   (15 Hours)

Atom model – vector atom model – electron, spin, quantum numbers – Pauli's exclusion principle – electronic configuration of elements and periodic classification of elements – various quantum numbers – magnetic dipole moment of electron due to orbital and spin motion – Bohr magneton – spatial quantisation – Stern and Gerlach experiment.

UNIT 3 : Nuclear Physics   (15 Hours)

Nuclear model – liquid drop model – magic numbers - shell model – nuclear energy – mass defect – binding energy. Radiation detectors – ionization chambers – GM Counter – Fission Controlled and Uncontrolled chain reaction – nuclear reactor – thermonuclear reactions – stellar energy.

UNIT 4 : Elements of relativity and quantum mechanics   **(15 Hours)**

Postulates of theory of relativity – Lorentz transformation equations – derivation – length contraction – time dilation – mass energy equivalence – uncertainty principle – postulates of wave mechanics – Schrodinger's equation – application to a particle in a box.

UNIT 5 : Electronics   **(15 Hours)**

Basic Electronics: Zener diode – voltage regulator – LED – Transistor RC coupled amplifier – feedback principle – condition for oscillation – phase shift oscillator – Wein's bridge oscillator.

Digital Electronics : NAND and NOR gates – Universal building blocks – Boolean algebra – Demorgan's theorem – verification – elementary ideas of ICs – SSI , MSI, LSI and VLSI – Half adder, Full adder, Half Subtractor and Full subtractor.

PRESCRIBED BOOKS:

1. Allied Physics by R. Murugesan, S.Chand & Co, New Delhi(2008).

2. Allied Physics by K. Thangaraj and D. Jayaraman, Popular Book Depot, Chennai(2004).

3. Text book of Optics by Brijlal and N. Subramanyam, S.Chand & Co, New Delhi(2002).

4. Modern Physics by R. Murugesan, S.Chand & Co, New Delhi (2005).

5. Applied Electronics by A. Subramaniyam, National Publishing Co., 2nd Edition, Chennai (2001).

REFERENCE BOOKS:

1. Fundamentals of Physics by Resnick Halliday and Walker, John Willey and Sons, Asia Pvt.Ltd., 6th Edition, Singapore.

2. Optics by D.R. Khanna and H.R. Gulati, S. Chand & Co., New Delhi (1979).

3. Concepts of Modern Physics by A.Beiser, Tata McGraw Hill Publication, New Delhi(1997).

4. Digital Fundamentals by Thomas L.Floyd, Universal Book Stall – New Delhi (1998).

E-LEARNING RESOURCES:

1. https://nptel.ac.in/courses/122106025

2. https://archive.nptel.ac.in/courses/106/105/106105185/

3. https://www.shiksha.com/online-courses/articles/universal-logic-gate/#A

4. https://www.javatpoint.com/binary-adder-subtractor-in-digital-electronics

GUIDELINES TO THE QUESTION PAPER SETTERS
QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (Each in 50 words)	1 – 12	3	**30**
B	Answer any 5 out of 7 questions (Each in 300 words)	13–19	6	**30**
C	Answer any 4 out of 6 questions (Each in 1200 words)	20– 25	10	**40**
			TOTAL	**100**

BREAK UP OF QUESTIONS

UNITS	SECTION - A	SECTION - B	SECTION - C
I	2	1	2
II	3	2	1
III	3	1	1
IV	2	2	1
V	2	1	1
TOTAL	**12**	**7**	**6**

PSO – CO Mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	2	3	3	3
CO 2	3	3	3	3	3
CO 3	2	3	3	3	2
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Ave.	**2.8**	**2.8**	**3**	**3**	**2.8**

PSO-CO-Question Paper Mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Overall view of Physical optics and optical instruments	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4,K5,K6
CO2	Basic study of atomic and nuclear aspects	PSO1, PSO2 PSO4, PSO5	K1, K2,K3, K4,K5,K6
CO3	Understanding of Nuclear model and nuclear reaction.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Basic idea of relativity and quantum mechanics	PSO1, PSO2, PSO4, PSO5	K1, K2, K3, K4, K5,K6
CO5	Introduction to electronics and Digital electronics	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5,K6

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

PROGRAMME : B.Sc PHYSICS	BATCH: 2024-27
PART: III	COURSE COMPONENT: ALLIED PRACTICALS
COURSE NAME: ALLIED PHYSICS-PRACITCALS	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 4	TOTAL HOURS: 75
PRACTICAL	

COURSE OBJECTIVE:

To make the students skillful in experimentally analysing the physical concepts through practical.

COURSE OUTCOMES:

1. Gain the knowledge on ability to formulate, conduct, analyze and interpret experiments in physics.

2. Acquire the knowledge on fundamental physics and basic mechanics principles.

3. Study the elastic modulus and behavior of the materials.

4. Analyze the specific heat capacity, refractive index, as per the standard procedure.

5. Understand the knowledge in electrical devices such as ammeter and voltmeter.

(Any Fifteen Experiments)

1. Young's Modulus by Non-uniform bending using Pin and Microscope

2. Young's Modulus by Non-uniform bending using Optic lever – Scale and telescope

3. Rigidity modulus by Static torsion method

4. Rigidity modulus by torsional oscillations without mass

5. Surface tension and interfacial tension – Drop Weight method

6. Comparison of viscosities of two liquids – Burette method

7. Specific heat Capacity of a liquid – Half time correction

8. Sonometer – Determination of a.c frequency

9. Newton's rings - Radius of curvature

10. Air wedge – Thickness of a wire

11. Spectrometer – Grating – Wavelength of Mercury lines – Normal Incidence

12. Potentiometer – Voltmeter Calibration

13. P.O. Box – Specific resistance

14. Table Galvanometer – Figure of merit

15. Construction of AND, OR, NOT gates – using diodes and Transistor

16. Zener Diode – Characteristics

17. NAND gate as a universal gate

Note : Use of Digital Balance Permitted

PRESCRIBED BOOKS:

1. Practical Physics by M.N.Srinivasan S. Chand & Co.,

2. Practical Physics by M.Arul Thalapathy Comptek Publishers.

SOFT SKILL COURSES

SOFT SKILLS	BATCH: 2024-27
COURSE NAME: COMMUNICATION AND PRESENTATION SKILLS	COURSE CODE: SOFT SKILL-I
SEMESTER: I	MARKS:100
CREDITS: 2	TOTAL HOURS: 30

COURSE OBJECTIVE:

To build communication skills for personal and professional development.

COURSE OUTCOMES:

1. Students will demonstrate the ability to listen to others actively, understand diverse perspectives, and paraphrase key points accurately, enhancing their comprehension skills in various personal and professional contexts.

2. Students will be able to articulate thoughts, ideas, and information clearly and concisely, using appropriate language and structure to convey messages effectively in both written and verbal communication.

3. Students will develop confidence in expressing opinions, asserting boundaries, and advocating for themselves and others, enhancing self-assurance and effectiveness in interpersonal and group communication.

4. Students will learn to adapt their communication style and approach based on the audience, context, and purpose of communication, fostering flexibility and versatility in interacting with diverse individuals and groups.

5. Students will acquire techniques for resolving conflicts, managing disagreements, and negotiating mutually beneficial outcomes through effective communication strategies, promoting constructive problem-solving and collaboration in personal and professional settings.

UNIT I Essentials of Effective Communication   (6 Hours)

Communication Skills-LSRW- Characteristic features of LSRW-Consequences of Ineffective Communication-Impact of technology on Communication

UNIT II Types of Communication   **(6 Hours)**

Verbal Communication – Non-verbal Communication- Visual Communication - Written Communication-Group Communication-Digital Communication-Formal and Informal Communication-Vertical-Horizontal-Diagonal Grapevine

UNIT III Barriers in Communication   **(6 Hours)**

Physical Barriers - Language Barriers - Social and Cultural Barriers - Psychological Barriers - Semantic Barriers - Interpersonal Barriers - Technological Barriers- Means to overcome the various barriers to Communication

UNIT IV Etiquettes and Ethical Practices in Communication   **(6 Hours)**

Active Listening - Clarity and Conciseness - Professional Tone - Timeliness – Constructive Feedback-Transparency-Professionalism-Accountability-Confidentiality-Cultural Sensitivity-Emotional Intelligence-Empathy-Social Intelligence-Social Etiquettes- Appreciation and Gratitude

UNIT V Presentation Skills   **(6 Hours)**

Types of Presentation- Preparing a presentation-Do's and Don'ts while giving a presentation-Managing tools for presentation-Using prompts-Making effective uses of Audio/Visual aids during presentation-Dealing with Questions, Interruptions and Pauses- Practical: Participating in Mock presentations

PRESCRIBED BOOKS:

1.   Monippally, Matthukutty, M. Business Communication Strategies. New Delhi: Tata McGraw- Hill Publishing Company Ltd., 2001.

2.   Peter, Francis. (2012) Soft Skills and Professional Communication. New Delhi: Tata McGraw Hill.

3.   Raman, Meenakshi & Prakash Singh (2012) Business Communication Oxford University Press

REFERENCE BOOKS:

1.   Gallo, Maria. D (2018) Stop Lecturing Start Communicating: The Public Speaking Survival Guide for Business Kindle Edition

2.   Hasson, Gill. (2012)Brilliant Communication Skills. Great Britain: Pearson Education.

3.   Patil, Shailesh (2020) Handbook on Public Speaking, Presentation & Communication Skills: Principles & Practices to create high impact presentations & meaningful conversations, Chennai, Notion Press Media Pvt Ltd.

E-LEARNING RESOURCES:

1.   https://uwaterloo.ca/centre-for-teaching-excellence/catalogs/tip-sheets/effective-communication- barriers-and-strategies

2.   https://www.coursera.org/articles/presentation-skills

3.   https://positivepsychology.com/how-to-improve-communication-skills/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	Answer any 5 out of 7 questions (answer in 50 words)	1-7	2	**10**
B	Answer any 4 out of 6 questions (answer in 300 words)	8-13	5	**20**
C	Answer any two (Internal (Choice)	14-15	10	**20**
	Internal & Viva Voce		50	**50**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	----
II	2	1	1
III	1	1	1
IV	1	1	1
V	1	1	1
TOTAL	12	**6**	4

SOFT SKILLS	BATCH: 2024-27
COURSE NAME: INTERVIEW SKILLS AND RESUME WRITING	**COURSE CODE: SOFT SKILL-II**
SEMESTER: II	**MARKS:100**
CREDITS: 2	**TOTAL HOURS: 30**

COURSE OBJECTIVE:

To equip the students to acquire the relevant skills for better employability.

COURSE OUTCOMES:

1. Students will gain an overall understanding of the concept, the purpose, and the objectives of an interview

2. Students will become aware of the various types of interviews and the nuances of each one of them

3. Students will understand and equip themselves with the techniques and strategies required to ace an interview

4. Students will be able to draft a biodata /CV/Resume in the proper format

5. Students will embark on acquiring the relevant skills and will learn to leverage them effectively for better employability

UNIT I Introduction to Interview Skills   (6 Hours)

Definition- meaning- concept of interview –Purpose- Objectives of interview-Characteristic features of job interviews

UNIT II Types of Interview   (6 Hours)

Traditional one on one job interview- Panel interview- Behavioral interview-Group interview- Phone Interview- Preliminary Interview-Patterned Interview Depth Interview, Stress Interview, Exit Interview- Interview through tele and video conferencing

UNIT III Interviews: Techniques and Strategies   (6 Hours)

Preparing for the Interview Process- Before the interview-During the interview-After the interview -Tips to ace an interview -Commonly asked questions in interview -Do's and Don'ts of interview - Reasons for rejections

UNIT IV Preparing Biodata/CV/Resume **(6 Hours)**

Essential characteristics of a job Application-Difference between Biodata- CV-Resume-covering letter-Tips to draft an application

UNIT V   Leveraging Employability Skills **(6 Hours)**

Personality Development-Organizational skills-Time Management–Stress Management-Effective Communication Skills -Reasoning Ability-Verbal Ability- Group Discussion-Technical skills - Presentation skills

PRESCRIBED BOOKS:

1. Monipally, Matthukutty M. (2017) *Business Communication: From Principles to Practice*

2. Peter, Francis. (2012) *Soft Skills and Professional Communication*. New Delhi: Tata McGraw Hill.

REFERENCE BOOKS

1. Higgins, Jessica JD (2018)*10 Skills for Effective Business Communication: Practical Strategies from the World's Greatest Leaders*

2. Nicholas, Sonji (2023) *Interviewing: Preparation, Types, Techniques, and Questions,* Pressbooks

3. Storey, James (2016) *The Art of The Interview: The Perfect Answers to Every Interview Question*

E-LEARNING RESOURCES

1. https://careermobilityoffice.cs.ny.gov/cmo/documents/Resume%20&%20 Interviewing%20Handou t.pdf

2. https://edu.gcfglobal.org/en/interviewingskills/interview-etiquette/1/

3. https://findjobhub.com/en/types-of-interviews

4. https://egyankosh.ac.in/bitstream/123456789/23411/1/Unit-2.pdf

5. https://bharatskills.gov.in/pdf/E_Books/CTS/ES/English/ES_Part_1_62%20hour_Englis h.pdf

6. https://bharatskills.gov.in/pdf/E_Books/CTS/ES/English/ES_Part2_58hour_English.pdf

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	Answer any 5 out of 7 questions (answer in 50 words)	1-7	2	**10**
B	Answer any 4 out of 6 questions (answer in 300 words)	8-13	5	**20**
C	Answer anytwo(Internal (Choice)	14-15	10	**20**
	Internal &Viva Voce		50	**50**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	----
II	2	1	1
III	1	1	1
IV	1	1	1
V	1	1	1
TOTAL	12	6	4

PROGRAMME: For All Non IT students	BATCH: 2024-27
PART: IV	COURSE COMPONENT: SOFT SKILL III
COURSE NAME: DIGITAL PROFICIENCY AND MULTIMEDIA SKILLS	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
PRACTICAL	

COURSE OBJECTIVES:

To equip students with essential computing skills.

COURSE OUTCOMES:

1. Design document using salient features of MS-Word.

2. Utilize MS-Excel to manipulate data and prepare dynamic presentation using MS-Power Point.

3. Develop a static web page using HTML.

4. Exhibit proficiency in multimedia creation using GIMP.

5. Demonstrate expertise in data visualization with Raw Graphs.

Unit I: (6 Hours)

MS-Word: Creating, Editing, Formatting and Printing of Documents - Headers and Footers - Spell check- Insert/Draw Tables, Table Auto format – Page Borders and Shading - Mail Merge.

MS-Excel: Creating a new worksheet – Entering, editing and formatting the text, numbers – Formatting cells.

Unit II: (6 Hours)

Inserting Rows/Columns - Changing column widths and row heights – Freezing Titles, splitting screen - Formulae for calculation - Changing font sizes and colours, Sort.

MS-PowerPoint: Creating a Presentation - Inserting and Deleting Slides in a Presentation – Adding Text/Clip Art/Pictures - Slide Transition – Custom Animation.

Unit III: **(6 Hours)**

Web designing using HTML: Basic tags – heading tags – paragraph, bold, italic, underline tags – font tags – ordered and unordered list – inserting images – hyperlinks.

Unit IV: **(6 Hours)**

Multimedia applications using GIMP: Interface and Drawing Tools in GIMP- Applying Filters Creating and handling multiple layers - Using Stamping and Smudging tools - Importing pictures.

Unit V   **(6 Hours)**

Data visualization using Raw Graphs: Importing and exploring data - Basic chart types – mapping - customizing visualizations - Exporting visualizations.

E-LEARNING RESOURCES:

1.   https://www.javatpoint.com/ms-word-tutorial

2.   https://www.w3schools.com/excel/

3.   https://www.tutorialspoint.com/html/

4.   https://www.gimp.org/tutorials/

5.   https://www.rawgraphs.io/learning

PROGRAMME: ALL UG	BATCH: 2024 – 27
PART: IV	COURSE COMPONENT: SOFT SKILL- IV
COURSE NAME: FOUNDATIONS OF QUANTITATIVE APTITUDE	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

Develop learners' problem-solving skills and critical thinking abilities in the context of recruitment aptitude tests.

COURSE OUTCOMES:

1. The learner will be able to recognize, describe and represent patterns and relationships, as well as to solve problems using algebraic language and skills.

2. To learn about factors and multiples that numbers have in common with each other.

3. The student will analyse monthly profit and loss statements for a school store and calculate profit margin percentages.

4. Students learn what different types of interest are, where it occurs in real life and understand the concept of simple and compound interests.

5. The learner will draw, interpret and compare pie charts, bar charts and frequency diagrams.

Unit I: Number system and Number series   (6 Hours)

Numbers: Numbers and their classification, test for divisibility of numbers, General properties of divisibility, division and remainder, remainder rules.

Number Series: Number series, three steps to solve a problem on series, two-line number series, sum rules on natural numbers.

Unit II: HCF and LCM of Numbers   (6 Hours)

Factors, Multiples, Principal of Prime factorization, Highest Common Factor (HCF) and Least Common Multiple (LCM), Product of two numbers, Difference between HCF and LCM.

Unit III: Percentage, Profit and Loss   **(6 Hours)**

Percentage: Introduction, fraction to rate percent, rate percent to fraction, rate percent of a number, express a given quantity as a percentage of another given quantity, convert a percentage into decimals and convert a decimal into percentage.

Profit and Loss: Gain/Loss and % gain and % loss, relation among Cost price, Sale price, Gain/Loss and % gain and % loss.

Unit IV: Simple Interest and Compound Interest   **(6 Hours)**

Simple Interest: Definition, effect of change of *P, R and T* on Simple Interest, amount.

Compound Interest: Introduction, conversion period, basic formula, to find the Principal / Rate/Time, Difference between Simple Interest and Compound Interest.

Unit V: Data interpretation   **(6 Hours)**

Tabulation, Bar Graphs, Pie Charts, Line Graphs, average.

PRESCRIBED BOOK:

Quantitative Aptitude by R.S. Agarwal

REFERENCE BOOKS:

1.   Quantitative Aptitude by Abhijit Guha, Fourth Edition.

2.   Quantitative Aptitude by Ramandeep Singh.

E - LEARNING RESOURCES:

1.   https://byjus.com/maths/numeral-system/#:~:text=crore%20is%207.,International %20Numeral%20System,8%20%E2%80%93%20Ones

2.   https://byjus.com/maths/hcf-and-lcm/

3.   https://byjus.com/maths/profit-loss-percentage/

4.   https://www.vedantu.com/jee-main/maths-difference-between-simple-interest-and-compound-interest

5.   https://sites.utexas.edu/sos/guided/descriptive/descriptivec/frequency/

SELF STUDY COURSES

INDIAN HERITAGE AND KNOWLEDGE SYSTEM

PROGRAMME: For all UG	BATCH: 2024-27
PART: IV	COURSE COMPONENT: Self Study Course
COURSE NAME: INDIAN HERITAGE AND KNOWLEDGE SYSTEM	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 2	
QUESTION PATTERN: MCQ	
THEORY	

COURSE OBJECTIVE:

To delve into Indian Heritage, this course focuses on South Indian cultures and ancient knowledge like Yoga, Ayurveda, and Siddha, shaping the Nation's identity.

COURSE OUTCOMES:

1. Develop a comprehensive understanding among students of Indian heritage, its richness and diversity, and its role in shaping the nation's cultural identity.
2. Gain an enhanced insight into the artistic, architectural, and literary achievements of South India and other regions, fostering a sense of pride in Indian cultural heritage.
3. Enhance students' cultural literacy by gaining insights into traditional practices preserved through folklore across India.
4. Acquire knowledge among students of ancient Indian sciences for holistic well-being, promoting physical, mental, and spiritual health.
5. Develop a deeper understanding of the interconnectedness of spiritual, medicinal, and artistic dimensions within Indian Heritage systems.

UNIT I: Introduction to Indian Heritage

● **Concept of Heritage:** Definition, the importance of studying heritage, and its diverse forms.

● **Cultural Landscape of India:** Overview of major cultural zones in India, with a focus on South India.

Key Concepts: Cultural heritage, diversity, tangible heritage (e.g., monuments), intangible heritage (e.g., traditions, practices).

UNIT II: Cultural Tapestry of South India

● **Literature:** The classical Tamil literature of *Sangam poetry,* the epic Kannada works like the *"Kuvempu Ramayana,"* the Telugu compositions of *Annamacharya,* and the poetic Malayalam works of Kerala's rich literary tradition.

- **Painting:** The intricate gold leaf work of *Tanjore* painting, the intricate patterns of *Mysore* painting, hand-painting or block-printing of Kalamkari.
- **Theatre:** The ancient art form of *Koothu* and the elaborate dance-dramas of *Bhagavata Mela* in Tamil Nadu, and the colourful folk theatre of *Yakshagana* in Karnataka.
- **UNESCO Indian Heritage Sites:** *Great Living Chola Temples* artistry, *Hampi-*Virupaksha Temple and the Vijaya Vittala Temple, *Mahabalipuram-* a treasure trove of Pallava art, *Mysore Palace-*Indo-Saracenic architecture, *Periyar National Park-*Western Ghats, *Kanchipuram-*City of Thousand Temples

UNIT III: Tamil Nadu Folklores
- **Origins and Significance:** Historical background of Tamil Nadu folklore and its cultural significance.
- **Folk Dances:** Exploration of traditional Tamil folk dances like *Karakattam, Kolattam,* and *Kummi.*
- **Folk Music:** Overview of folk music traditions in Tamil Nadu, including *Parai Attam and Villu Paatu.*
- **Rituals and Festivals:** Understanding the role of folklore in Tamil Nadu's rituals and festivals- *Pongal and Jallikattu.*

   Key Concepts: Karakattam, Kolattam, Parai Attam, Villu Paatu, Tamil folk tales, cultural rituals.

UNIT IV: Unveiling the Knowledge Systems
- **Cultural Landscape of India:** Overview of major cultural zones in India, with a focus on South India.

- **Yoga:** Exploring the various aspects of Yoga - its philosophy, Eight Limbs, practices (e.g., Asanas, Pranayama), and benefits for physical and mental well-being.

- **Ayurveda:** Understanding the core principles of Ayurveda - its focus on holistic health, diagnosis, and treatment methods.

   Key Concepts: Yoga philosophy, Asanas, Pranayama, Tridosha theory (Ayurveda), Doshas (Vata, Pitta, Kapha), Panchakarma, herbal medicine, Ayurvedic lifestyle.

UNIT V: Siddha Tradition and Other Knowledge Systems
- **Siddha Tradition:** Origins, philosophy, medicinal practices, and spiritual aspects.

- **Other Important Knowledge Systems:** Jyotish Shastra (Indian astrology), Natya Shastra (Treatise on performing arts).

   Key Concepts: Siddha literature, alchemy, and spirituality in Siddha tradition. Pancha Boothas (Siddha), herbal remedies, Planetary influences, elements of classical Indian dance and music, and aesthetics in Natya Shastra.

PROGRAMME: For all UG	BATCH: 2024-27
PART: IV	COURSE COMPONENT: Self Study Course
COURSE NAME: CONTEMPORARY WORLD AND SUSTAINABLE DEVELOPMENT	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 2	
QUESTION PATTERN: MCQ	
THEORY	

COURSE OBJECTIVE:

To delve into global dynamics, this course highlights Asia and India's pivotal role in achieving global sustainability objectives.

COURSE OUTCOMES:

1. Gain a comprehensive understanding of the key actors, institutions, and dynamics shaping the contemporary world order.
2. Acquire the ability to analyze the political, economic, and security challenges within major Asian regions, fostering informed perspectives on these critical issues.
3. Study the recent wars to develop critical thinking skills to assess the root causes, human costs, and potential solutions to contemporary conflicts.
4. Gain a deeper understanding of the principles and challenges of sustainable development, empowering them to advocate for responsible solutions at local, national, and international levels.
5. Equip to critically evaluate India's contributions to the SDGs, particularly through specific programs implemented in Tamil Nadu, and assess their effectiveness in achieving sustainable development goals.

UNIT I: Global Governance and Institutions

- **State & Non-State Actors:** Definition, types (nation-states, failed states), functions.
  Key Actors: International states, Intergovernmental organizations (IGOs), nongovernmental organizations (NGOs), multinational corporations (MNCs).
- **United Nations (UN):** Structure, key organs (General Assembly, Security Council), functions, WB, & others.
  Key Concepts: United Nations General Assembly, United Nations Security Council.
- **Regional Organizations:** European Union (EU), African Union (AU), North Atlantic Treaty Organization (NATO)
  Key Concepts: European Union Commission, African Union Commission, North Atlantic Treaty Organization.
- **International Law and Treaties:** Significance, role in addressing global challenges.
  Key Concepts: International Court of Justice, International Criminal Court, Geneva Conventions.

UNIT II: Contemporary Asia
   Major Geographical Regions
- **Middle East:** Characterized by rich oil reserves, Complex political dynamics, and ongoing conflicts.

Key countries: Iran, Iraq, Israel, Saudi Arabia, Syria, Turkey

- **Southeast Asia:** Rapid economic growth, Challenges- maritime security and environmental degradation.
  Key countries: Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam
- **Far East:** Major economic powerhouses and Potential flashpoints.
  Key countries: China, Japan, North Korea, South Korea
- **Rise of China:** Political-South China Sea, Territorial disputes and Competition for Resources. Economic- China's Belt and Road Initiative (BRI)
- **Major Economic Centers: Singapore-** Global financial hub, **Hong Kong-** Special Administrative Region of China, **United Arab Emirates (UAE) -** Diversified economy driven by oil and gas, tourism, and trade.
  Regional Organizations:
- Association of Southeast Asian Nations (ASEAN)
- South Asian Association for Regional Cooperation (SAARC)
- Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)
- Asia-Pacific Economic Cooperation (APEC)
- Shanghai Cooperation Organization (SCO)

UNIT III: Recent Wars of the World

- **Syrian Civil War (2011-present):** Bashar al-Assad regime, Syrian opposition groups, ISIS.
  Key Concepts: Origins of the conflict, humanitarian crisis, foreign intervention, refugee crisis.
- **Yemeni Civil War (2015-present):** Houthi rebels, Yemeni government, Saudi-led coalition.
  Key Concepts: Proxy war dynamics, humanitarian crisis, role of Iran and Saudi Arabia, UN peace efforts.
- **Ukraine Conflict (2014-present)**: Ukrainian government, Russian-backed separatists, Russia.
  Key Concepts: Annexation of Crimea, Donbas region conflict, Minsk agreements, NATO-Russia tensions.
- **Ethiopia Civil War (2020-present):** Ethiopian government, Tigray People's Liberation Front (TPLF), Eritrean forces.
  Key Concepts: Tigray conflict, humanitarian crisis, regional implications, efforts for ceasefire and peace talks.
- **Nagorno-Karabakh War (2020):** Armenia, Azerbaijan, Russia.
  Key Concepts: Conflict over Nagorno-Karabakh region, ceasefire agreement, role of Turkey, peace negotiations.
- **Myanmar Civil War (2021-present):** Myanmar military (Tatmadaw), ethnic armed groups, and Civilian resistance.
  Key Concepts: Coup aftermath, Rohingya crisis, ethnic conflicts, ASEAN mediation efforts.

UNIT IV: Sustainable Development Goals

- **Definition of Sustainable Development:** Balancing economic, social, and environmental needs.
  Key Concepts: United Nations Development Programme (UNDP), World Wildlife Fund (WWF), Sustainable Development Solutions Network (SDSN).
- **UN Sustainable Development Goals (SDGs):** Overview, targets.
  Key Concepts: United Nations, national governments, NGOs, private sector.
- **Challenges and Opportunities:** Achieving sustainability, global cooperation.

Key Concepts: United Nations, national governments, civil society organizations, multinational corporations.

UNIT V: India's Role in Achieving Sustainable Development Goals (SDGs) with Tamil Nadu Initiatives

Addressing Basic Needs:
- **Goal 1: No Poverty**
  - National Rural Employment Guarantee Act (NREGA)
  - Kalaignar Kanchi Thalaiyalar Scheme
  - Ungal Thozhil Udhayanam (UTOY)
- **Goal 2: Zero Hunger**
  - National Food Security Act (NFSA)
  - Nutritious Noon Meal Programme
  - Annadhanam Scheme
  - Amma Unavagam
- **Goal 3: Good Health and Well-being**
  - National Health Mission (NHM)
  - Health Insurance of Tamil Nadu
  - Chief Minister's Comprehensive Health Insurance Scheme
  - Maruthuva Mitri
  - Amma Mini Clinics

Ensuring Essential Services:
- **Goal 4: Quality Education**
  - Sarva Shiksha Abhiyan (SSA)
  - Rashtriya Madhyamik Shiksha Abhiyan (RMSA)
  - Namakkal District Library Scheme
  - Pudhumai Penn Scheme under Higher Education Assurance Scheme (HEAS)
  - Free Coaching for Competitive Exams
- **Goal 6: Clean Water and Sanitation**
  - Swachh Bharat Mission (Clean India Mission)
  - National Rural Drinking Water Programme (NRDWP)
  - Jal Jeevan Mission Tamil Nadu
  - Namakku Naamey Scheme
  - Kudimaramathu Scheme
- **Goal 7: Affordable and Clean Energy**
  - National Solar Mission
  - Tamil Nadu Solar Energy Policy
  - Green House Scheme

Building Sustainable Communities:
- **Goal 11: Sustainable Cities and Communities**
  - Smart Cities Mission
  - Atal Mission for Rejuvenation and Urban Transformation (AMRUT)
  - Adi Dravidar Housing Scheme
- **Goal 13: Climate Action**
  - National Action Plan on Climate Change (NAPCC)
  - International Solar Alliance
  - Tamil Nadu Wind Energy Policy 2019
- **Goal 17: Partnerships for the Goals**
  - Development Assistance Programmes (DAPs)
  - International Development Cooperation (IDC)