

PHYSICS COMPLEMENTARY COURSE STRUCTURE

Total Credits: 12 (Internal: 20%; External: 80%)

<i>Semester</i>	<i>Code No</i>	<i>Course Title</i>	<i>Hours/Week</i>	<i>Total Hours</i>	<i>Credit</i>	<i>Marks</i>
1	PHY1C01	Complementary Course I: Properties of matter and Thermodynamics	2	36	2	75
	-	Complementary Course V: PHYSICS Practical	2	36	-*	-
2	PHY2C02	Complementary Course II: Optics ,Laser, Electronics	2	36	2	75
	-	Complementary Course V: PHYSICS Practical	2	36	-*	-
3	PHY3C03	Complementary Course III: Mechanics, Relativity, Waves and Oscillations	3	54	2	75
	-	Complementary Course V: PHYSICS Practical	2	36	-*	-
4	PHY4C04	Complementary Course IV: Electricity ,Magnetism and Nuclear Physics	3	54	2	75
	PHY4C05	Complementary Course V: PHYSICS Practical	2	36	4*	100
Total					12	400

* Examination will be held at the end of 4th semester

COMPLEMENTARY COURSE THEORY: EVALUATION SCHEME

The evaluation scheme for each course contains two parts: *viz.*, internal evaluation and external evaluation. Maximum marks from each unit are prescribed in the syllabus.

1. INTERNAL EVALUATION

20% of the total marks in each course are for internal evaluation. The colleges shall send only the marks obtained for internal examination to the university.

Table 1: Components of Evaluation

<i>Sl. No.</i>	<i>Components</i>	<i>Marks for 2/3 credits papers</i>
1	Class room participation based on attendance	3
2	Test paper: I	6
3	Assignment	3
4	Seminar/ Viva	3
<i>Total Marks</i>		15

Table 2: Pattern of Test Papers

<i>Duration</i>	<i>Pattern</i>	<i>Total number of questions</i>	<i>Number of questions to be answered</i>	<i>Marks for each question</i>	<i>Marks</i>
2 Hours	Short answer	12	10-12	2	20
	Paragraph/problem	7	6-7	5	30
	Essay	2	1	10	10
<i>Total Marks*</i>					60

*90% and above = 6, 80 to below 90% = 5.5, 70 to below 80% = 5, 60 to below 70% = 4.5, 50 to below 60% = 4, 40 to below 50% = 3.5, 35 to below 40% = 3, 25 to below 30% = 2.5, 15 to below 20 = 2, less than 15 = 0

2. EXTERNAL EVALUATION

External evaluation carries 80% marks. University examinations will be conducted at the end of each semester.

Table 1: Pattern of Question Papers

<i>Duration</i>	<i>Pattern</i>	<i>Total number of questions</i>	<i>Number of questions to be answered</i>	<i>Marks for each question</i>	<i>Marks</i>
2 Hours	Short answer	12	10-12	2	20
	Paragraph/problem	7	6-7	5	30
	Essay	2	1	10	10
<i>Total Marks</i>					60

Practical Evaluation (Complementary)

Internal		External	
Record	4	Record with 20 experimrnts. Max. ½ mark for one expt.	10
Regularity	4	Formulae, Theory, Principle	22
Attendance	4	Adjustments, setting	14
Test I	4	Tabulation & Observation	20
Test II	4	Calculation, graph, result, unit	10
		Viva	4
Total	20	Total	80

B.Sc. PHYSICS
COMPLEMENTARY COURSES SYLLABUS
(For B. Sc Programme in Mathematics, Chemistry etc)

Semester 4 | Complementary Course IV
PHY4C04: Electricity, Magnetism and Nuclear physics
54 Hours (Credit - 3)

	Course Outcome	CL	KC	Class Sessions allotted
CO1	Understand the basic ideas of static and current electricity	U	C	20
CO2	Understand the concepts of magnetism	U	C	12
CO3	Describe the fundamental concepts of nuclear physics	U	C	12
CO4	Understand the basic ideas of cosmic rays and elementary particles	U	C	10

Unit 1 Electrostatics

10 Hrs

Coulomb's law between charges- Electric field- field lines- Electric potential-Gauss's law and applications of Gauss's law to find field due to plane sheets of charge- Electrostatic shielding (Illustrate practical application) –Dielectrics- capacitors: A parallel plate capacitor, Energy of a capacitor, capacitance of cylindrical and spherical capacitors. Capacitance of a parallel plate capacitor- partially filled with dielectric and when completely filled with dielectric.

Unit 2 Current electricity

10 Hrs

Drift velocity of charges- electric resistance- superconductivity (basic ideas)- Galvanometer- conversion of galvanometer in to Voltmeter and ammeter – potentiometer – determination of resistance- Carey Foster's bridge- temperature coefficient of resistance.

Unit 3 Magnetism

12 Hrs

Earth's magnetism- magnetic elements- Dia magnets-paramagnets and ferromagnets, Hysteresis. Magnetic moment-Deflection magnetometer-Tan A, Tan B and Tan C- Searles vibration magnetometer- Tangent galvanometer.

Unit 4 Nuclear physics

12 Hrs

Nucleus and its properties- nuclear force- stability of nucleus- binding energy- nuclear fission- fusion- reactors- Nuclear bomb, Hydrogen bomb- Radio activity- α , β and γ radiations- half life and mean life- C_{14} dating- Effects of radiation- Nuclear waste disposal Particle accelerators- Linear accelerator- cyclotron

Unit 5 Cosmic rays and Elementary particles**10 Hrs**

Cosmic rays (primary and secondary)- cosmic ray showers- Elementary particles-Classifications- Leptons- Hadrons - Higgs boson- L H C- Origin of universe.

Books for study

1. Electricity and Magnetism-Murugesan
2. Nuclear Physics-D C Tayal

Reference books

1. Introduction to Electrodynamics-David J Griffith
2. Electricity and Magnetism – Arthur F Kip
3. Concepts of Modern physics – Arthur Beiser
4. Nuclear physics – Irvin Kaplan

Mark distribution for setting Question paper.

Unit/ chapter	Title	Marks
1	Electrostatics	15
2	Current electricity	15
3	Magnetism	17
4	Nuclear physics	17
5	Cosmic rays and Elementary particles	15
<i>Total Marks *</i>		79

*Total marks include that for choice of questions in sections A, B and C in the question paper.

LAB PROGRAMME FOR COMPLEMENTARY COURSES

(Lab examination will be conducted at the end of 4th semester)

The minimum number of experiments for appearing examination is **75% of total 24 experiments** in the syllabus. Basic theory of the experiment must be shown at the time of Examination. **Students must submit a certified fair record at the time of Examination.** Number of Questions per session for the practical Examination shall be 8, and a minimum of 6 questions in the Question paper shall be set for the Examination at the centre.

Semester 1 to 4 | Complementary Course V

PHY4C05: PHYSICS PRACTICALS I

36 Hours in each semester × 4 (Credit - 5)

	Course Outcome	CL	KC	Class Sessions allotted
CO1	Apply and illustrate the concepts of properties of matter through experiments	Ap	P	36
CO2	Apply and illustrate the concepts of electricity and magnetism through experiments	Ap	P	36
CO3	Apply and illustrate the concepts of optics through experiments	Ap	P	36
CO4	Apply and illustrate the principles of electronics through experiments	Ap	P	36

List of Experiments

1. Characteristics of Diode and Zener diode
2. Liquid lens- Refractive index of liquid and glass
3. Torsion pendulum- Rigidity modulus
4. Spectrometer- Refractive index of the material of prism
5. Deflection Magnetometer- Moment of a magnet (Tan-A & Tan - B positions)
6. Potentiometer-Measurement of resistance
7. Young's modulus – Uniform bending –using optic lever
8. Static torsion – Rigidity modulus
9. Spectrometer- Grating- Normal incidence
10. Melde's string- Frequency of fork (Transverse and Longitudinal mode)- (Mass determination by equal oscillation method / digital balance)

11. Half wave rectifier and Full wave rectifier
12. Field along the axis of a circular coil
13. Deflection Magnetometer- Moment of a magnet (Tan-C)
14. Potentiometer- Conversion of Galvanometer in to voltmeter –calibration by standard voltmeter
15. Viscosity of liquid- Capillary flow- Variable pressure head method (Mass determination by equal oscillation method / digital balance)
16. Logic gates – Verification of truth table
17. Carey Fosters bridge- Resistivity of the material of wire
18. Surface Tension-Capillary rise method - Radius by microscope.
19. Young's modulus of a cantilever- Pin and microscope method
20. Potentiometer-Calibration of low range voltmeter
21. Moment of inertia of fly wheel
22. Tangent galvanometer – Reduction factor
23. Searle's vibration magneto meter – Comparison of moments
24. Newton's rings- Wavelength of sodium light

Books of Study:

1. Electronics lab manual- K A Navas (vol 1 &2)
2. B.Sc Practical Physics- C L Arora

Reference book:

3. Practical Physics- S L Gupta & V Kumar