

KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
COIMBATORE - 641029



DEPARTMENT OF PHYSICS (UG)

CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)

(2026-2027)

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE-641029

DEPARTMENT OF PHYSICS

Vision

The goal of the Department of Physics is to bring eminence and excellence in teaching learning process and to fetch ours as one of the Benchmark Department with “Potential for Academic excellence”

Mission

To execute the teaching profession to bring the students as an asset for a productive and fascinating career, successful in their life and to realize learning with real world experience.

PROGRAMME OUTCOME (PO)

Upon successful completion of the programme, the students will be able to

- PO1: Gain basic ideas of various branches of Physics
- PO2: Have the knowledge of theories involved in Physics
- PO3: Understand the fundamental ideas of experimental Physics and inculcate strong laboratory skills
- PO4: Understand the applications of basic concepts of Physics in Technology
- PO5: Realize the role of Physics in day-to-day life
- PO6: Be able to transfer their theoretical knowledge to experimental levels in laboratories
- PO7: Develop written and oral communication skills
- PO8: Acquire various technical skills

PROGRAMME SPECIFIC OUTCOME (PSO)

Students will

1. Understand the applications of basic concepts of Physics in Technology
2. Realize the role of Physics in day-to-day life
3. Be able to transfer their theoretical knowledge to experimental levels in laboratories
4. Develop written and oral communication skills
5. Acquire various technical skills

Semester	Part	Subject code	Title of the Paper	Instruction hours / cycle	Exam. Marks			Duration of Exam. Hours.	Credits
					CIA	ESE	Total		
I	I	26TML101 [@]	Language I [@]	6	25	75	100	3	3
	II	26ENG101	English I	6	25	75	100	3	3
	III	26UPH101	Core Paper 1 - Properties of Matter and Sound	6	25	75	100	3	4
		-	Core Practical 1- General Experiments	3	-	-	-	-	-
		26UMA1A1	Allied Paper 1 - Mathematics I	7	25	75	100	3	5
	IV	26EVS101	Environmental Studies**	2	-	50	50	3	2
Total				30	-	-	450	-	17
II	I	26TML202 [@]	Language II [@]	6	25	75	100	3	3
	II	26ENG202	English II	6	25	75	100	3	3
	III	26UPH202	Core Paper 2 - Heat and Thermodynamics	6	25	75	100	3	4
		26UPH2CL	Core Practical 1- General Experiments	3	40	60	100	3	3
		26UMA2A2	Allied Paper 2 - Mathematics II	7	25	75	100	3	5
	IV	26VED201	Value Education - Moral and Ethics**	2	-	50	50	3	2
Total				30	-	-	550	-	20

III	I	26TML303@	Language III @	6	25	75	100	3	3
	II	26ENG303	English III	6	25	75	100	3	3
	III	26UPH303	Core Paper 3 – Mechanics and Relativity	4	25	75	100	3	4
		-	Core Practical 2 – General Experiments	3	-	-	-	-	-
		26UCH3A3	Allied Paper 3 - Chemistry I	4	20	55	75	3	4
	-	Allied Practical- Chemistry Practicals	3	-	-	-	-	-	
	IV	26UGC3S1	Skill based Subject 1 - Cyber Security	2	100	-	100	3	3
		26TBT301/ 26TAT301/ 26UHR3N1	Basic Tamil * / Advanced Tamil** / Non-Major Elective - I **	2	-	75	75	3	2
Total			30	-	-	550	-	19	
IV	I	26TML404@	Language IV @	6	25	75	100	3	3
	II	26ENG404	English IV	6	25	75	100	3	3
	III	26UPH404	Core Paper 4 - Electricity and Magnetism	4	25	75	100	3	4
		26UPH4CM	Core Practical 2 – General Experiments	3	40	60	100	3	3
		26UCH4A4	Allied Paper 4 - Chemistry II	4	20	55	75	3	4
	26UCH4AL	Allied Practical - Chemistry Practical	3	20	30	50	3	2	
	IV	26UPH4S2	Skill based Subject 2 - Scientific Computing – Python and Artificial Intelligence	2	25	75	100	3	3
		26TBT402/ 26TAT402/ 26UWR4N2	Basic Tamil * / Advanced Tamil ** / Non-Major Elective - II**	2	-	75	75	3	2
Total			30	-	-	700	-	24	

V	III	26UPH505	Core Paper 5 - Mathematical Physics	4	25	75	100	3	4
		26UPH506	Core Paper 6 - Optics	4	25	75	100	3	4
		26UPH507	Core Paper 7 - Principles of Electronic Devices and Circuits	3	25	75	100	3	4
		26UPH508	Core Paper 8 - Basics of Quantum Mechanics	4	25	75	100	3	4
		26UPH5E1	Major Elective 1	5	25	75	100	3	5
		-	Core Practical 3 – General Experiments	3	-	-	-	-	-
		-	Core Practical 4 - Electronics	3	-	-	-	-	-
		-	Core Practical 5 - Digital Electronics, Microprocessor and Python programming	2	-	-	-	-	-
	IV	26UPH5X1	EDC	2	100		100	3	3
	-	26UPH5IT	Internship Training **** / Mini Project ***	Grade					
Total				30	-	-	600	-	24
VI	III	26UPH609	Core Paper 9 - Atomic and Solid State Physics	5	25	75	100	3	4
		26UPH610	Core Paper 10 - Fundamentals of Digital Electronics and Microprocessor	5	25	75	100	3	4
		26UPH611	Core Paper 11 - Nuclear Physics	4	25	75	100	3	4
		26UPH6CN	Core Practical 3 - General Experiments	3	40	60	100	3	4
		26UPH6CO	Core Practical 4 - Electronics	3	40	60	100	3	3
		26UPH6CP	Core Practical 5 - Digital Electronics, Microprocessor and Python programming	3	40	60	100	3	3
		26UPH6E2	Major Elective 2	5	25	75	100	3	5
		26UPH6Z1	Project and Viva Voce ***	-	20	80	100	-	5
		26UBI6S3	Skill Based Subject 3 - Basics of IPR	2	25	75	100	3	3
		Total		30	-	-	900	-	35
	V	26 NCC \$ /NSS/ YRC/ PYE/ECC/ RRC/WEC 101#	Co-curricular Activities *	-	50	-	50	-	1
Grand Total				-	-	-	3800	-	140

Note : CBCS – Choice Based Credit system, CIA– Continuous Internal Assessment, ESE– End of Semester Examinations

\$ For those students who opt NCC under Co-curricular activities will be studying the prescribed syllabi of the UGC which will include Theory, Practical & Camp components. Such students who qualify the prescribed requirements will earn an additional 24 credits.

@ Hindi/Malayalam/ French/ Sanskrit – 26HIN/MLM/FRN/SAN101 - 404

* - No End-of-Semester Examinations. Only Continuous Internal Assessment (CIA)

** - No Continuous Internal Assessment (CIA). Only End-of-Semester Examinations (ESE)

*** Project Report – 60 marks; Viva voce – 20 marks; Internal-20 marks

**** The students shall undergo Internship training / field work for a minimum period of 14 working days at the end of the fourth semester during summer vacation and submit the report in the fifth semester which will be evaluated for 100 marks by the concerned guide and followed by an Internal Viva voce by the respective faculty or HOD as decided by the department. According to their marks, the grades will be awarded as given below.

Marks %	Grade
85 – 100	O
70 – 84	D
60 – 69	A
50 – 59	B
40 – 49	C
< 40	U (Reappear)

Major Elective Papers (2 papers are to be chosen from the following 6 papers)

1. Laser Physics and Fiber Optics
2. Principles of Communication Systems
3. Materials Science
4. Measurement Systems
5. Introduction to Biophysics
6. Object Oriented Programming in C++

Non-Major Elective Papers

1. Human Rights
2. Women's Rights
3. Consumer Affairs

Sub. Code & Title of the Extra Departmental Course (EDC):

26UPH5X1 - Physics in everyday life

List of Cocurricular Activities:

1. National Cadet Corps (NCC)
2. National Service Scheme (NSS)
3. Youth Red Cross (YRC)
4. Physical Education (PYE)
5. Eco Club (ECC)
6. Red Ribbon Club (RRC)
7. Women Empowerment Cell (WEC)

Note: In core/ allied subjects, no. of papers both theory and practical are included wherever applicable. However, the total credits and marks for core/allied subjects remain the same as stated below.

Tally Table:

S.No.	Part	Subject	Marks	Credits
1.	I	Language – Tamil/Hindi/Malayalam/ French/ Sanskrit	400	12
2.	II	English	400	12
3.	III	Core – Theory/Practical	1600	60
	III	Allied	400	20
		Electives/Project	300	15
4.	IV	Basic Tamil / Advanced Tamil (OR) Non-major electives	150	4
		Skill Based subject	300	9
		EDC	100	3
		Environmental Studies	50	2
		Value Education	50	2
5.	V	Cocurricular Activities	50	1
		Total	3800	140

- 100 % CIA for Basics of Cyber Security, EDC and Basics of IPR.
- The students should complete **Health and Wellness Programme (26UHW401)###** in the **4th semester** and the completion marks should be submitted through the HoD to the Controller of Examinations. Extra credits will be given to the candidates who have successfully completed.
- The students may be encouraged to complete any **MOOC course available for Online learning platforms like SWAYAM, NPTEL, Coursera^{\$\$}, IIT Bombay Spoken Tutorial, e-Pathshala etc.**, before the completion of the **5th semester** and the course completion certificate should be submitted through the HoD to the Controller of Examinations. Appropriate credits will be given to the candidates who have successfully completed.
- An **Onsite Training** preferably relevant to the course may be undertaken as per the discretion of the HoD.
- Extra credits shall be awarded for innovative products/ individual paper presentations and publications in reputed national/ international proceedings and in indexed journals by the UG students for their original research contributions.
 - Product development through Technology Readiness Levels:
 - Phase 1 Level (TRL 1-3) : Basic research: 1 credit
 - Phase 2 Level (TRL 4-6) : Development and validation: 2 credits
 - Phase 3 Level (TRL 7-9) : Deployment: 3 credits
 - National / International level paper presentation in conferences and publications of full papers in reputed Scopus/ web of Science indexed journals.
 - National Level : 1 credit/ paper
 - International Level : 2 credits/ paper
 - Open access Journals are not included
- Extra credits shall be awarded to students who prefer to opt any course out of their programme on self-learning mode. No internal components. 100% ESE.

Teaching Pedagogy

Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Classroom/Peer Learning / Experimental Learning / Blended learning

Flipped Classroom

Preamble:

- Under flipped classroom model, students review foundational content before class, with class time dedicated to practice, discussion, and problem – solving where the role of the teachers will be facilitating discussions and enabling students to embark on a holistic learning perspective.

Work instructions:

- One flipped session / unit is made mandatory and the course In-charge shall identify and specify the topic to be covered in the flipped session in the lesson plan.
- Detailed session plans must be intimated to all students at least one week in advance.
- Curated content such as LORs, video lectures, animations, and other relevant digital content shall be provided to students in advance to facilitate effective preparation for the flipped classroom session.

Peer Learning

Preamble:

- Peer Assisted learning enables students to learn from each other sharing knowledge in a collaborative learning environment.
- Development of leadership skills and student engagement through student-to-student academic support.
- Reduce drop out/failure rates of the students and create a supportive academic culture where a high performing or trained student assists peers academically.

Work Instructions:

- Course In-charge shall supervise the programme by periodically reviewing its implementation, conducting review meetings, and monitoring the progress reports.
- Course In-charge shall identify 5 to 6 fast learners based on their academic performance in internal and external examinations.
- Course In-charge shall also identify students who require additional academic support and assign 4 to 5 such students to each fast learner to facilitate peer learning.
- This team will operate remedial classes on a peer learning mode as per the following:
 - a) One session / week / course and each session shall be for 30 minutes in duration, with follow-up learning activities.
 - b) The faculty In-charge shall review attendance records and monitor the academic progress of the students.

Blended learning

Preamble:

- Blended learning integrates traditional in class instruction with digital tools exposing students to a myriad options for learning from subject experts across the globe
- It is provided with online learning sessions on recorded videos, lecture captured sessions (included under guided library hours), digital resources, and guided sessions facilitated by internal faculty members and external experts through Zoom meets etc.,

Work Instructions:

- For every course, students will be motivated to attend additional webinar/online courses through any interactive learning tools such as, telepresence systems, podcasts, interactive videos etc, with minimum of 2 sessions/course and maximum of 3 sessions/course.

Components of Continuous Internal Assessment

Components		Marks	Total
Theory			
CIA I	75	(75+75 = 150/10) 15	25
CIA II	75		
Objective Capacity Testing */Seminar		5	
Attendance		5	
Practical			
CIA Practical		25	40
Observation Notebook		10	
Attendance		5	
Project			
Review		15	20
Regularity		5	
Theory (Allied) (External : 55 marks)			
CIA I	55	(55+55) Converted to 10	20
CIA II	55		
Objective Capacity Testing */Seminar		5	
Attendance		5	
Practical (Allied) (External : 30 marks)			
CIA Practical		10	20
Observation Notebook		5	
Attendance		5	

* Objective Capacity Testing:

For the first assessment, questions shall be set from 2 ½ units (25 questions) and evaluation for 5 marks. The assessment shall be conducted through any authentic online platform, one week prior to the commencement of I CIA theory examinations.

For the second assessment, questions shall be set from 2 ½ units (25 questions) and evaluation for 5 marks. The assessment shall be conducted through any authentic online platform, one week prior to the commencement of II CIA theory examinations.

The average of the first and second assessment scores shall be considered for the final **5 marks** allocation.

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Remembering; **K2**-Understanding; **K3**-Applying; **K4**-Analyzing; **K5**-Evaluating

1. ESE Theory Examination:

(i) CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K1 – K5 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K2 – K5 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

(ii) CIA I & II and ESE: 55 Marks (Allied)

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	55
K2 – K4 Q11 to 15	B (Either or pattern)	5 x 3 = 15	Short Answers	
K2 – K5 Q16 to 20	C (Either or pattern)	5 x 6 = 30	Descriptive / Detailed	

2. ESE Practical Examination:

Knowledge Level	Section	Marks	Total
K3	Experiments Record Work	50	60
K4		10	
K5			

(For Allied papers)			
Knowledge Level	Section	Marks	Total
K3	Experiments	25	30
K4		05	
K5	Record Work		

3. ESE Project Viva Voce:

Knowledge Level	Section	Marks	Total
K3	Project Report	60	80
K4		20	
K5	Viva voce		

Scheme of Evaluation - Health and Wellness Programme (26UHW401)###

Part	Description	Mark
A	Report	40
B	Attendance	20
C	Activities (Observation during Practice)	40
Total		100

*

Programme Code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 1 - Properties of Matter and Sound			
Batch 2026-2027	Semester I	Hours/Week 6	Total Hours 90	Credits 4	Entrepreneurship

Course Objectives

To enable the learners to

1. Understand the basic concepts of gravitation.
2. Get exposure to the properties of liquids & solids.
3. Understand the metallurgical advancement and properties of sound.

Course Outcomes (CO)

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

K1-K5	CO1	Understand the action of gravitational fields and potentials on different objects
	CO2	Gain knowledge on elastic behavior of beams, rods and wires through the bending and torsional behaviors of the objects
	CO3	Gain knowledge on properties of liquids by surface tension and viscosity
	CO4	Production and application of ultrasonics and acoustics in different types of buildings
	CO5	Understand the metallurgical advancement and acoustic resonance based on Indian Knowledge System

Syllabus

UNIT I

(18 Hours)

Gravitation fields and potentials

Nature of motion under central forces - Kepler's law - Newton's law of gravitation - Gravitational potential and field - Gravitational potential and field due to i) spherical shell, ii) solid sphere and hollow sphere - Boy's Method and Heyl's Method of determining 'G'. Gravitational field of Earth - equation of motion of elementary volume - escape velocity.

UNIT II

(18 Hours)

Elasticity

Elastic constants - Relations connecting them - Poisson's ratio - Bending of beams - uniform and non - uniform bending - Cantilever - static and dynamic methods - Torsion in a wire - Rigidity modulus -determination by static and dynamic methods.

UNIT III

(18 Hours)

Surface Tension and Viscosity

Surface Tension

Surface tension and Surface energy- pressure in a curved surface of a liquid-Shape of Liquid Meniscus in a Capillary tube - Angle of contact - Measurement of angle of contact - Experimental determination of Surface Tension

Viscosity

Streamline flow, turbulent flow - Energy of a liquid - Bernoulli's theorem and its applications - Coefficient of viscosity - Poiseuille's formula to find η of low viscous liquid - Stoke's method

UNIT IV**(18 Hours)****Acoustics and Ultrasonics**

Acoustics–Basic principle–Reverberation– Sabine’s reverberation formula – Determination of absorption coefficient– Factors affecting the acoustics of buildings– Sound distribution in an auditorium–Requisites for good acoustics.

Ultrasonics – Production of ultrasonic waves: Magnetostriction oscillator and piezoelectric oscillator– Detection of ultrasonic waves – **Application of ultrasonics***.

UNIT V**(18 Hours)****Indian Knowledge System**

Wootz Steel and Ancient Indian Crucible Steel: Chemical Composition – forging techniques – comparison with modern materials. Chola Bronze Sculptures and Lost-Wax Casting: Precision casting techniques – microstructural analysis. Temple Bells and Acoustic resonance: Bell metal composition – resonant frequency studies.

*** denotes Self study**

Text Books:

1. D.S.Mathur, (2018), Elements of Properties of Matter-Shyamlal Charitable Trust, New Delhi.
2. Brijlal and N.Subramaniam, (1999), Properties of Matter- S.Chand & Co., New Delhi.
3. R.L.Saihgale, (1982), A Textbook of Sound- S.Chand & Co., New Delhi.
4. Srinivasan Sharadha and R.Ranganathan, Wootz steel: An advanced material of the ancient world, Academia, 1997

Reference Books:

1. Alex A.Kaufman, (2007), Principles of the Gravitational method, Elsevier
2. Brijlal and N.Subramaniam, (2018), A Textbook of Sound- S.Chand & Co. New Delhi.
3. D.S.Mathur, (2019), Mechanics - S.Chand & Co., New Delhi.
4. R.Murugesan, (2018), Properties of Matter, S.Chand & Co., New Delhi.
5. K.K.Muhammed, Bronzes of South India, Navabharat Publishers, Kolkata, 1978
6. T.R.Anadharaman, Metallurgy in India, South Asia Books, 1995

e-Resources:

1. <http://orca.phys.uvic.ca/~tatum/celmechs/celm5.pdf>
2. [https://en.wikipedia.org/wiki/Elasticity_\(physics\)](https://en.wikipedia.org/wiki/Elasticity_(physics))
3. <https://youtu.be/HALbtyDUjp0>
4. <https://byjus.com/physics/viscosity/>
5. <https://www.youtube.com/watch?v=P2DOx0WGsOc>

Mapping

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	S	H	H
CO 2	H	S	H	S	S
CO 3	S	S	H	H	S
CO 4	H	H	S	S	S
CO 5	H	S	H	S	H

S- Strong

H-High

M-Medium

L – Low

Programme Code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 2 - Heat and Thermodynamics			
Batch 2026-2027	Semester II	Hours/Week 6	Total Hours 90	Credits 4	Entrepreneurship

Course Objectives

To enable the learners to understand

1. The concept of heat and temperature and specific heat
2. Mechanism of petrol and diesel engine
3. Quantum theory of radiation and three types of thermodynamical statistics.

Course Outcomes (CO)

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

K1-K5	CO1	Understand the concept of Zero and First law of thermodynamics
	CO2	Gain knowledge on second law of thermodynamics and engines
	CO3	Understand gas laws and its behavior, Einstein's and Debye's theory of specific heat
	CO4	Understand radiative heat transfer and radiation laws
	CO5	Analyze the concepts of microstate, macrostate of a model system, classical and quantum statistics.

Syllabus

UNIT I

Concept of Temperature

(18 Hours)

Zeroth law of thermodynamics-Concept of heat-Comparison of heat and work-First law of thermodynamics-Isothermal Process- Adiabatic Process-Isochoric Process- Isobaric Process-Gas equation during a Process -Slopes of adiabatic and isothermals process-Work done during Adiabatic and Isothermal Process-Relation between isothermal and adiabatic elasticities.

UNIT II

(18 Hours)

Second Law of Thermodynamics

Irreversible Process- Reversible Process-Second law of thermodynamics- Carnot reversible engine - Carnot Cycle-efficiency-Otto Cycle-Petrol engine -Diesel engine- Clausius- Clapeyron's latent heat equation-Applications-Thermodynamic potentials-Maxwell's thermodynamic relation.

UNIT III

(18 Hours)

Gas equations

Van der waals equation of a state – Estimation of Critical constants – Constants of Van der waals equation – Critical co-efficient of a gas – Limitations of Van der waals equation.

Quantum theory of specific heat

Dulong and Petit's law and the deduction; failure of Dulong and Petit's law – Einstein's theory and its limitation – Debye's theory – **Specific heat of diatomic gases***.

UNIT IV

(18 Hours)

Thermal radiation

Quantum theory of radiation; Planck's hypothesis – average energy of Planck's oscillator– Planck's radiation law and its experimental verification – Wien's law and Rayleigh – Jean's law in relation to Planck's law– Stefan's constant and Wien's constant from Planck's law

UNIT V**Thermodynamics**

Statistical equilibrium - probability theorem in statistical thermodynamics; Maxwell - Boltzmann distribution law; Maxwell – Boltzmann distribution in terms of temperature – Maxwell’s quantum statistics – Phase space – Fermi- Dirac distribution law – Bose-Einstein distribution law (Qualitative study only) – **comparison of three statistics***

*** denotes Self-study**

Text Books:

1. Brijlal and N.Subrahmaniam, P.S.Hemne (2018), Heat, Thermodynamics and Statistical Physics - S.Chand & Co., New Delhi

Reference Book:

1. R.Murugesan, Sivaprasath, (2004), Thermal Physics- S.Chand & Co., New Delhi.
2. Zemansky and R.H. Dcltanann, (2017), Heat and Thermodynamics, McGraw Hill Education.

E- Resources:

1. <https://www.askiitians.com/revision-notes/physics/heat-transfer/>
2. <https://www.askiitians.com/revision-notes/physics/kinetic-theory-of-gases/>
3. <https://www.youtube.com/watch?v=TnDCxw0y6YM>
4. <https://www.youtube.com/watch?v=n1go03oIyos>
5. <https://www.youtube.com/watch?v=Fi9Z5DxVsu0>

Mapping

CO	PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1		S	S	H	S	H
CO 2		H	H	S	S	S
CO 3		S	S	H	H	H
CO 4		H	S	S	H	S
CO 5		H	S	H	S	S
S- Strong		H-High		M-Medium		L – Low

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Practical I – General Experiments			
Batch 2026-2027	Semester 1 & 2	Hours/Week 3	Total Hours 90	Credits 3	Skill Development

Course Objectives

To enable the learners to:

1. Understand the physical phenomena and fundamentals of General Physics.
2. Perform experiments in the field of General Physics.
3. Interpret the practical result to corroborate the theory.

Course Outcomes (CO)

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

K3 - K5	CO1	Provide hands on experiences in conducting laboratory experiments.
	CO2	Develop the ability to analyze basic experiments
	CO3	To analyze the relationship between theory and experimental results.
	CO4	To conduct experimental investigations on mechanical, electrical, heat and optical physics.
	CO5	Practice recording of experimental work and data graphing

List of experiments (Any Fifteen)

1. Determination of Young's Modulus - Non-uniform bending - Optic lever
2. Determination of Young's Modulus - Cantilever - Static method
3. Determination of Rigidity Modulus - Static Torsion
4. Determination of rigidity modulus and moment of inertia - Torsional Pendulum
5. Determination of Young's modulus by uniform bending - optic lever method
6. Determination of co-efficient of viscosity - Stokes's method
7. Determination of A.C. frequency - Sonometer
8. Determination of frequency of tuning fork- Sonometer
9. Determination of acceleration due to gravity - Compound pendulum
10. Determination of specific heat capacity of a liquid - Newton's cooling method
11. Determination of refractive index of a solid prism - Spectrometer
12. Determination of refractive index of a liquid prism – Spectrometer
13. Determination of refractive index of a solid prism (i-d) curve – Spectrometer
14. Determination of wavelength of spectral lines - Normal incidence - Grating - Spectrometer
15. Calibration of low range voltmeter – Potentiometer
16. Calibration of low range ammeter – Potentiometer
17. Determination of specific resistance of a wire – Meter bridge
18. Determination of unknown resistance using Post office Box
19. Determination of pole strength – Tan C position
20. Determination of surface tension by Capillary rise method

21. Determination of wavelength of laser - Diffraction method
22. Determination of angle of deviation of laser
23. Determination of viscosity of a liquid by Poiseuille's flow method.
24. Determination of surface tension & interfacial surface tension by drop weight method.

e-Resources:

1. https://www.youtube.com/watch?v=Ia_GINOCaTs
2. https://www.youtube.com/watch?v=VC_TT8S65ac
3. <https://www.youtube.com/watch?v=B-W0eVv6fLI>
4. <https://www.youtube.com/watch?v=oRch7irmLvo>
5. <https://www.youtube.com/watch?v=Iv08qZqJnGk>

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1		S	H	S	S	H
CO 2		S	S	H	H	S
CO 3		S	S	H	S	H
CO 4		S	H	S	H	S
CO 5		H	S	H	S	H
S- Strong		H-High		M-Medium		L – Low

Practical beyond the syllabus

1. Measurement of error on simple pendulum

Programme Code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 3 – Mechanics and Relativity			
Batch 2026-2027	Semester 3	Hours/Week 4	Total Hours 60	Credits 4	Employability / Skill Development

Course Objectives

To enable the learners to

1. Understand the principles of rigid body dynamics
2. Acquire the fundamental ideas of projectile motions
3. Attain the idea about statics, hydrostatics and hydrodynamics

Course Outcomes (CO)

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

K1 - K5	CO1	Understanding the behavior of various bodies due to kinematic and dynamic forces acting on the body
	CO2	Apply the knowledge of mathematics, fundamental sciences to obtain solution of complex mechanical problems
	CO3	Study of statics which promotes analysis and interpretation of numerical problems
	CO4	Gain knowledge on hydrostatics
	CO5	Understand the theory of relativity

Syllabus

UNIT I

(12 Hours)

Rigid body dynamics

Rigid body – rotational and vibrational motion – Torque – moment of inertia – radius of gyration – kinetic energy of rotation – M.I. of a fly wheel – experimental determination – precession – **gyrostat – gyrostatic application *** – M.I. of a diatomic molecule and its rotational energy states.

UNIT II

(12 Hours)

Projectiles

Projectiles – Range – Expression for the range of projectile on an inclined plane – path of a projectile – Impulse – direct and oblique impact – expression for velocity after direct impact – loss of energy during direct and oblique impact.

UNIT III

(12 Hours)

Statics

Centre of gravity – Position of G for simple rigid bodies – rigid solid cone – thin hollow hemisphere – solid hemisphere – Centre of gravity of a body composed of two parts – Equilibrium of bodies – suspended and supported – types of equilibrium. Force of friction – Limiting friction – Laws of friction – Angle of friction and resultant reaction – Cone of friction.

UNIT IV

(12 Hours)

Hydrostatics Fluid thrust

Thrust on a plane surface – the center of pressure – position of the center of pressure – Rectangular lamina – Triangular lamina – Thrust on curved surfaces.

Flotation: Laws of flotation – Metacenter – Metacentric height – Metacentric height of a ship.

UNIT V
Relativity

Frames of reference – inertial frames of reference – Galilean transformation – Michelson Morley experiment and explanation of negative results - Postulates of special theory of relativity – Lorentz's transformation equation – length contraction – time dilation – Meson decay – relativity of simultaneity – addition of velocities – variation of mass with velocity – **mass energy equivalence*** – General theory of relativity.

* denotes Self study

Text Books:

1. D.S.Mathur and P.S.Hemme (2021), Mechanics, S.Chand & Co., New Delhi.

Reference Books:

1. M.Narayanamurthy, N.Nagarathianam, (2005), Statics, Hydrostatics and Hydrodynamics- TheNational Publishing Company, Chennai.
2. D.Halliday, R.Resnick and J.Walker (2018), Fundamentals of Physics - 11th Edition, John Wiley & Sons, India

e-Resources:

1. <https://nucleoniitjeekota.com/topic-notes.php?topic=RIGID%20BODY%20DYNAMICS>
2. <https://byjus.com/physics/projectile-motion/>
3. https://engineeringstatics.org/Chapter_07-center-of-gravity.html
4. <https://byjus.com/physics/buoyant-force/>
5. <https://byjus.com/physics/fluid-dynamics/>

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	S	H	H
CO 2	H	S	H	S	S
CO 3	S	S	H	H	S
CO 4	H	H	S	S	S
CO 5	H	S	H	S	H

S- Strong

H-High

M-Medium

L – Low

Programme Code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 4 - Electricity and Magnetism			
Batch 2026-2027	Semester 3	Hours/Week 4	Total Hours 60	Credits 4	Employability

Course Objectives

To enable the learners to

1. Acquire basic knowledge of electrostatics and thermoelectricity
2. Study about magnetic properties of materials
3. Learn motion of charges and alternating current and its circuits

Course Outcomes (CO)

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

K1 - K5	CO1	Acquire knowledge about electrostatics
	CO2	Understand the magnetic properties of materials and magnetic effect of electric current
	CO3	Gain knowledge on thermoelectricity
	CO4	Apply knowledge on fabrication of different types of capacitors, transformer, choke coil and thermoelectric power generators.
	CO5	Analyze the trouble shooting of ac circuits (LCR series and LCR parallel mode) and also analyze the thermoelectric diagrams

Syllabus**UNIT I****(12 Hours)****Electrostatics**

Gauss theorem and its applications: Gauss theorem, application of Gauss theorem – Electric intensity at a point immediately adjacent to a charged conductor – energy stored in unit volume of an electric field. **Capacitance and capacitors:** Spherical capacitor – cylindrical capacitor – force of attraction between charged plates of a capacitor – change in the energy of a parallel plate capacitor when the distance between the plates is altered and when a dielectric slab is introduced between the plates – types of capacitors – Guard ring capacitor – electrolytic capacitor – variable capacitor.

Dielectrics: Polarization in dielectric material – parallel plate capacitor and dielectric slab – boundary condition – depolarization factor.

UNIT II**(12 Hours)****Magnetic properties of materials**

Magnetic vector potential – electron theory of magnetism – Dia, Para and Ferromagnetism – magnetic field (B) – magnetization (M) – magnetic field intensity (H) – magnetic susceptibility and magnetic permeability – magnetic materials and magnetization – magnetic hysteresis – area of the hysteresis loop – Ferro magnets, determination of susceptibility – Curie balance method – **Guoy's method*** **Magnetic effect of electric current** - Moving coil Ballistic Galvanometer – Figure of merit of B.G. – Absolute capacitance of a capacitor.

UNIT III**(12 Hours)****Thermoelectricity:**

Seebeck effect – laws of thermo e.m.f – Measurement of thermo e.m.f - Peltier effect – Peltier Co-efficient, determination of Peltier co- efficient at a junction – Thomson effect – Thomson co – efficient – e.m.f. generated in a thermocouple taking both Peltier effect at the junctions and Thomson effect in the metals – application of thermodynamics to thermocouple – thermoelectric power diagrams and their uses.

UNIT IV**(12 Hours)****Alternating Current**

Mutual and Self Inductance-EMF induced in a coil rotating in a magnetic field – AC circuits containing resistance, inductance and capacitance in series – series resonant circuit – acceptor circuit – voltage magnification – the Q-factor – Parallel resonant circuit – Power in AC circuit containing resistance, capacitance and inductance – wattless current – choke coil – transformer.

UNIT V**(12 Hours)****Transient currents**

Growth and decay of current in an inductance – resistance circuit – charging and discharging of a capacitance through a resistance – Measurement of resistance by leakage – charging and discharging of a capacitance through an inductance and a resistor.

Motion of charged particles: Motion of charged particles in uniform longitudinal and transverse Electric field – Motion of charged particles in a uniform constant magnetic field* - e/m by Magnetron method - e/m by Thomson method.

* denotes Self study

Text Books:

1. R.Murugesan, (2019), Electricity and Magnetism - S.Chand & Co., New Delhi.
2. Brijlal and Subramaniam, (2000), Electricity and Magnetism- Ratan Prakashan Mandir.

Reference Books:

1. K.K. Tewari, (2007), Electricity and Magnetism with Electronics- S.Chand & Co., New Delhi.
2. D.N.Vasudeva, (2007), Fundamentals of Electricity and Magnetism - McGraw Hill, India

e-Resources:

1. <https://www.youtube.com/watch?v=MLvCPath35I>
2. <https://www.youtube.com/watch?v=VC1OTpL8qVI>
3. <https://www.youtube.com/watch?v=9EsOFiP1J2E>
4. <https://www.youtube.com/watch?v=bfR0k0BJeBE>
5. <https://www.youtube.com/watch?v=psdWQddVXd4>

Mapping

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	S	H	H
CO 2	H	S	H	S	S
CO 3	S	S	H	H	S
CO 4	H	H	S	S	S
CO 5	H	S	H	S	H

S- Strong H-High M-Medium L - Low

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Practical II – General Experiments			
Batch 2026-2027	Semester 3 & 4	Hours/Week 3	Total Hours 90	Credits 3	Skill Development

Course Objectives

To enable the learners to:

1. Understand the physical phenomena and fundamentals of general physics
2. Perform experiments in the field of general physics.
3. Interpret the practical result to corroborate the theory.

Course Outcomes (CO)

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

K3-K5	CO1	Provide hands-on experiences in conducting laboratory experiments.
	CO2	Develop the ability to analyze basic experiments
	CO3	Analyze the relationship between theory and experimental results.
	CO4	To conduct experimental investigations on mechanical, electrical, heat and optical physics.
	CO5	Practice recording of experimental work and data graphing

List of experiments (Any Fifteen)

1. Determination of Young's modulus – Uniform bending – Pin and microscope
2. Determination of Young's modulus – Cantilever – Dynamic method
3. Determination of spring constant of different metals
4. Determination of specific gravity of liquid – Joule's Calorimeter
5. Determination of wavelength of spectral lines – Grating – minimum deviation – Spectrometer
6. Determination of refractive index of a prism (i-i') – Spectrometer
7. Determination of thickness of a thin wire – Air wedge method
8. Study of solar spectrum – Spectrometer
9. Calibration of high range voltmeter – Potentiometer
10. Determination of emf. of a thermocouple – Potentiometer
11. Determination of specific resistance of a wire – Potentiometer
12. Determination of temperature co-efficient of resistance of a wire - Carey Foster's Bridge
13. Conversion of Galvanometer into ammeter and its calibration
14. Conversion of Galvanometer into voltmeter and its calibration
15. Determination of A.C. frequency - Melde's method
16. Determination of self-inductance of a coil - Maxwell's bridge
17. Study of series resonance circuit
18. Study of parallel resonance circuit
19. Determination of figure of merit - B.G.

20. Determination of absolute capacitance of a condenser – B.G.
21. Determination of moment of a magnet - circular coil – Deflection magnetometer
22. Determination of field intensity of a circular coil - Vibrational magnetometer
23. Study of Multimeter as Ammeter, Voltmeter and Ohm meter
24. Determination of temperature co-efficient of resistance of a wire –Post office Box
25. Determination of co-efficient of thermal conductivity - Lee's disc method

e-Resources:

1. <https://youtu.be/FRwHt4DAfhE>
2. https://youtu.be/_m2toS3HGG8
3. https://youtu.be/AXTsOpyYl_0
4. <https://youtu.be/SnxrvXQX8os>
5. <https://youtu.be/XuXUtGN928U>

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1		S	H	H	S	S
CO 2		H	H	S	S	H
CO 3		S	S	S	H	H
CO 4		H	H	S	H	H
CO 5		H	S	H	S	H

S- Strong**H-High****M-Medium****L – Low****Practical beyond the syllabus**

1. Determination of Retentivity and Coercivity of a magnetic material – Hysteresis
2. Determination of e/m - Thomson method
3. Determination of e/m – Magnetron method

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 5 - Mathematical Physics			
Batch 2026-2027	Semester 5	Hours/Week 4	Total Hours 60	Credits 4	Skill Development

Course Objectives

To enable the learners to

1. Apply Fourier series, transformation and vector analysis to physical problems
2. Know about the basic concepts of complex variables
3. Apply vectors to physical systems.

Course Outcomes (CO)

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

K1 - K5	CO1	Understand differential operators in vectors
	CO2	Apply vectors for physical examples
	CO3	Understand physical examples of Fourier series
	CO4	Apply Fourier's transformation
	CO5	Analyze complex variables

Syllabus

UNIT I

Differential Operators in Vectors

(12 Hours)

Orthogonal curvilinear coordinates - Differential operators: Gradient – divergence – Laplacian - curl - Spherical polar coordinates: Differential operators – Gradient – divergence – Laplacian – curl - Cylindrical Co-ordinates: Differential operators – Gradient - divergence.

UNIT II

Application of Vectors

(12 Hours)

Hydrodynamics - Equation of continuity - Cartesian form - Incompressible fluid - Euler's equation of motion - Bernoulli's equation - Fourier's Heat flow equation (One dimension)- Gravitational Potential and Intensity - Poisson's equation - Gauss' law of gravitation

UNIT III

Fourier series

(12 Hours)

Even and odd functions - Dirichlet's theorem and conditions - Fourier series for function such as $x \sin x$, $x+x^2$, e^x , x^2 - Physical examples of Fourier series - Half wave rectifier - Full wave rectifier - Square wave - Saw tooth wave - Triangular wave.

UNIT IV

Fourier's Transformation

(12 Hours)

Fourier Transform - Sine and Cosine Transforms - Properties of Fourier's Transform: Addition theorem - Similarity theorem - Complex Conjugate - Shifting property - Modulation theorem - Convolution theorem - Parseval's theorem - Self convolution Integral - Derivative of Fourier Transform - Fourier Transform of a derivative - Fourier sine and cosine transform of derivatives - Fourier transform of $1/\xi$ and $N e^{-\alpha x^2}$

UNIT V**Complex Variables****(12 Hours)**

Complex numbers - Review of Algebraic Operations of Complex Numbers - Complex Conjugates - Modulus and Argument of a complex number - Properties of Moduli and Arguments - Graphical representation on Argand diagram and Trigonometric form - Vector representation of Complex numbers - Some definitions underlying complex analysis - **Functions of a Complex variable - Limit, Continuity and Differentiability***.

* denotes Self study

Text Books:

1. Satya Prakash, (2021), Mathematical Physics- S. Chand & Co., New Delhi.
2. HK Dass and Rama Verma (2010), Mathematical Physics- S. Chand & Co., New Delhi.

Reference Books:

1. P.K.Chattopadhyay, (2022), Mathematical Physics-New Age International, New Delhi.
2. B.D. Gupta, (2022), Mathematical Physics-Vikas publishing house, New Delhi.
3. P. Kandasamy, K. Thilagavathy, K.Gunavathy, (2010), Engineering Mathematics - S. Chand & Co., New Delhi.

e-Resources:

1. <https://www.youtube.com/watch?v=hsGhvle5Krw>
2. <https://www.youtube.com/watch?v=qbTTLNzW->
3. [JI&list=RDCMUCVtCdIa5rA8PwQbz4hixtpQ&index=3](https://www.youtube.com/watch?v=JI&list=RDCMUCVtCdIa5rA8PwQbz4hixtpQ&index=3)
4. <https://www.youtube.com/watch?v=87AM0wyMp0&list=RDCMUCVtCdIa5rA8PwQbz4hixtpQ&index=1>
5. <https://www.youtube.com/watch?v=-QVENB3aEvY>

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	H	S	S	H	H
CO 2	S	H	H	H	S
CO 3	H	S	H	S	H
CO 4	S	H	H	S	H
CO 5	H	S	H	S	H

S- Strong

H-High

M-Medium

L – Low

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 6 - Optics			
Batch 2026-2027	Semester 5	Hours/Week 4	Total Hours 60	Credits 4	Employability

Course Objectives

To enable the learners to

1. Acquire knowledge in ray optics
2. Understand mechanism of energy transfer in the form of waves
3. Understand the basic principles of optical instruments

Course Outcomes (CO)

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

K1 - K5	CO1	Understand the aberrations with an emphasis on image forming systems
	CO2	Understand wave optics and interference
	CO3	Be acquainted with Fresnel and Fraunhofer diffraction
	CO4	Gain knowledge on polarization
	CO5	Understand principle, construction and working of optical instruments

Syllabus**UNIT I****(12 Hours)****Geometrical optics: Aberrations and dispersion**

Aberrations : Spherical aberrations in a lens – coma – aplanatic lens – astigmatism – curvature of the field – distortions – chromatic aberration– dispersion by a prism – irrational dispersion– angular and chromatic dispersions – Cauchy’s dispersion formula – dispersive power, achromatism in prisms – dispersion without deviation – deviation without dispersion - chromatic aberration in a lens– **circle of least confusion***, achromatic lenses – condition for achromatism of two thin lenses separated by a finitedistance.

UNIT II**(12 Hours)****Interference**

Fresnel’s bi prism – interference in thin films due to reflected and transmitted light – fringes due to wedged shaped thin film – Newton’s rings – refractive index of a liquid – Michelson’s interferometer – determination of wavelength of monochromatic light – difference in wave length between two neighboring spectral lines – Fabry-Perot interferometer - visibility of fringes – sharpness of fringes– resolving power – Airy’s formula.

UNIT III**(12 Hours)****Diffraction**

Fresnel’s assumptions – rectilinear propagation of light – half period zone – zone plate – action and construction – comparison with the convex lens – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction at a single slit – diffraction grating – resolving power and dispersive power of a grating.

UNIT IV**(12 Hours)****Polarization**

Double refraction – Huygen’s explanation in uniaxial crystals – Quarter wave plate – Half wave plate Babinet’s compensator - production and detection of plane, circularly and elliptically polarized lightoptical activity – Fresnel’s explanation – specific rotation – Laurentz’s half shade Polarimeter.

UNIT V**Optical instruments**

Objective lens and eye piece: Huygen's eyepiece – Ramsden eyepiece – compound microscope – astronomical telescope (refracting) – Constant deviation spectrometer - Kerr cell method - Anderson's method.

* denotes Self study

Text Books:

1. Brijlal, M.N. Avadhanulu, N. Subrahmanyam, (2019), A Text Book of Optics- S.Chand & Co., New Delhi

Reference Books:

1. R. Murugesan, (2013), Optics and Spectroscopy- S. Chand & Co., New Delhi.
2. Sathyapraksh, (2016), Optics- Ratan Prakashan Mandir., New Delhi

e-Resources:

1. <https://www.youtube.com/watch?v=ML7HcZo6IaE>
2. <https://www.youtube.com/watch?v=jB7suji-fCY>
3. <https://www.youtube.com/watch?v=ueurJnTGwx4>
4. <https://www.youtube.com/watch?v=HH58VmUbOKM>
5. <https://www.youtube.com/watch?v=8nxsx6AKDN8>

Mapping

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	H	H	S
CO 2	S	H	S	S	S
CO 3	S	S	H	S	H
CO 4	S	S	H	H	S
CO 5	H	S	H	S	H

S- Strong

H-High

M-Medium

L – Low

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 7 - Principles of Electronic Devices and Circuits			
Batch 2026-2027	Semester 5	Hours/Week 3	Total Hours 45	Credits 4	Employability

Course Objectives

To enable the learners to

1. Understand the principles of semiconductor devices and their applications.
2. Know the principle and working of oscillators.
3. Know the working of FET, MOSFET and UJT

Course Outcomes (CO)

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

K1 - K5	CO1	Understand the fundamentals of semiconductor devices
	CO2	Understand transistor biasing and stabilization
	CO3	Learn about the functioning of FET, MOSFET, UJT and SCR
	CO4	Understand the basic principles of amplifiers and Operational amplifiers
	CO5	Acquire knowledge on oscillators and wave shaping circuits

Syllabus

UNIT I

(9 Hours)

Semiconductors : Commonly used semiconductors – energy band description of semiconductors – effect of temperature on semiconductors – n type and p type semiconductors – majority and minority carriers - pn junction – volt ampere characteristics.

Semiconductors Diodes : Characteristics, equivalent circuits, applications of pn junction and zener diode – tunnel diode – photodiode – thermistor.

Rectifiers and Filters : Half wave and full wave bridge rectifiers – Ripple factor - **Inductive and capacitive filters***.

UNIT II

(9 Hours)

Transistor biasing and stabilization : Leakage current and total output current in a CE and CC circuits – advantages of common emitter circuits - Load line – Q point and maximum undistorted output – factors affecting stability of Q point stability factor, Thevenin's Theorem, Norton's Theorem.

Transistor equivalent circuits and h parameter : AC load resistance – current gain – voltage gain – h parameters – h parameters of an ideal transistor.

UNIT III

(9 Hours)

Field Effect Transistor

Junction Field Effect Transistor (JFET) – construction, operation, parameters and characteristics of JFET – expression for transconductance – comparison between FET and bipolar junction transistor.

Metal Oxide Semiconductor FET (MOSFET)

Construction, working of drain and transfer characteristics of depletion type and enhancement type MOSFETs – advantages of MOSFETs over JFETs – advantages of n over p channel MOSFETs.

Uni Junction Transistor (UJT): Construction, equivalent circuit, operation, characteristics and application

Silicon Controlled Rectifier : SCR - Working of SCR - VI characteristics – SCR as a switch

UNIT IV**Amplifiers – Single stage & multistage**

Design of single stage transistor amplifier: RC coupled amplifier – multistage amplifier: transformer coupled amplifier

Operational Amplifiers: Characteristics of an ideal operational amplifier – operational amplifier as inverting and non- inverting amplifier – operational amplifier as an adder, subtractor, differentiator and integrator.

UNIT V**(9 Hours)****Sinusoidal Oscillators**

Principle of an oscillator - Crystal oscillators - Hartley and Colpitts oscillators with theory - Waveforms of astable, monostable and bistable multivibrator circuits – clipping and clamping circuits and applications.

* denotes Self study

Text Books:

1. V.K.Metha, (2020), Principles of Electronics - (12th Edition) S.Chand & Co., New Delhi.
2. R.S.Sedha, (2019), A Text Book of Applied Electronics- S.Chand & Co., New Delhi.

Reference Book:

1. B.L.Theraja (2007), Basic Electronics (Solid State) - S.Chand & Co., New Delhi.
2. Bernod Grob, (2010), Basic Electronics - McGraw Hill, New Delhi.

e-Resources:

1. <https://byjus.com/jee/semiconductors/#properties-of-semiconductors>
2. <https://www.shobhituniversity.ac.in/pdf/econtent/4TransistorBiasing&Stabilization-Dr-Aniket-Kumar.pdf>
3. <https://byjus.com/physics/fet-transistor/>
4. <https://amiestudycircle.com/>
5. https://www.tutorialspoint.com/sinusoidal_oscillators/sinusoidal_oscillators_introduction.htm

Mapping

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	H	H	S
CO 2	S	H	S	S	S
CO 3	S	S	H	S	H
CO 4	S	S	H	H	S
CO 5	H	S	H	S	H

S- Strong**H-High****M-Medium****L - Low**

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 8 – Basics of Quantum Mechanics			
Batch 2026-2027	Semester 5	Hours/Week 4	Total Hours 60	Credits 4	Employability

Course Objectives

To enable the learners to

1. Know about De-Broglie concept
2. Understand operators and uncertainty relation
3. Know about applications of Schrodinger's equation

Course Outcomes (CO)

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

K1 to K5	CO1	Understand the wave aspects of matter
	CO2	Know the relation between group velocity and phase velocity of waves
	CO3	Understand uncertainty principle and its applications
	CO4	Understand the concept of operators and to solve Schrodinger's equation for simple systems in one dimension.
	CO5	Understand Schrodinger's equation, wave function and to solve Schrodinger's equation for systems in three dimensions.

Syllabus

UNIT I

Origin of Quantum Mechanics

(12 Hours)

Inadequacy of classical mechanics - shortcomings of old quantum theory - Foundations of wave mechanics - dual nature of light and matter - experimental evidence for matter waves - Davisson and Germer's electron diffraction experiment - G.P.Thomson's experiment – De'Broglie concept of stationary orbits – De'Broglie wavelength associated with electron accelerated through a potential difference – Non relativistic expression – Relativistic expression.

UNIT II

Wave and Group velocity

(12 Hours)

Wave (or Phase) velocity and group velocity – velocity of De'Broglie waves – relation between phase velocity and group velocity for a non relativistic free particle - Equation of motion of matter waves – Physical interpretation of the wave function – Normalized and orthogonal wave function – conditions satisfied by wave function – solution of the Schrodinger's equation – Stationary state solution.

UNIT III

Uncertainty principle and its applications

(12 Hours)

Uncertainty Principle - Heisenberg's gamma ray microscope – Diffraction of a beam of electrons by a slit – application of uncertainty principle – Nonexistence of electrons in a nucleus – radius of the first orbit – Light Quanta – Minimum energy of a harmonic oscillator – Bohr's atomic energy levels and Uncertainty principle – Energy of particle in one-dimensional box.

UNIT IV

Operators and Schrodinger Equation

(12 Hours)

Operators associated with different observables – Expectation values of dynamical quantities – probability current density – Ehrenfest theorem – related problems - Free particle - Particle in a box - Potential step – Reflectance and Transmittance for $E > V_0$ and $E < V_0$.

UNIT V**Physical applications of Schrödinger's Equation****12 Hours**

Particle in one dimensional infinitely deep potential well - One dimensional linear harmonic oscillator - Eigen values of harmonic oscillator- Significance of zero-point energy - Particle in three dimensional infinitely deep potential well – **The square well potential – Bound states: Discrete energy levels. ***

*** denotes Self study**

Text Books:

1. Satya Prakash and Swati Saluja, (2021), Quantum Mechanics - Kedar Nath Ram Nath & Co., Meerut.
2. R.Murugesan and Kiruthiga Sivaprasath, (2018), Modern Physics - S.Chand & Co., New Delhi.

Reference Books:

1. S.P.Singh and M.K.Bagde, Kamal Singh, (2004), Quantum Mechanics - S.Chand & Co.,New Delhi.
2. V.Devanathan, (2005), Quantum Mechanics - Narosa Publishing House, New Delhi.

e-Resources:

1. <https://www.youtube.com/playlist?list=PLbMVogVj5nJTDmHThY9xu2Tvg0u1RPuxO>
2. <https://www.askiitians.com/revision-notes/physics/special-theory-of-relativity/>
3. <https://www.youtube.com/watch?v=zZ2975Ui26w&list=RDLV-yKwHvAWMT8&index=7>
4. https://youtu.be/iRVfaR3N5K4?list=PLU14u3cNGP629n_3fX7HmKKgin_rqGzbx
5. <https://www.youtube.com/watch?v=wBAfNRnYYEE>

Mapping

CO	PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1		S	S	H	H	H
CO 2		H	H	S	H	S
CO 3		H	H	S	S	H
CO 4		S	H	H	H	H
CO 5		H	S	H	S	H

S- Strong**H-High****M-Medium****L – Low**

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 9 - Atomic and Solid State Physics			
Batch 2026-2027	Semester 6	Hours/Week 5	Total Hours 75	Credits 4	Employability

Course Objectives

To enable the learners to

1. Know about x - rays, Photoelectric effect and their applications
2. Know about different coupling schemes and the effect of magnetic and electric fields on the spectrum of an atom and molecule
3. Understand the different crystal structure and their bonds

Course Outcomes (CO)

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

K1 - K5	CO1	Acquire knowledge about atomic and molecular spectroscopy.
	CO2	Understand bonding in solids
	CO3	Understand crystal structure
	CO4	Gain knowledge about x-rays and photoelectric effect
	CO5	Understand the concept of Superconductors

Syllabus

UNIT I

(15 Hours)

Atomic and Molecular Spectroscopy

Vector atom model – Quantum number associated with the Vector atom model – Coupling schemes – Pauli's exclusion principle – Electronic configuration of light elements – Normal and anomalous Zeeman effects - Expression for the Zeeman shift – Anomalous Zeeman effect – Paschen Back effect – Stark effect – Raman Effect – Raman shift – Stokes and Antistokes lines.

UNIT II

(15 Hours)

Bonding in solids

Interatomic forces and types of bonding – Ionic bonds – Metallic bonds – Vander Waal's bonds – Hydrogen bonds – Binding energy of ionic crystals – Evaluation of Madelung constant – Determination of range – Binding energy of crystals – Vander Waals' Interaction – Repulsive interaction.

UNIT III

(15 Hours)

Crystal structure

Crystal lattice – Unit cell – Lattice parameter – Primitive cell – Types of crystal system – Bravais lattices – BCC – FCC – HCP – Miller indices – Procedure for finding miller indices of crystal planes - Representation of crystal planes in a cubic unit cell – Atomic radius, number of atoms and atomic packing factor of SC, BCC and FCC structures - Crystal growth by slow evaporation method - Czochralski method.

UNIT IV

(15 Hours)

X-Rays : Productions of x-rays : Coolidge tube method - Spacing between three dimensional lattice planes –absorptions of x-rays - Bragg's Law - Bragg's x-ray Spectrometer - powder crystal diffraction Compton Scattering.

Photoelectric effect: Einstein's photoelectric equation - Experimental verification - Applications of photoelectric effect - Millikan's experiment – Determination of Planck's constant

UNIT V**Electron Theory of Metals**

Drude-Lorentz theory and its applications – Sommerfeld theory – Fermi-Dirac distribution – Brillouin Zone theory – Relation between energy and wave number.

Superconductivity

Experimental facts of Superconductivity – Persistent currents – Effect of magnetic fields – Meissner effect – **Type I and Type II superconductors** * – BCS theory of superconductivity.

* denotes Self study

Text Books :

1. R.S.Khurmi, R.S.Sedha, (2014), Material Science - S.Chand & Co., New Delhi.
2. R.K.Puri, V.K.Babbar, (2010), Solid State Physics - S.Chand & Co., New Delhi.

Reference Books:

1. B.S. Saxena, P.N. Saxena, R.C. Gupta, (2019), Fundamentals of Solid State Physics, Pragati Prakashan, New Delhi.
2. S.O.Pillai, (2018), Solid State Physics - New Age International Pvt. Ltd, New Delhi.
3. V. Raghavan, (2010), Materials Science and Engineering, Prentice Hall India Pvt. Ltd, New Delhi.

e- Resources:

1. <https://www.youtube.com/watch?v=-3aqWCcfKzQ>
2. <https://www.youtube.com/watch?v=ik51zFSWN4g>
3. <https://www.youtube.com/watch?v=eMmNPGdx1Ec>

Mapping

CO	PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1		S	H	H	H	S
CO 2		H	S	H	H	S
CO 3		S	H	H	S	H
CO 4		H	S	H	S	H
CO 5		H	S	H	S	H

S- Strong

H-High

M-Medium

L – Low

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Paper 10 – Fundamentals of Digital Electronics and Microprocessor			
Batch 2026-2027	Semester 6	Hours/Week 5	Total Hours 75	Credits 4	Employability

Course Objectives

To enable the learners to acquire knowledge about

1. Logic gates, Boolean algebra and Karnaugh map
2. Flip- flops, counters, arithmetic circuits, data processing circuits, shift registers
3. Microprocessors architecture and instruction sets

Course Outcomes (CO)

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

K1 - K5	CO1	Acquire knowledge on number systems, binary arithmetic operations and binary codes
	CO2	Have an understanding of logic gates, Demorgan's theorems, Karnaugh maps and simplification of Boolean expressions
	CO3	Apply the knowledge of logic gates to design flip-flops and counters
	CO4	Understand architecture of a Microprocessor
	CO5	Get exposure on Microprocessor programmes

Syllabus

UNIT I

(15 Hours)

Logic gates, Boolean algebra and Karnaugh map

Logic gates (OR, AND, NOT, NOR, NAND, XOR, XNOR) – NAND and NOR gates as Universal building blocks – Construction of OR, AND, NOT gates using discrete components – Laws of Boolean algebra – DeMorgan's theorems – Construction of Karnaugh maps – Simplification of Boolean expressions using Boolean algebra.

UNIT II

(15 Hours)

Flip-flops and Counters

R-S flip flop - D flip flop - JK flip flop – Master slave J-K flip flop - Edge triggered flip flops
Asynchronous counters: Ripple counter – Mod 3, Mod 5 counters and Decade counters, Ring counters
- synchronous counters.

UNIT III

(15 Hours)

Arithmetic, Data processing circuits and Shift Register

Half and full adder – Half and full subtractor – Parallel binary adder and subtractor – Multiplexer-Demultiplexer – Encoder – Decoder – Serial in serial out shift register – Parallel in parallel out shift registers- **Bidirectional shift register***.

Unit IV

Microprocessor

(15 Hours)

Origin and development of microprocessor - Internal Architecture of 8085 – PIN diagram - Addressing modes – timing diagram – Addressing modes

UNIT V**Microprocessor Programming**

Instruction Set: Data Transfer instructions – Arithmetic instructions – Logical instructions – Branching and looping Instructions - Addition – Subtraction – Multiplication – Division – Finding Smallest and Biggest number in a array - Sorting of an array in ascending order and descending order
(Experienced learning - Demonstration of above programs*)

* denotes Self study

Text Books:

1. Thomas L. Floyd, (2017), Digital fundamentals -Tata McGraw Hill, India
2. M. Morris Mano, (2016), Digital logic and computer Design - Prentice-Hall of India, New Delhi.
3. B.Ram, (2005), Fundamentals of Microprocessor and Microcomputers - Dhanpat Rai Publications, New Delhi.

Reference Books:

1. V.Vijayendaran, S.Vishwanathan, (2011), Introduction to Integrated Electronics: Digital and Analog Printers and Publishers Pvt. Ltd.
2. Albert Paul Malvino & Donald P Leach, (2015), Digital principles and applications -Tata McGraw Hill, New Delhi.
3. Ramesh, (2013), Microprocessor Architecture & Applications with 8085- InternationalPublishing India.

e-Resources:

1. https://www.youtube.com/watch?v=RKAQsyPRk_w
2. <https://www.youtube.com/watch?v=wjM2RDG5yTI>
3. <https://www.youtube.com/watch?v=tSti91b6qec>
4. https://www.tutorialspoint.com/microprocessor/microprocessor_overview.htm
5. https://www.tutorialspoint.com/microprocessor/microprocessor_8085_architecture.htm

Mapping

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	S	S	S
CO 2	S	S	S	H	S
CO 3	S	H	S	S	S
CO 4	S	S	S	H	S
CO 5	H	S	H	S	H

S- Strong

H-High

M-Medium

L – Low

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Paper - 11: Nuclear Physics			
Batch 2026-2027	Semester 6	Hours/Week 4	Total Hours 60	Credits 4	Employability

Course Objectives

To enable the learner to know about

1. General properties of atomic nuclei, particle accelerators and radioactivity
2. Artificial transmutation of elements and nuclear transmutation
3. Nuclear fission, fusion and elementary particles

Course Outcomes (CO)

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

K1 - K5	CO1	Know about basic nuclear properties and particle accelerators.
	CO2	Gain knowledge on radioactivity
	CO3	Understand artificial and nuclear transmutations
	CO4	Understand nuclear fission, fusion and detection of nuclear radiations.
	CO5	Acquire knowledge on elementary particles

Syllabus

UNIT I

(12 Hours)

General properties of atomic nuclei

Classification of nuclei- nuclear spin angular momentum – nuclear magnetic dipole moment – electric quadrupole moment – nuclear size – nuclear stability – nuclear forces – Meson theory of nuclear forces- theories of nuclear composition – proton electron hypothesis – Models of nuclear structure : liquid drop model – shell model.

Particle accelerators: Synchrocyclotron – betatron – electron synchrotron and **proton synchrotron***.

UNIT II

(12 Hours)

Radioactivity

Determination of e/m of alpha particles – determination of charge of alpha particles – experimental measure of range of alpha particles – Geiger and Nuttall experiment – Geiger Nuttall law – alpha particle disintegration energy – determination of e/m of beta particles – origin of line and continuous spectrum- neutrino theory of beta decay- k electron capture – origin of gamma rays – absorption of gamma rays – natural radioactive series – law of successive disintegration – radioactive equilibrium and radioactive dating.

UNIT III

(12 Hours)

Artificial transmutation of elements

Discovery of artificial transmutation – Rutherford experiment – Bohr's theory of nuclear disintegration - nuclear reaction – energy balance in nuclear reaction and Q value

Nuclear transmutation

Transmutation by alpha particles, protons, deuterons and neutrons - scattering cross section and its determination - production of radioisotopes and their uses.

UNIT IV**Nuclear fission and fusion**

Nuclear fission – energy released in fission – Bohr and Wheeler’s theory of nuclear fission – chain reaction - multiplication factor - natural uranium and chain reaction - design of nuclear reactor - breeder reactor - nuclear fusion-source of stellar energy - thermonuclear reactions - transuranic elements.

Detectors of nuclear radiations: Ionization chamber – Geiger Muller counter - Proportional counter - Wilson’s cloud chamber - bubble chamber.

UNIT V**(12 Hours)****Elementary particles**

Baryons – Leptons – Mesons – particles and antiparticles – concept of antimatter – strong interaction – electromagnetic interaction – weak interaction – gravitational interaction – elementary particle quantum numbers – conservation laws and symmetry – charge conjugation, parity and time reversal – CPT Quark model.

*** denotes Self study**

Text Books:

1. R.Murugesan, Kiruthiga Sivaprasath, (2019), Modern Physics - 18th edition, S.Chand & Co., New Delhi.
2. Brijlal, N.Subramaniam and Jivan Seshan, (2013), Atomic and Nuclear Physics - S.Chand & Co., New Delhi.

Reference Books:

1. D.C.Tayal, (2021), Nuclear Physics (5th edition) Himalaya Publishing House, Bombay.
2. M.L.Pandya, R.P.S.Yadav and Amiya Dash (2020), Elements of Nuclear Physics- Kedar Nath Ram Nath, Meerut.
3. B.C.Theraja, (2008), Modern Physics- (16th edition), S.Chand & Co., New Delhi.

e-Resources:

1. <https://byjus.com/physics/nuclear-physics/>
2. <https://kcccollege.ac.in/uploads/ca4b81962bc660ef4a6466e1ba6c0681SEM%20radioactivity%20new.pdf>
3. <https://uou.ac.in/sites/default/files/slm/BSCPH-302.pdf>
4. https://www.diffen.com/difference/Nuclear_Fission_vs_Nuclear_Fusion
5. <https://theconversation.com/explainer-what-are-fundamental-particles-38339>

Mapping

CO PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	H	S	S	H
CO 2	S	S	H	H	S
CO 3	S	S	H	S	H
CO 4	S	H	S	H	S
CO 5	H	S	H	S	H

S- Strong**H-High****M-Medium****L – Low**

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Practical III – General Experiments			
Batch 2026-2027	Semester 5 & 6	Hours/Week 3	Total Hours 90	Credits 4	Skill Development

Course Objectives

To enable the learners to:

1. Have a good foundation in the fundamentals and applications of general Physics
2. Acquire the skill of finding and developing practical scientific facts
3. Employ the practical result to support the theory

Course Outcomes (CO)

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

K3 - K5	CO1	Develop the ability to analyze basic experiments.
	CO2	Take measurements to compare experimental results in the laboratory with the theoretical analysis.
	CO3	Conduct experimental investigations on mechanical, heat and optical phenomena.
	CO4	Conduct experimental investigations on electrical and magnetic phenomena.
	CO5	Practice record keeping of experimental work and data graphing

List of Experiments (Any Fifteen)

1. Determination of Young's modulus – uniform bending – Koenig's method
2. Determination of Young's modulus – non-uniform bending – Koenig's method
3. Determination of Rydberg's constant – scale and telescope
4. Determination of dispersive and resolving power of a Grating - spectrometer
5. Determination of Cauchy's constant and dispersive power of a prism - spectrometer
6. Determination of refractive index of a prism- Stoke's formula- spectrometer
7. Determination of the wavelength of the arc spectrum - Hartmann's interpolation formula
8. Determination of the wavelength of a monochromatic source - Fresnel's Biprism - Optic bench
9. Determination of refractive index of a convex lens - Newton's rings
10. Determination of specific rotation of light and concentration of the solution - Polarimeter experiment
11. Comparison of Mutual Inductance - Ballistic Galvanometer
12. Determination of high resistance by charging - Ballistic Galvanometer
13. Determination of high resistance by leakage - Ballistic Galvanometer
14. Determination of temperature co-efficient of resistance of a coil – Post office box.
15. Determination of band gap energy of a semiconducting material
16. Determination of melting point of wax - Thermistor
17. Determination of impedance and power factor of an LR circuit
18. Determination of self-inductance of a coil- Anderson bridge
19. Determination of capacitance - Scherring bridge
20. Determination of capacitance - DeSauty bridge

21. Determination of inductance - Owen's bridge
22. Determination of particle size - Laser diffraction method
23. Determination of Planck's constant using photoelectric effect.
24. Magnetic properties of Iron rod-I-H Curve apparatus

e-Resources:

1. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	H	H	H
CO 2	H	H	S	H	S
CO 3	H	H	S	S	H
CO 4	S	H	H	H	H
CO 5	H	S	H	S	H
S- Strong		H-High	M-Medium	L – Low	

Practical beyond the syllabus

1. Determination of Boltzmann constant
2. Zener diode as a voltage regulator
3. Determination of Youngs modulus-elliptical fringes (Cornus method)
4. Determination of Youngs modulus-hyperbolic fringes (Cornus method)

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Practical IV – Electronics			
Batch 2026-2027	Semester 5 & 6	Hours/Week 3	Total Hours 90	Credits 3	Employability

Course Objectives

To enable the learners

1. To design and construct electronic circuits
2. To develop experimental skills and understand relation between experimental data and theoretical analysis.
3. Have a foundation of constructing electronic devices

Course Outcomes (CO)

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

K3 - K5	CO1	Acquire basic knowledge in solid state electronics.
	CO2	Analyze and design analog electronic circuits using discrete components.
	CO3	Acquire knowledge in basic electronics by constructing electronic circuits
	CO4	Take measurements to compare experimental results with the theoretical data
	CO5	Practice record keeping of experimental work and data graphing

LIST OF EXPERIMENTS (Any Fifteen)

1. Construction and study of IC regulated power supply
2. Construction and study of bridge rectifier
3. Characteristics of PN junction diode and zener diode
4. Construction and study of voltage doubler
5. Study of transistor characteristics – CE configuration
6. Construction and study of single stage RC coupled amplifier
7. Construction and study of Feedback amplifier
8. Construction and study of Hartley oscillator
9. Construction and study of Colpitt's oscillator
10. Construction and study of monostable multivibrator using transistor
11. Study of characteristics of tunnel diode
12. Study of characteristics of SCR
13. Study of characteristics of FET
14. Study of characteristics of MOSFET
15. Study of characteristics of UJT
16. Construction of inverting amplifier using op-amp.
17. Construction of non-inverting amplifier using op-amp.
18. Construction of adder and subtractor using op-amp.
19. Construction of scalar using op-amp

20. Construction of integrator and differentiator using op-amp.
21. Current and voltage characteristics of LED.
22. Study of characteristics of photodiode.

e-Resources:

1. <https://youtu.be/HG22Y0KrvI0>
2. <https://youtu.be/okGdxX36pt0>
3. <https://youtu.be/dICmcSNo4eI>
4. <https://youtu.be/1G8Sx6vE7kM>
5. <https://youtu.be/NZAg4Li1mvs>

Mapping

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	H	H	H
CO 2	H	S	S	S	S
CO 3	H	H	S	S	H
CO 4	S	H	H	H	S
CO 5	H	S	H	S	H

S- Strong**H-High****M-Medium****L – Low**

Programme code: 03		B.Sc. Physics			
Title of the Paper		Core Practical V – Digital Electronics, Microprocessor and Python programming			
Batch 2026-2027	Semester 5 & 6	Hours/Week 3	Total Hours 90	Credits 3	Employability

Course objectives

To enable the learners to

1. Have foundations in the fundamentals of digital electronics.
2. Visualize the applications of digital electronics and microprocessor
3. Simulation using Python programme

Course Outcomes (CO)

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

K3 - K5	CO1	Construct basic logic gates.
	CO2	Gain expertise to construct digital electronic circuits.
	CO3	Get familiarized in Microprocessor and Python programming
	CO4	Accomplish Physics concepts through python programme-based tasks.
	CO5	Practice record keeping of experimental work and data graphing

List of Experiments (Any fifteen)

Digital electronics

1. Verification of truth tables of logic gates using IC's
2. Construction of logic gates using discrete components
3. Verification of NOR gate as universal building blocks
4. Verification of NAND gate as universal building blocks
5. Verifications of De Morgan's theorems
6. Construction and study of Half adder and Full adder
7. Construction and study of Half subtractor and Full subtractor
8. Construction and study of 4 bit parallel adder
9. Construction and study of 4 bit parallel subtractor
10. Construction and study of RS, D and T flip flop
11. Construction and study of counters
12. Construction of Timer circuit using IC 555
13. Construction of sine wave generator using IC 555
14. Construction of DC voltage doubler using IC 555
15. Construction of darkness detector using LDR and IC 555
16. Construction of Seven segment display counter using IC 555 and IC 4026

Microprocessor Programmes

17. Microprocessor - Addition and Subtraction
18. Microprocessor - Multiplication and Division
19. Microprocessor - Finding Smallest and Biggest number in a array
20. Microprocessor - Sorting of an array in ascending order and descending order

Python Programmes

21. Python – Graph plotting in 2D and 3D using matplotlib.
22. Python - Simulation of the electric field of a capacitor
23. Python - Simulation of Half wave and Full wave rectifier
24. Python - Simulate and plot the characteristics of a Zener diode
25. Python - Simulation of Op-amp inverting and non-inverting amplifier
26. Python - Simulation of ac coupled amplifier using NPN bipolar transistor

e-Resources:

1. <https://www.youtube.com/watch?v=ldeQU8lvnts>
2. <https://www.youtube.com/watch?v=rM2FTNQbDCY>
3. <https://www.youtube.com/watch?v=4Po3-QHPGWO>
4. <https://pyspice.fabrice-salvaire.fr/releases/v1.6/examples/diode/rectification.html>
5. <https://scipython.com/blog/the-electric-field-of-a-capacitor/>

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	H	H	H
CO 2	H	S	S	S	S
CO 3	H	H	S	S	H
CO 4	S	H	H	H	S
CO 5	H	S	H	S	H

S- Strong

H-High

M-Medium

L – Low

Practical beyond the syllabus

1. Fabrication of Printed Circuit Board (PCB)
2. Microprocessor 8085- Music Tone generator interface

Programme code: 03		B.Sc. Physics			
Title of the Paper		Project and Viva Voce			
Batch 2026-2027	Semester 6	Hours/Week -	Total Hours -	Credits 5	Skill Development

Course objectives

To enable the learners to

1. Have foundations in the fundamentals of Physics and related area.
2. Acquire skills to develop a working model
3. Visualize the applications of theoretical concepts

Course Outcomes (CO)

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

K3 - K5	CO1	Construct working models
	CO2	Gain expertise to present their ideas systematically through PPT
	CO3	Get familiarized to develop a report on the project work
	CO4	Accomplish the result accumulation and data graphing
	CO5	Gain expertise to apply knowledge on multidisciplinary field

Marks Distribution

CIA/ESE	Particulars	Marks
CIA	Project Review	15
	Regularity	05
	Total Internal Marks	20
*ESE	Project Report Presentation	60
	Viva Voce	20
	Total External Marks	80
Total Marks (CIA + ESE)		100

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	H	H	H
CO 2	H	S	S	S	S
CO 3	H	H	S	S	H
CO 4	S	H	H	H	S
CO 5	H	S	H	S	H

S- Strong

H-High

M-Medium

L – Low

* Projects report and Viva voce will be evaluated jointly by Project Supervisor and an External Examiner.

Major Elective Papers

1. Laser Physics and Fiber Optics
2. Principles of Communication Systems
3. Materials Science
4. Measurement Systems
5. Introduction to Biophysics
6. Object Oriented Programming in C++

Programme Code: 03	B.Sc. Physics			
Title of the Paper	Major Elective Paper: Laser Physics and Fiber Optics			
Batch 2026-2027	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

To enable the learners to

1. Acquire knowledge about the principles of conventional and advanced lasers.
2. Understand the applications of lasers.
3. Understand fundamentals of optical fibers and their fabrication.

Course outcomes (CO)

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

K1 - K5	CO1	Understand the basic principles of lasers
	CO2	Explain the types of lasers and Laser amplifiers
	CO3	Illustrate the application of lasers in various fields.
	CO4	Understand optical fibers and its attenuations
	CO5	Know about fabrication of optical fibers.

Syllabus

UNIT I

(15 Hours)

Basic principles of laser

Quantum Nature of Light - Energy Levels - Population inversion - Schawlow -Towne's Threshold Condition for Laser Oscillations in Terms of Population Difference – Absorption - Spontaneous and stimulated emission - Einstein Co-efficients A & B - Basic Components of a Laser - Laser active Medium - Different Pumping Methods - Optical Resonator - Cavity Configuration - Plane Parallel Cavity - Confocal Cavity – **Hemispherical and Long Radius Cavity***.

UNIT II

(15 Hours)

Types of lasers

Solid laser (Ruby laser and Nd:YAG laser) – Gas laser (He-Ne laser and CO₂ laser) – Liquid laser (Dye laser) - Semiconductor laser - **Laser amplifiers** - General description of Q switching – Production of Q switching : Electro-optic shutter (Kerr effect and Pockels effect) - Mechanical and Saturable absorber shutters.

UNIT III

(15 Hours)

Applications of lasers

Materials processing with lasers: Drilling, Cutting and Welding - Nuclear fusion with lasers - Communication by lasers - Large range finders - Laser Gyro - LASIK - Optical computing - Principle of holography - Recording and reconstruction - Classification of hologram-Holographic interferometry in nondestructive testing - Lasers in compact disc players.

UNIT IV

(15 Hours)

Fiber fabrication: Classification of fiber fabrication techniques: External chemical vapour deposition (External CVD), Axial vapour deposition (AVD), Internal chemical vapor deposition, Multielement glasses and Phasil system, Comparison of various fabrication processes, drawing and coating, double crucible method, rod in tube method- Mechanism of refractive index variation - Fiber strength – **Mechanical strength measurement of fibers***.

UNIT V**(15 Hours)****Optical fibers and its attenuation**

Basic structure of an optical fiber - Advantages of optical fibers – Propagation of light waves in an optical fiber - Types of fibers: step index single mode fiber, step index multimode fiber and graded index fiber - Acceptance angle and acceptance cone of a fiber – Numerical aperture of a step index fiber and graded index fiber - Attenuation in optical fibers: Material losses – Rayleigh scattering loss – Absorption losses - Bending losses – Radiation induced losses – Inherent defect losses.

*** denotes Self study**

Text Books:

1. M.N.Avadhanalu, (2013), P.S.Hemne, An introduction to lasers and applications - S.Chand & Co., New Delhi.
2. Subir Kumar Sarkar, (2010), Optical fibers and fibers optic communication systems S.Chand & Co., New Delhi.

Reference Books:

1. B.B Laud, (2011), Lasers and Nonlinear Optics - New Age International Pub. Ltd, New Delhi.
2. K.R. Nambiar, (2014), Lasers: Principles, Types and Applications - New Age International, New Delhi.
3. William T. Silfvast, (2008), Laser fundamentals - University Press, Foundation books, New Delhi.

e-Resources:

1. <https://www.youtube.com/watch?v=xZ9kSBHWpUM>
2. <https://www.youtube.com/watch?v=vd6Lo64s3vc>
3. <https://www.youtube.com/watch?v=2NNWPJj8hvU>
4. <https://www.youtube.com/watch?v=pavBq7HIoIE>
5. <https://www.youtube.com/watch?v=AEkIPwP0YI8>

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	S	H	H
CO 2	H	S	H	S	S
CO 3	S	S	H	H	S
CO 4	H	H	S	S	S
CO 5	H	S	H	S	H
S- Strong	H-High		M-Medium		L - Low

Programme Code: 03	B.Sc. Physics			
Title of the Paper	Major Elective Paper - Principles of Communication Systems			
Batch 2026-2027	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

To enable the learners

1. To understand the basic idea of modulation and demodulation
2. To gain knowledge on antennas and transmission lines
3. To know about radio, television communications and modern display systems

Course Outcomes (CO)

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

K1 - K5	CO1	Get knowledge about modulation and demodulation
	CO2	Understand the working principles of antennas and transmission lines
	CO3	Acquire knowledge on radio communication
	CO4	Understand the functioning of CRT television
	CO5	Gain knowledge on modern display systems

Syllabus

UNIT I

(15 Hours)

Modulation and Demodulation

Need for modulation - Concept of Amplitude modulation (AM) - modulation index (m) – Analysis of AM wave - Side band frequencies - Power in AM wave - Limitations of AM - Suppression of carrier wave by Balanced modulator - Single Side Band (SSB) generation - Circuit for AM modulation and demodulation. **Practical vitalization of AM modulation and demodulation using CRO. ***

Concept of Frequency modulation (FM) - Expression for FM wave - Circuit for FM modulation using transistors - Circuit for FM demodulation (Ratio detector) - Comparative merits and limitations of AM and FM.

UNIT II

(15 Hours)

Antennas and Transmission Lines

Antennas: Radiation mechanism – The dipole antenna - current and voltage distribution in a half-wave dipole antenna – Parameters of an antenna (Radiation resistance, Beam width, Gain, S/N ratio) – Principle of Yagi-Uda Antenna and its radiation pattern.

Transmission Lines: Primary and Secondary constants of a transmission line - Transmission Line equations - Short and open-ended lines - Standing wave ratio (SWR) - Relation between SWR and Reflection coefficient - losses in transmission lines.

UNIT III

(15 Hours)

Radio and Cellular Communication

Classification of Radio Transmitters - AM radio transmitter stages – Note on AM radio broadcast transmitters – Principle of super heterodyne receiver - Block diagram of the stages of super heterodyne AM receiver – Block diagram of a stages of a FM radio receiver – Difference between AM and FM receivers – Cellular Communications (Elementary ideas)

UNIT IV**(15 Hours)****Television and Satellite Communications**

Principle of picture transmission and reception – Television standards – Gross structure of a television – Picture elements - Scanning, image continuity and Persistence of vision – Horizontal and Vertical Blanking pulses – TV Camera tubes: Image orthicon - Vidicon - Block diagram of basic TV transmitter - Block diagram of a monochrome TV receiver – Introduction on Satellite communications – **Satellite links and Satellite construction** * – Different domestic satellites.

UNIT V**(15 Hours)****Modern Displays**

Flat Panel Displays (FPD): Plasma Panel, Thin Film Transistor Liquid Crystal Display (TFT-LCD), Light Emitting Diode display (LED), Organic Light Emitting Diode (OLED), Active Matrix OLED display - Passive Matrix OLED display – Transparent Quantum Light Emitting diode (QLED) - Touch Screens: Principles of capacitive touchscreen and resistive touchscreen.

* denotes Self study

Text Books:

1. D.A. Deshpande, (1989), Communication Electronics - McGraw Hill Publications, India.
2. Bernard Grob and Charles Herndon, (1999), Basic Television and Video Systems -McGraw Hill
3. R. R. Gulati, (2023), Modern Television Practice: Transmission, Reception and Applications, New Age International (P) Ltd. New Delhi.

Reference Books:

1. George Kennedy, Bernard Davis and SRM Prasanna, (2017), Electronic Communication Systems McGraw Hill Publishers Ltd, India.
2. Sanjeeva Gupta, (1997), Electronics Communication Systems - Khanna Publications, Salem.

e-Resources:

1. <https://www.youtube.com/watch?v=S8Jod9AtpN4>
2. <https://www.digimat.in/nptel/courses/video/108101092/L01.html>
3. <https://www.youtube.com/watch?v=yWWfKrbMRUs>
4. <https://www.youtube.com/shorts/a0G6Z6pW49U>
5. https://www.youtube.com/watch?v=_ubwkG7uCFA

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	H	H	H
CO 2	H	H	S	H	S
CO 3	H	H	S	S	H
CO 4	S	H	H	H	H
CO 5	H	S	H	S	H

S- Strong**H-High****M-Medium****L - Low**

Programme Code: 03	B.Sc. Physics			
Title of the Paper	Major Elective Paper – Measurement Systems			
Batch 2026-2027	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

To enable the learners to

1. Understand the basic concepts of measurement and error analysis.
2. Get exposure to the knowledge on transducers on viscosity measurement.
3. Understand the working of ac bridges.

Course Outcomes (CO)

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

K1 - K5	CO1	Understand the methods of measurements
	CO2	Gain knowledge on asdic electrical measurements
	CO3	Acquire knowledge on different type of specific gravity monitoring
	CO4	Acquire knowledge on different applications of BG
	CO5	Understand the working of different electrical bridges

Syllabus**UNIT-I****(15 Hours)****FUNDAMENTALS OF MEASUREMENTS**

Definition of measurement; Significance of measurement; Methods of measurements: Direct & Indirect; Generalized measuring system; Standards of measurements: Primary & Secondary; Factors influencing selection of measuring instruments; Terms applicable to measuring instruments: Precision and Accuracy, Sensitivity and Repeatability, Range, Threshold, Hysteresis, calibration; Errors in Measurements: Classification of errors, Systematic and Random error.

UNIT-II**(15 Hours)****BASIC ELECTRICAL MEASUREMENTS**

Introduction-DC Voltage Measurements- Electromechanical DC voltmeters-Static Electric field and charged surface measurements-DC current measurements- Electro mechanical DC ammeter-Magneto optic current errors- AC voltage measurements-Electro mechanical AC voltmeters- Iron vane Voltmeters- Vacuum thermocouple- Analog electronic AC voltmeter- AC amplifier- Rectifier-AC voltmeter-AC current measurements.

UNIT-III**(15 Hours)****SPECIFIC GRAVITY MONITORING**

Measurement of liquid level-Viscosity measurement of humidity and moisture- Measurement of PH value- Bio medical measurements / Bio metrics- measurement of environmental air pollution parameter-computer aided measurement-**Fibre optic transducer.***

Unit – IV**(15 Hours)****BALLISTIC GALVANOMETER**

Working principle - Measurement of current density - Measurement of absolute capacitance - Comparison of capacitance - Measurement of earth magnetic field - Measurement of High resistance by leakage method - Measurement of Inductance.

UNIT – V**(15 Hours)****ELECTRICAL BRIDGES**

Wheatstone Bridge analysis - Kelvin Bridge - Andreson constant - Current loop – Potentiometer - AC Null measurement - AC operation of Wheatstone's bridges-AC bridges - Schering Bridge - Wien Bridge - Maxwell's Bridge - Hay's Bridge - De Sauty Bridge.

*** denotes Self Study**

TEXT BOOKS

1. B.C.Nakara, KK Chaudary (2005), Electronic instrumentation and measurement systems TMH Publication 3rd edition
2. Brijlal and Subramaniam, (2000), Electricity and Magnetism- Ratan Prakashan Mandir.

REFERENCE BOOK

1. Modern Electronic Instrumentation and Measurement Techniques -Albert D. Helfrick, William David Cooper - Prentice Hall PTR, 5th Ed (1990)
2. Advanced Electronic Systems - Wayne Tomasi - Prentice Hall PTR, 4th edition (1998)

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	H	H	H
CO 2	H	H	S	H	S
CO 3	H	H	S	S	H
CO 4	S	H	H	H	H
CO 5	H	S	H	S	H

S- Strong**H-High****M-Medium****L - Low**

UPH - 40 -

Programme Code: 03	B.Sc. Physics			
Title of the Paper	Major Elective Paper - Introduction to Biophysics			
Batch 2026-2027	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

To enable the learners

1. To understand the concept of Physics principles and apply it to biological phenomenon
2. To know about Biophysics, fluid run and Gas transport
3. To know about audition of human ear and Physics of Vision

Course Outcomes (CO)

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

K1 - K5	CO1	Apply principles of Physics on evaluation and analyses of biological phenomenon.
	CO2	Understand the basic concepts of biophysics and fluid run.
	CO3	Know about gas transport concepts.
	CO4	Acquire knowledge on Physics of audition.
	CO5	Acquire knowledge on Physics of vision.

Syllabus

Unit – I

(15 Hours)

Biomechanics

Biostatics - Forces and Torques - Biophysics of Muscle –Muscle Power –Mass Specific Muscle Power - Strength of Bones - Biodynamics – Newton’s law Frictional forces and stokes law – Frictional forces and Stokes Law - Locomotion of Land - Walking - Jumping - Propelling - Locomotion in Air - Locomotionin Water - Role of Gravity.

Unit – II

(15 Hours)

Biophysics and Fluid run

Steady Laminar Flow - Co-efficient of viscosity - Temperature dependence - Newtonian Fluid - Poiseuille’s Formula - Energetics of Fluid Flow – Turbulence – Reynolds’s Number - Hemodynamics - Plasma skimming – Turbulence - Pressure flow relation

Unit – III

(15 Hours)

Biophysics and Gas Transport

Ideal Gas – Dalton’s law of Partial Pressure – Vapor Pressure – Solutions and Henry’s Law - Convectivettransport of Gases – Airway resistance – Transport of O₂ in blood – Transport of CO₂ in Blood - Diffusion of gases - Fick’s Laws – Gas exchange in lungs – Gas exchange in tissues – Physiology of respiration – Physics of alveoli – Work of breathing.

Unit – IV

(15 Hours)

Physics of Audition

Transverse and Longitudinal Waves - Physiological characteristics of Sound - Human Ear - phase sensitivity and determination of direction - Doppler Effect.

Unit – V

(15 Hours)

Physics of Vision

Retina and Photoreceptors - Photochemistry of receptor cells – Intensity sensitivity – Spectral sensitivity - Resolving power of Eye – Diffraction – Polarization and Vision – Optical rotation – Birefringence and Dichroism - **Photoreceptors and Fiber optics***.

* denotes Self Study

Text Books:

1. P.K.Srivastava, (2015), Elementary Biophysics: An Introduction - Narosa Publishing House, NewDelhi.

Reference Books:

1. Vasantha Pattabhi, N.Gautham, (2002), Biophysics – Springer.
2. M. Daniel, (2007), Basic Biophysics - Publisher Agrobios, India.

e-Resources:

1. <https://www.youtube.com/watch?v=DNhLG1H7ttY>
2. <https://youtu.be/jFZHIPhmNTs?list=PLFn7fvIP7CbMun4daH24AZzX3r7ETT6aD>
3. <https://www.youtube.com/watch?v=VdoSff84Wqk>
4. <https://www.youtube.com/watch?v=fvQrbtRCH8I>
5. <https://www.youtube.com/watch?v=S1XeaNV4p38>

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	H	H	H
CO 2	S	S	S	S	S
CO 3	H	S	S	S	H
CO 4	S	H	H	H	S
CO 5	H	S	H	S	H
S- Strong	H-High		M-Medium		L - Low

Programme Code: 03	B.Sc. Physics			
Title of the Paper	Major Elective Paper - Materials Science			
Batch 2026-2027	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objectives

To enable the learners

1. To understand the electron theory of solids
2. To know about electric and dielectric properties of materials.
3. To know about magnetic and superconducting properties of materials.

Course Outcomes (CO)

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

K1 to K5	CO1	Understand the electron theory of solids.
	CO2	Know about electric properties of materials.
	CO3	Know about dielectric properties of materials.
	CO4	Understand magnetic properties of materials.
	CO5	Acquire knowledge about superconducting properties of materials.

Syllabus

Unit I

(15 Hours)

Electron Theory of Solids

Classical free electron theory - quantum free electron theory - Electron energy in metals and Fermi energy - density of states - antisymmetric nature of the wave functions of the Fermi system – covalent bonding in crystals - electron in a periodic potential - energy bands in solids - Brillouin zones – distinction between metals, insulators and semiconductors - effective mass of electron and concept of holes.

Unit II

(15 Hours)

Conducting Properties of materials

Atomic interpretation of ohms law - relaxation time - electrical conductivity - collision time - mean free path - heat developed in a current carrying conductor - sources of resistivity of metals and alloys - thermal conductivity - Wiedemann Franz law - thermal expansion - electrical conductivity at high frequencies - geometrical and magnetic field effects on electrical conductivity - variation of electrical resistivity due to mechanical stress (strain gauge)- different types of conducting materials.

Unit III

(15 Hours)

Dielectric Properties of materials

Dielectrics - different types of electric polarization - frequency and temperature effects on polarization - dielectric loss - local field or internal field - Clausius-Mossotti relation – determination of dielectric constant – dielectric break down - properties and different types of insulating materials – **Ferroelectric materials***.

Unit IV

(15 Hours)

Magnetic Properties of materials

Different type of magnetic materials – classical theory of diamagnetism (Langevin theory) - Langevin theory of paramagnetism- Weiss theory of paramagnetism- Weiss theory of ferromagnetism (molecular field theory on field magnetism) – Heisenberg interpretation on internal field and quantum theory of ferromagnetism - domain theory of ferromagnetism- hard and soft materials

Unit V**(15 Hours)****Superconducting materials**

Occurrence of superconductivity – general properties of superconductors – Meissner effect - types of superconductors - Isotope effect – Specific heat capacity - BCS Theory - applications of superconductors - SQUID.

Self study*Text Books:**

1. M. Arumugam, (2012), Material Science - Anuradha Agencies, Chennai

Reference Books:

1. Vijaya, Rangarajan, (2005), Materials Science - Tata McGraw Hill Publishing Co. Ltd, India.
2. Raghavan, (2010), Materials Science - Prentice Hall of India, New Delhi.

e-Resources:

1. <https://www.youtube.com/watch?v=D-9M3GWOBrw>
2. <https://youtu.be/hr08GUR2HQQ>
3. <https://youtu.be/Yl43KpsNncw>
4. <https://youtu.be/QQZ6EGf0Ju8>
5. <https://youtu.be/gtzNdfUD2wc>

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	H	H	S
CO 2	H	S	H	H	S
CO 3	S	H	H	S	H
CO 4	H	S	H	S	H
CO 5	H	S	H	S	H
S- Strong		H-High		M-Medium	
				L – Low	

Programme Code: 03	B.Sc. Physics			
Title of the Paper	Major Elective Paper - Object Oriented Programming in C++			
Batch 2026-2027	Hours/Week 5	Total Hours 75	Credits 5	Employability

Course Objective

To enable the learners to

1. Know about the basics in C++ language
2. Develop programming skills in C++ language
3. Understand about various functions and operators.

Course Outcome (CO)

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

K1 to K5	CO1	Acquire basic knowledge about various data types, variables, operators and solving programs for real data.
	CO2	understand about function prototyping and function overloading
	CO3	Acquire relevant information about various classes, objects and programming with various functions and arguments.
	CO4	Gain knowledge on Constructors, Destructors
	CO5	Gain knowledge on Polymorphism and inheritance

UNIT I

(15 Hours)

Beginning with C++

Basic concepts of Object oriented Programming – tokens – keywords – identifiers and constants – basic data types – user defined data types – derived data types – declaration of variables – dynamic initialization of variables – reference variables – scope resolution operators – expression and their types – **control structures***

UNIT II

(15 Hours)

Functions in C++

Main function – function prototyping – call by reference – return by reference - inline functions – default arguments – Const arguments – function overloading.

UNIT III

(15 Hours)

Classes and Objects

Specifying a class – defining member functions - C++ program with class – making an outside function inline – nesting of member functions – private member functions – arrays within class – memory allocation for objects – static data members and functions – arrays of objects – objects as function arguments – friendly functions.

UNIT IV

(15 Hours)

Constructors and Destructors

Constructors – parameterized constructors – multiple constructors in class – copy constructors – dynamic constructors – destructors.

UNIT V

(15 Hours)

Polymorphism and Inheritance

Defining operator overloading – overloading unary and binary operators – rules for overloading operators – Inheritance: Introduction – defining derived class – single inheritance – **multilevel inheritance*** – multiple inheritance.

UPH - 45 -

* denotes Self study

Books for study:

- 1.E. Balagurusamy, (2017), Object Oriented Programming with C++ - Tata McGraw Hill, India

Books for reference:

1. Yashwant Kaneetka, (2020), Let us C++ - BPB Publications, New Delhi.
2. H. Schildt, (2014), C++: A beginners guide, McGraw Hill, India.

e-Resources:

1. <https://www.digimat.in/nptel/courses/video/106105151/L01.html>
2. <https://youtu.be/JenkXelhImM>
3. <https://youtu.be/1puaGnJ9pyAA>
4. https://youtu.be/wtuks_f3vP4
5. <https://youtu.be/Qe8zcyTlvjc>

Mapping

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	H	S	H
CO 2	H	S	S	S	S
CO 3	S	S	S	H	S
CO 4	S	H	S	H	S
CO 5	H	S	H	S	H

S- Strong

H-High

M-Medium

L - Low

Skill Based Subjects (SBS)

1. Basics of Cyber Security
2. Scientific Computing- Python and Artificial Intelligence
3. Basics of Intellectual Property Right's

Programme Code		For B.A., BBA., B.Com., BCA. and B.Sc. Degree Students			
Title of the Paper		Title of the Paper : Skill Based Subject 1 – Basics of Cyber Security			
Batch 2026-2027	Semester 3	Hours/Week 2	Total Hours 30	Credits 3	Skill Development

COURSE OBJECTIVES

- To provide fundamental knowledge of cyber security concepts and the digital environment.
- To create awareness about cyber threats, cybercrimes, and common online frauds.
- To develop the ability to identify risks associated with internet, mobile, and online transactions.
- To familiarize students with safe practices in email, social media, and digital communication.
- To introduce basic cyber laws, ethics, and responsible digital behavior.

COURSE OUTCOMES

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

K Level	CO Code	Course Outcome
K1 ↑↓ K5	CO1	Apply the fundamental concepts of cyber security and digital safety at appropriate place
	CO2	Identify various cyber threats, cybercrimes, and online frauds
	CO3	Enable safe practices while using internet, mobile, and e-commerce platforms
	CO4	Interpret security issues related to email and social media usage
	CO5	Comprehend cyber laws, ethics, and legal responses to cybercrime

SYLLABUS

UNIT I

6 Hours

Foundations of Cyber Security: Cyberspace and Digital Environment -Evolution of Cyber Security- Basic Concepts and terminology in Cybersecurity –Cybersecurity Threat – Defense in Depth concept in Cyber Security- Information Literacy – Types of False Information — Digital footprint — Cyber Frauds- Basic Safety Practices and Password Awareness - Multi-Factor Authentication (MFA)- Zero Trust Security Model.

UNIT II

6 Hours

Cyber Crimes & Threat Landscape: Introduction to AI in Cyber Security- Cyber Crimes- Important of Cybercrime- Types of Cyber Crime - CIA Triad – Tools for Confidentiality, Integrity, Availability -Cyber Crime & Digital Evidence Indian Perspective- Recent Cyber Crime Incidents-Social Engineering Frauds- Financial Frauds using Social Media Platforms- Ransomware Attacks -Deep fake based frauds - Cryptocurrency scams -Dark Web basics - Preventive Measures for individuals and Organizations – Awareness and Safe Online Behavior- Incident Response Process.

UNIT III**6 Hours**

Internet, Mobile & Digital Transaction Security: Browser Security Tools – Mobile phone security and privacy settings – E-commerce concepts and risks – UPI Fraud Awareness -QR Code Scams - App permissions & Data Tracking – Malware Types and Cyber Attacks- Secure browsing and Data Theft & Public Wi-Fi Precautions – Symmetric vs Asymmetric Encryption.

UNIT IV**6 Hours**

Communication & Social Media Security: Basics of email usage and Communication – Email threats: Spam, Phishing, Malicious links- Fake News – Fake profiles, Cyber Bullying and Data Misuse –Computer Viruses – Antivirus and Firewall concepts – Safe sharing practices and Digital responsibility. Ethical Hacking.

UNIT V**6 Hours**

Cyber Laws, Ethics & Digital Responsibility: Introduction to Cyber Law – IT Act 2000 and Amendments– Data Protection Laws (India DPDP Act 2023). Intellectual Property in Digital Space- Cybercrime and legal provisions – User rights and responsibilities in cyberspace – Digital footprint and online identity – Personal data protection and privacy – Cyber ethics and responsible usage – Cyber safety awareness programs and best practices.

Case Study: Case studies of cyber law enforcement in India

Work Book

1. *Basics of Cyber Security*, prepared by Kongunadu Arts and Science College, Coimbatore

Reference Books

1. Data Security Council of India (DSCI), in collaboration with Seqrite, presents the second edition of the India Cyber, Threat Report 2025.
2. Green, J., Smith, A., & Brown, T. (2024). Information security management principles. Routledge.
3. Armstrong-Smith, S. (2024). Understand the cyber attacker mindset: Build a strategic security program. Kogan Page.
4. Ismail, Y., Lacy, F., & Belu, R. (Eds.). (2024). Cybersecurity: Threats, technologies, and emerging solutions. IntechOpen.
5. Rais, R., Morillo, C., Gilman, E., & Barth, D. (2023). Zero trust networks: Building secure systems in untrusted networks (2nd ed.). O'Reilly Media.
6. Shapiro, S. J. (2023). Fancy bear goes phishing: The dark history of the information age. Farrar, Straus and Giroux.
7. Tamil Nadu Fact Check Unit, Training Handbook
8. James Graham (2011), Cyber Security Essentials, CRC Press, Auerbach Publications, Taylor & Francis Group.
9. Kathryn Knerler (2022), 11 Strategies of a World-Class Cybersecurity Operations Center, MITRE Corporation.
10. Dr. Jeetendra Pande (2017), Introduction to Cyber Security, Uttarakhand Open University.

11. Rohas Nagpal (2008), Real world cyber crime cases, Cyber Crime & Digital Evidence – Indian Perspective, Asian School of Cyber Laws
12. Prof. (Dr.) Nilesh K. Modi (2021), Cyber Security Techniques, Dr. Babasaheb Ambedkar Open University.
13. Cyber Security Awareness Handbook (2020), Ciso Jil information Technology Limited.
14. Jeff Kosseff (2020), Cybersecurity Law, John Wiley & Sons, Inc.
15. Cyber Crime Law and Practice, The Institute of Company Secretaries of India, 2016
16. Yuri Diogenes (2018), Cybersecurity Attack and Defense Strategies, Packt Publishing.
17. Cybersecurity Handbook, Ministry of Digital Governance, National Cybersecurity Authority, June 2021.
18. Justin Hutchens (2024), The Language of Deception: Weaponizing Next Generation AI– Explores AI in social manipulation, deep fakes, and malware.
19. D.R. Halston (2025), Cyber Security Mastery Covers AI-driven attacks, cloud security, and career preparation.

Web References

- <https://safety.google/>
- <https://safety.google/security/security-tips/>
- <https://www.simplilearn.com/tutorials/cyber-security-tutorial>
- <https://www.getcybersmart.org/for-students>
- <https://www.techbuddies.io/cyber-security-basics>
- <https://www.geeksforgeeks.org/ethical-hacking/what-is-cyber-security/>
- <https://www.drishtias.com/daily-updates/daily-news-editorials/india-s-cybersecurity-challenge-threats-and-strategies>
- <https://www.dsci.in/resource/content/india-cyber-threat-report-2025>
- <https://www.eimt.edu.eu/25-major-cyber-attacks-in-india-threats-and-strategies>
- <https://www.coursera.org/in/articles/types-of-cyber-attacks>
- <https://eventussecurity.com/cybersecurity/india/cyber-attacks/>
- www.heimdalsecurity.com

Programme Code: 03		B.Sc. Physics			
Title of the Paper		Skill Based Subject 2 – Scientific Computing – Python and Artificial Intelligence			
Batch 2026-2027	Semester 4	Hours/Week 2	Total Hours 30	Credits 3	Employability

Course Objectives

To enable the learners to

1. build basic programme using fundamental programming constructs
2. build programme for Physics related applications
3. know the applications Artificial Intelligence

Course Outcomes (CO)

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

K1 to K5	CO1	Gain knowledge about how to use list
	CO2	Gain knowledge about conditions and loops
	CO3	Understand the concepts of functions and class
	CO4	Understand the concepts of python libraries
	CO5	Realize the applications Artificial Intelligence in Physics

Syllabus

UNIT I

(6 Hours)

Introduction to Python

Python on different operating systems - Variables – Strings – Numbers – Comments – List – Changing, Adding and Removing Elements – Organizing a List – Looping through List – **Making Numerical List***.

UNIT II

(6 Hours)

Conditions and Loops

Conditional Tests - If statements - While statement – Infinite loops - Continue statement – For loops – Dictionaries – Counting and summing loops – Maximum and minimum loops - Loop with Lists and Dictionaries.

UNIT III

(6 Hours)

Functions and Class

Functions – Styling - Creating and Using a Class – Opening files – Text files – Reading files – Searching through files – Writing files – Testing a Class.

UNIT IV

(6 Hours)

Python Libraries

Basic Numpy: 2D Numpy Arrays - Pandas: Basic data manipulation - Matplotlib: Basic plotting – Plot types - Axis functions - Figure functions - 2D and 3D plots - Annotations and texts.

UNIT V**(6 hrs)****Applications of Artificial Intelligence in Physics**

Introduction to AI – History of AI - Applications of AI in communication - Types of Artificial Intelligence (ANI, AGI, ASI) - Application of Artificial Intelligence in Physics (Particle Physics, Statistical Physics, Astrophysics, Quantum Mechanics, Materials Science, Atmospheric Physics)

*** denotes Self Study**

TEXT BOOKS

1. Eric Matthes(2019), Python Crash Course - 2nd Edition, No Starch Press
2. Wes McKinney (2013), Python for Data Analysis - O'Reilly Media
3. International Journal of Education, Modern Management, Applied Science & Social Science (IJEMMASSS) ISSN : 2581-9925 Volume 05, No. 01(II), January - March, 2023, pp. 11-17
4. **AI Book**

REFERENCE BOOKS

1. Charles R. Severance, (2017), Python for Everybody: “Exploring data using Python 3”, Schroff Publishers, ISBN 978-9352136278.
2. Timothy C. Needham, (2017), Python for Beginners: A crash course guide to learn python in 1 week.

e-Resources:

1. <https://www.python.org/about/gettingstarted/>
2. https://www.w3schools.com/python/python_intro.asp
3. <https://www.youtube.com/watch?v=QXeEoD0pB3E&list=PLsyebzWxl7poL9JTVyndKe62ieoN-MZ3>
4. <https://archive.nptel.ac.in/courses/106/106/106106182/>
5. https://www.youtube.com/watch?v=7wnove7K-ZQ&list=PLu0W_9lII9agwh1XjRt242xIpHhPT2llg

Mapping

CO	PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1		S	H	S	H	H
CO 2		H	S	H	S	S
CO 3		S	S	H	H	S
CO 4		H	H	S	S	S
CO 5		H	S	H	S	H

S- Strong**H-High****M-Medium****L - Low**

Programme Code :	For B.A., BBA, B.Com, BCA and B.Sc., Degree Students			
Skill Based Subject 3 - BASICS OF INTELLECTUAL PROPERTY RIGHT'S				
Batch 2026-2027	Hours / Week 2	Total Hours 30	Credits 2	Skill Development

Course Objectives

To enable the learners to

1. create awareness about recent trends in IPR and Innovation
2. explore the basic concepts IPR
3. focus upon trademarks, copyrights, patents, industrial designs and traditional knowledge.
4. learn more about managing IP rights and legal aspects.

Course Outcomes

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

K1 - K5	CO1	Know about basic concepts of IPR and patent
	CO2	Understand copyrights, industrial designs and geographical indication of goods.
	CO3	Differentiate between trademarks and trade secrets
	CO4	Acquire knowledge on protection of traditional knowledge and plant varieties.
	CO5	Manage and protect IP Rights

UNIT – I

(6 hours)

Introduction -origin and development of Intellectual Property Rights (IPR), need for protecting IP, **Patents:** Foundation of patent law, patent searching process, basic criteria of patentability. Patentable and non - patentable subject matters in India. Patent prior art search, drafting the patent specification and filing procedure

UNIT – II

(6 hours)

Copyrights: Fundamentals of copyright law, originality of material, right of reproduction, right to perform the work publicly, copyright ownership issues, notice of copyright. **Industrial Designs:** Kind of protection provided in Industrial design. **Geographical Indication of Goods:** Basic aspects and need for the registration.

UNIT – III

(6 hours)

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, transfer of rights, selecting and evaluating trademark, registration of trademarks, claims. **Trade Secrets:** Trade secret law, determination of trade secret status, liability form is appropriation of trade secrets, trade secret litigation.

UNIT – IV

(6 hours)

Protection of traditional knowledge - Objectives, concept of traditional knowledge, issues concerning, bioprospecting and biopiracy. **Protection of Plant Varieties** - Objectives, international position, plant varieties protection in India. Rights of farmers, breeders and researchers.

UNIT- V

(6 hours)

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, protecting IP Rights: non-disclosure agreement, cease and desist letter, settlement memorandum. **Transferring IP Rights:** Assignment contract, license agreement, deed of assignment. Infringement and enforcement.

TEXT BOOKS

1. Ramakrishna Chintakunta and M. Geethavani (2022). A Textbook of Intellectual Property \ Rights. Blue Hills publications.
2. N.K Acharya (2021).Intellectual property rights(8thEdn). Asia Law House.
3. Craig Allen Nard, Michael J. Madison, and Mark P. McKenna. (2017). Law of Intellectual Property (5thEdn). New York Aspen publishers.
4. Barrett and Margreth (2009). Intellectual Property. New York Aspen publishers.
5. Deborah E.Bouchoux(2013). Intellectual property:The Law of Trademarks, Copyrights, Patents, and Trade Secrets. Publisher: Cengage India

REFERENCES

1. B.Ramakrishna and H.S.Anil Kumar (2017). Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers.Notion Press.
2. V. K. Ahuja(2013). Law relating to Intellectual Property rights (2nd Edn). LexisNexis.
3. R. Radhakrishnan and S. Balasubramanian(2008).Intellectual property rights: Text and Cases. Excel Books India.
4. D. Goeland S. Parashar (2013). IPR Biosafety and Bioethics. Pearson Education India.

CIA EXAMINATION MARK BREAKUP

The CIA Examination mark breakup for the course **Basics of IPR** is given below:

S.No.	Distribution Component	Marks
1	CIA I – 75 Marks Converted to 30	30
2	CIA II – 75 Marks Converted to 30	30
3	Assignment I	10
4	Assignment II	10
5	Attendance	05
6	Any Case Study related to IPR (as a Group)	15
	Total	100

QUESTION PAPER PATTERN

The following question paper pattern will be followed for the above said courses:

Section A - Multiple Choice	(10 × 1 = 10 Marks)
Section B - Either or Type	(5 × 5 = 25 Marks)
Section C - Either or Type	(5 × 8 = 40 Marks)

Maximum Marks : 75

Duration : 3 Hours

Extra Departmental Course (EDC)

Physics in Everyday life (26UPH5X1)

Programme Code: 03		B.Sc. Physics			
Title of the Paper		Extra Departmental Course (EDC) - Physics in Everyday life			
Batch 2026-2027	Semester 5	Hours/Week 2	Total Hours 30	Credits 3	Skill Development

Course Objectives

To study about the

1. Physics of Universe and solar systems
2. Principles, advancements and applications of Physics in various fields.
3. Physics principles involved in common household appliances

Course outcomes (CO)

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

K1 to K5	CO1	Understand origin of universe and study about planets.
	CO2	Study Physics in Human anatomy.
	CO3	Study about various Physics principles behind sports.
	CO4	Apply of Physics in Technology.
	CO5	Realize Physics in appliances

Syllabus**Unit I****(6 Hours)****Physics of Universe and Solar system**

Origin of the Universe - Big bang theory - Oscillating theory – Steady state theory – Sun – Solar system – Interior planets – exterior planets - Moon - Bode's law.

Unit II**(6 Hours)****Physics in Human Body**

Eyes as an optical instrument - Vision defects - Rayleigh criterion and resolving power, Sound waves and hearing - Sound intensity - Decibel scale - temperature control.

Unit III**(6 Hours)****Physics in Sports**

The sweet spot - Dynamics of rotating objects - Running, Jumping and pole vaulting - Motion of a spinning ball - Banana shot: Magnus force - Turbulence and drag.

Unit IV**(6 Hours)****Physics in Technology**

Microwave ovens - CCDs – Lasers – Displays - Optical recording: **CD, DVD Player *** - Electric motors : Hybrid car - Telescope – Microscope - Projector.

Unit V**(6 Hours)****Physics in Appliances**

Pressure cooker - Automatic wrist watches - Air conditioner - Refrigerator - Television - Computer - Global Positioning System - Smoke Detectors - Polaroid Sunglasses

*** denotes Self Study**

Text Books:

1. F.W.Sears, M. Zemansky, R.A.Freedman, and H.D.Young, (2004), University Physics - Pearson Education, UK
2. The Hindu Speaks on Scientific facts, (2017) - Kasturi & Sons Ltd, India.

Reference Books:

1. Hugh D. Young, (2012), College Physics - Pearson Education, UK
2. D. Halliday, R. Resnick, J. Walker, (2014), Fundamentals of Physics – John Wiley & Sons, India.

e-Resources:

1. <https://www.youtube.com/watch?v=pivS9HzattI>
2. <https://www.youtube.com/watch?v=XV3PTLBBTzs>
3. https://www.youtube.com/watch?v=k6zRYoUs_YA
4. https://www.youtube.com/watch?v=D9_2qtD8flo
5. <https://www.youtube.com/watch?v=SQDWNdO6xE4>

EDC - Question Paper Pattern**Duration: 3 Hours****Max: 75 marks****Section - A (10x1=10)****Choose the correct answer****Section - B (5x5=25)****Short answer questions, either or type, one question from each unit.****Section - C (5x8=40)****Essay answer questions, either or type, one question from each unit.****CIA EXAMINATION MARK BREAKUP****(For Theory Only)**

S. NO	DISTRIBUTION COMPONENT	MARKS
1.	CIA I – 75 Marks Converted to 40	40
2.	CIA II – 75 Marks Converted to 40	40
3.	Assignment I	05
4.	Assignment II	05
5.	Attendance	05
6.	Others (Seminar, Group Discussion, Flipped Class room, etc.,)	05
Total		100

Programme Code: 03		B.Sc. Physics		
Title of the Paper		Part IV – Environmental Studies		
Batch 2026-2027	Semester 1	Hours/Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

- To provide a fundamental understanding of natural resources, environmental ethics, and the impact of modern practical conservation and sustainability.
- To inculcate knowledge and create awareness about concepts, components and function of ecosystems
- To appraise on the importance of biodiversity, its values, threats, indigenous and Traditional knowledge systems, conservation strategies, and modern identification tools, and cultivate conscious responsibility and awareness for biodiversity conservation and sustainability.
- To understand the environment threats and pollution, its impacts and mitigation strategies
- To develop an understanding of disasters (natural and man-made) and its preparedness

COURSE OUTCOMES

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

K1 - K5	CO1	Formulate genetic resource conservation strategies and assess India's SDG performance through AI/ML tools.
	CO2	Evaluate and predict the impact of humans on web of life, global economy and quality
	CO3	Think critically and develop strategies for biodiversity conservation, sustenance and environmental equity through eco conscious approach
	CO4	Demonstrate values and have compassion towards complex environmental issues and take part in mitigating current environment challenges through sustainable solutions
	CO5	Apply basic safety and preparedness measures in disaster situations in society, household and workplace

UNIT I**(6 HOURS)****MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND ITS SOCIAL ETHICS AND VALUES**

Introduction to environment; Historical Development of Human – environment interaction; Industrial revolution, Economic development and its impact on the environment; **Overview of resources:** Definition, Classification of natural resources – biotic and abiotic, renewable and non-renewable.

Renewable Resources: Water Resources- Rainwater Harvesting, Reservoirs managements, AI & ML tools for water resource management. Sustainable Development goals - Agriculture and Environment. Revisiting traditional agricultural practices- Biodynamic Farming, Physical and Biological soil factors. **Non-renewable Resources-** fossil fuel, nuclear fuel, Energy Resources: Conventional and non-conventional Resources- solar, wind, clean energy- hydrogen, Biomass energy-coir pith, charcoal; Use of exotic/invasive weed biomass for alternative energy/economy. Eg: *Lantana camara*, *Eichhornia Sp*, Genetic Resources and conservation, strategies.

- *Activity:** (i) Analyze your department and its practices towards compliance to SDG's. List out the compliances towards SDG's with justification.
- (ii) Examine your campus' current resource conservation strategies and provide recommendations to improve its sustainability and resource efficiency.
- * Students can take up any one of the above.

UNIT II ECOSYSTEMS

(6 HOURS)

Ecosystem- Definition, Components (producers, consumers and decomposers) and functions- Energy flow, Food chains and its types, food web, Disturbances to food chain and food web due to anthropogenic intrusions Eg: Diclofenac Case, Ecological pyramids: types and importance of ecological pyramids, **Types of Ecosystems:** Natural ecosystem- Aquatic Ecosystem (Pond, River, Marine and Estuarine), Terrestrial Ecosystem (Forest, Grassland and Desert). Artificial Ecosystem (Crop land).

Activity: Develop a working model for an ecosystem through building a Terrarium or Suseum.

UNIT III BIODIVERSITY

(6 HOURS)

Concept of Biodiversity: Definition, Types-Genetic, Species and Ecosystem diversity. Indigenous Knowledge Systems on Biodiversity – Traditional knowledge and legal framework for bioprospecting and Biomimicry. Biodiversity- Values, uses and threats, sustainable use of bioresources for value additions, Conservation strategies of Biodiversity- *In-situ* - National Parks, Wildlife Sanctuaries, Community Reserve and Conservation Reserves, *Ex-situ* – Zoological Park, Aquarium, Botanical garden. ***Case Study-** Nilgiri Tahr Conservation Project.

- Activity: (i)** Applications for plant and animal identification by software -*iNaturalist* and Merlin Bird ID
- (ii) Field observation and documentation of the campus biodiversity.

UNIT IV ENVIRONMENTAL THREATS AND POLLUTION

Introduction and Classification of Pollution- physical, chemical and biological; major types of pollution- air, water, soil/land, noise, thermal, radioactive, solid waste, electronic waste (e-waste), plastic, biomedical waste. **Assessment and Monitoring:** Pollution impact assessment/health risk assessment & monitoring techniques, Biological indicators of pollution – Dissolved Oxygen (DO), Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). Impact of pollution and incidence of Life style disorders like Diabetes, Cardio Vascular Disease, Cancer, PCOS etc. **Waste Management** – concept of 3R (Reduce, Recycle and Reuse) and sustainability. ***Case studies:** Dye Industrial pollution from tanneries, paper and pulp industrial effluents in Noyyal and Cauvery rivers.

Activity: Prepare an Audit report for:

- (i) Water usage in your department/house
- (ii) Magnitude of solid waste generation and its management at your department/house.

UNIT V: DISASTER MANAGEMENT AND PREPAREDNESS (6 HOURS)

Definition and Classification of Disaster (Natural and Man-made disasters). **Natural Disaster:** Earthquakes, Landslides, Tsunami, Floods, Volcanic eruptions, Cyclones. Wayand- landslides, Joshimath- The sinking Village, Forest fires: causes, spread, control measures. **Man-made Disasters:** Industrial and chemical accidents (Bhopal disaster, oil spills), Nuclear hazards (Chernobyl and Fukushima). Kasargod- Impact of Endosulfan spraying on cashew farms. **Preparedness and safety measures:** Early warning system, response, recovery, mitigation, vulnerability, risk, resilience and capacity building. **Forecasting methods:** Conventional – cloud formation & wind, wave patterns, behaviours of animals & plants, Modern methods – remote sensing, drone and AI tools for impact assessment. ***Case studies:** Chennai flood 2015, causes and control measures.

Activity: Prepare (i) Personal/Class emergency plan

- (ii) Risk identification checklist like loose heavy furniture, poor wiring, blocked exits
- (iii) A document using Mobile technology to map local resources or identify safer locations.

Field Study: Visit to eco parks'/conservation sites and report.

* Case studies are not for examination purposes.

Text book

1. Workbook on Environmental Science (2026), published by Kongunadu Arts and Science College, Coimbatore-641029.

Reference Books:

1. Fundamentals of Ecology, Odum E.P, Odum H.T & Andrews- Saunders publications
2. Ecology, Environmental science and Conservation. Singh J.S & Gupta SR, S Chand Publishing (2017).
3. This Fissured Land: An Ecological History of India; Gadgil M & Guha R (1993), University of California Press, 1st Edition.
4. Environment (8th Ed.) by Raven PH, Gift, Bary LR, Hassenzahl DM, 2015, Wiley publishing house.
5. R. S. Ambasht, A Text Book of Plant Ecology, Students Friends & Company, 1990 - Plant ecology - 373 pages
6. A. Ravikrishnan (2019), Environmental Science and Engineering (Forth Edition) by Sri Krishna Hitech Publishing Company Pvt.Ltd, Velappanchavadi, Chennai.
7. Yadav, P. (2021). Applied and Economic Zoology. Kedar Nath Ram Nath
8. Krishnamurthy, K. V. (2023). An advanced textbook on biodiversity: Principles and practice. Oxford and IBH Publishing.
9. Anonymous (2003) Professional's The Wildlife (Protection) Act, 1972. Professional Book Publications.
10. National Disaster Management Guidelines - National Disaster Management Information and Communication System (NDMICS) (2011). A publication of the National Disaster Management Authority, Government of India. ISBN: 978-93-80440-12-5, February 2012, New Delhi.
11. Disaster Risk Management Systems Analysis: A Guide Book, Food and Agriculture Organization of the United Nations, Rome (2008). ISBN 978-92-5106056-8.

e- Resources

1. <https://egyankosh.ac.in/bitstream/123456789/77368/1/Unit-4.pdf>
2. <https://agritech.tnau.ac.in/pdf/sustainableagriculture.pdf>
3. https://www.dev-practitioners.eu/media/key_documents/SDGs_Booklet_Web_En.pdf
4. <https://www.pmfias.com/environment-ecosystem-components-ecosystem/>
5. <https://www.ugc.gov.in/oldpdf/modelcurriculum/Chapter3.pdf>
6. https://mjcollege.kces.in/pdf/download_documents/study_material_env_studies/ch3.pdf
7. [https://www.deshbandhucollege.ac.in/pdf/resources/1587401626_BA\(H\)-Psc-Eco-Eng-BA\(P\)-II-Ecosystem.pdf](https://www.deshbandhucollege.ac.in/pdf/resources/1587401626_BA(H)-Psc-Eco-Eng-BA(P)-II-Ecosystem.pdf)
8. <http://www.tezu.ernet.in/denvsc/IDC/biodiversity.pdf>
9. <https://egyankosh.ac.in/bitstream/123456789/86424/1/Unit-11.pdf>
10. <https://utkaluniversity.ac.in/wp-content/uploads/2022/05/Environmental-Pollution.pdf>
11. https://cdn.visionias.in/value_added_material/d6c24-disaster_management.pdf
12. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SCIA4001.pdf
13. https://mrcet.com/downloads/MBA/Disaster%20and%20Crisis%20Management_Digital%20Notes.pdf

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Sub. Code: 26EVS101

QUESTION PAPER PATTERN

Maximum Marks : 50

Duration : 3 Hours

Answer all Questions (5×10=50 Marks)

Essay type, Either or type questions from each unit.

Question Paper Pattern

Duration: 3 hours

Total Marks: 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

Programme Code:	For B.A., BBA, B.Com, BCA and B.Sc., Degree Students		
VALUE EDUCATION – MORAL AND ETHICS			
Batch 2026-2027	Hours / Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

1. To impart Value Education in every walk of life.
2. To help the students to reach excellence and reap success.
3. To impart the right attitude by practicing self introspection.
4. To portray the life and messages of Great Leaders.
5. To insist the need for universal brotherhood, patience and tolerance.
6. To help the students to keep them fit.
7. To educate the importance of Yoga and Meditation.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 - K5	CO1	will be able to recognize Moral values, Ethics, contribution of leaders, Yoga and its practice
	CO2	will be able to differentiate and relate the day to day applications of Yoga and Ethics in real life situations
	CO3	can emulate the principled life of great warriors and take it forward as a message to self and the society
	CO4	will be able to Analyse the Practical outcome of practicing Moral values in real life situation
	CO5	could Evaluate and Rank the outcome of the pragmatic approach to further develop the skills

SYLLABUS**UNIT I:****(4 Hours)**

Moral and Ethics: Introduction – Meaning of Moral and Ethics – Social Ethics – Ethics and Culture – Aim of Education.

UNIT II:**(6 Hours)**

Life and Teachings of Swami Vivekananda: Birth and Childhood days of Swami Vivekananda – At the Parliament of Religions – Teachings of Swami Vivekananda

UNIT III:**(4 Hours)**

Warriors of our Nation: Subhas Chandra Bose – Sardhar Vallabhbhai Patel – Udham Singh – V. O. Chidambaram Pillai – Bhagat Singh – Tiruppur Kumaran – Dheeran Chinnamalai – Thillaiaadi Valliammai – Velu Nachiyar – Vanchinathan

UNIT IV:**(8 Hours)**

Introduction -yoga and its benefits - Ardhasiddhasana- Yoga for peace- Yoga for health - Yoga for wellbeing - Yoga for success - Brain yoga benefits - The science of Yoga.

UNIT V:**(8 Hours)**

Isha kriya -Surya Shakthi and it's benefits.

Text Books:

Value Based Education – Moral and Ethics – compiled by Kongunadu Arts and Science College (Autonomous), 3rd Edition (2024).

Reference Books:

1. Swami Vivekananda - A Biography, Swami Nikhilananda, Advaita Ashrama, India, 24th Reprint Edition (2010).
2. Gandhi, Nehru, Tagore and other eminent personalities of Modern India, Kalpana Rajaram, Spectrum Books Pvt. Ltd., revised and enlarged edition(2004).
3. Freedom Fighters of India, Lion M.G. Agrawal, Isha Books Publisher, First Edition (2008).
4. Easy steps to Yoga by Swami Vivekananda, A Divine Life Society Publication(2000).

Question Paper Pattern

Duration: 3 hours

Total Marks: 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

Non - Major Elective Papers

1. Human Rights
2. Women's Rights
3. Consumer affairs

Programme Code:03	For B.A., BBA, B.Com, BCA and B.Sc., Degree Students		
Title of the Paper	Part IV – Non Major Elective - I Human Rights		
Batch 2026-2027	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

To enable the learners

1. To prepare for responsible citizenship with awareness of the relationship between Human Rights, democracy and development.
2. To impart education on national and international regime on Human Rights.
3. To sensitive students to human suffering and promotion of human life with dignity.
4. To develop skills on human rights advocacy
5. To appreciate the relationship between rights and duties
6. To foster respect for tolerance and compassion for all living creature.

Course Outcomes

After Completion of the Course the student will be able

K1 - K5	CO1	To understand the hidden truth of Human Rights by studying various provisions in the Constitution of India.
	CO2	To acquire overall knowledge regarding the Feminist perspectives in the Liberative Empowerment of Women.
	CO3	To gain knowledge about various gender roles and stereotypes involved in the comprehension of gender equality and women's rights.
	CO4	To comprehend the legal provisions and policies that foreground the safety of children in the society and to promote awareness.
	CO5	To gain enhanced knowledge about sexual and gender minorities to recognize, celebrate and acknowledge the diversified forms of gender expressions and rights.

Syllabus

UNIT I

(6 Hours)

HUMAN RIGHTS HUMANS RIGHTS CONSTITUTION OF INDIA: Humans Rights - Constitution of India

UNIT II

(6 Hours)

WOMEN EMPOWERMENT IN INDIA: Feminism and Sexual Violence - Women And Liberation

UNIT III

(6 Hours)

GENDER EQUALITY AND WOMEN'S RIGHTS: Stereotype Gender Roles - Women's Education, Power And Science

UNIT IV

(6 Hours)

RIGHTS OF THE CHILD IN INDIA: Status of child in contemporary Indian society - Special Laws and Policies for protection of children

UNIT V

SOGIESC RIGHTS: Understanding SOGIESC- basic Definitions- inclusivity of SOGIESC- importance of studying SOGIESC- presence of SOGIESC in Indian Traditions- temples and cultural practices that exemplify SOGIESC in India- Genetics of Sex determination- Genetics of Intersex community- Successful SOGIESC Personalities and achievers – Alan Turing- Sally Ride- Leonardo da vinci- Alan Hart- Virginia -Woolf- Bayard Rustin- Padmini Prakash- Akkai Padmashali- K Prithika Yashini- Laxmi Narayan Tripathi- Madhu Bai Kinnar-Manabi Bandhopadhyay- SOGIESC Rights and laws

Text Books

1. Human Rights (2024) Compiled by Kongunadu Arts and Science College, Coimbatore –29.

Reference

1. Human Rights, (2018) by Jaganathan, MA., MBA., MMM., ML., ML., (Humanitarian Law) and J.P. Arjun Proprietor: Usha Jaganathan, Refugee Law Law series, 1st floor, Narmatha Nanthi Street, Magathma Gandhi Nagar, Madurai – 625014.
2. Country Report on SOGIESC Rights In India: An Unfinished Agenda.
Weblink: <https://www.ilgaasia.org/publications/india-country-report-an-unfinished-agenda>
3. Intersex. Weblink: <https://my.clevelandclinic.org/health/articles/16324-intersex>
4. SOGIESC Personalities:
<https://www.bbc.com/news/world-asia-india-29357630>
https://en.wikipedia.org/wiki/Laxmi_Narayan_Tripathi
https://en.wikipedia.org/wiki/Akkai_Padmashali
<https://www.indiatoday.in/india/story/prithika-yashini-india-first-transgender-police-officer-tamil-nadu-969389-2017-04-04>
<https://yourstory.com/2018/03/first-transgendre-college-principal-west-bengal>
5. SOGIESC Rights and laws
<https://www.openglobalrights.org/lgbtqia-to-sogiesc-reframing-sexuality-gender-human-rights/>
<https://static1.squarespace.com/static/5a84777f64b05fa9644483fe/t/625ead0484f9005d75b92dd0/1650371887436/ILGA+Asia+India+Report+2021.pdf>

Question Paper Pattern
(External only)

Duration: 3 Hours

Max: 75 marks

Answer ALL Questions

SECTION A

(5 x 5 = 25 marks)

Short answers, either or type, one question from each unit.

SECTION B

(5 x 10 = 50 marks)

Essay type questions, either or type, one question from each unit.

Programme Code: 03	B.Sc. Physics		
Title of the Paper	Part IV – Non Major Elective – II		Women's Rights
Batch 2026-2027	Hours/Week 2	Total Hours 30	Credits 2

Course Objectives

To enable the learners

1. To know about the laws enacted to protect Women against violence.
2. To impart awareness about the hurdles faced by Women.
3. To develop a knowledge about the status of all forms of Women to access to justice.
4. To create awareness about Women's rights.
5. To know about laws and norms pertaining to protection of Women.
6. To understand the articles which enables the Women's rights.
7. To understand the Special Women Welfare laws.
8. To realize how the violence against Women puts an undue burden on healthcare services.

Course Outcomes (CO)

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

K1 - K5	CO1	Understand the importance of Women's Studies and incorporate Women's Studies with other fields.
	CO2	Analyze the realities of Women Empowerment, Portrayal of Women in Media, Development and Communication.
	CO3	Interpret the laws pertaining to violence against Women and legal consequences.
	CO4	Study the important elements in the Indian Constitution, Indian Laws for Protection of Women.
	CO5	To be Aware of Government Developmental schemes for women and to create Awareness on modernization and impact of technology on Women.

Syllabus

Unit I

(6 Hours)

Women's Studies:

Basic concepts of Women's studies in Higher education, Women's studies perspectives- Socialization- Patriarchy- Women's studies as an academic discipline- Growth and development of Women's studies as a discipline internationally and in India.

Unit II

(6 Hours)

Socio-Economic Development of Women:

Family welfare measures, role of Women in economic development, representation of Women in media, status of Women land rights, Women Entrepreneurs, National policy for the empowerment of women.

Unit III

(6 Hours)

Women's Rights – Access to Justice:

Crime against Women, domestic violence – physical abuse- verbal abuse – emotional abuse - economic abuse – minorities, dowry- harassment and death, code of conduct for work place, abetment of suicide.

Unit IV**(6 Hours)****Women Protective acts:**

Protective legislation for Women in the Indian constitution- Anti dowry, SITA, PNDT, and Prevention Sexual Harassment at Workplace (Visaka case), Domestic violence (Prevention) Act.

Unit V**(6 Hours)****Women and Child welfare:**

Safety provisions - various forms of mass media, radio, visual, internet, cyber space, texting, SMS and smart phone usage. Healing measures for the affected Women and child society by private and public sector, NGO and society.

Text Book:

1. Women's Rights (2021), compiled by Kongunadu Arts & Science College, Coimbatore – 641 029.

Reference Books:

1. "Rights of Indian Women" by Vipul Srivatsava. Publisher: Corporate Law Advisor, 2014.
2. "Women's security and Indian law" by Harsharam Singh. Publisher: Aabha Publishers and Distributors, 2015.
3. "Women's Property Rights in India" by Kalpaz publications, 2016.

**Question Paper Pattern
(External only)****Duration: 3 Hours****Max: 75 marks****Answer ALL Questions****SECTION A****(5 x 5 = 25 marks)**

Short answers, either or type, one question from each unit.

SECTION B**(5 x 10 = 50 marks)**

Essay type questions, either or type, one question from each unit.

Programme Code: 03	B.Sc. Physics		
Title of the Paper	Part IV – Non Major Elective III - Consumer Affairs		
Batch 2026-2027	Hours/Week 2	Total Hours 30	Credits 2

Course Objectives

To enable the learners

1. To familiarize the students with their rights and responsibilities as a consumer.
2. To understand the procedure of redress of consumer complaints.
3. To know more about decisions on Leading Cases by Consumer Protection Act.
4. To get more knowledge about Organizational set-up under the Consumer Protection Act
5. To impart awareness about the Role of Industry Regulators in Consumer Protection
6. To understand Contemporary Issues in Consumer Affairs

Course Outcomes (CO)

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

K1 - K5	CO1	Know the rights and responsibility of consumers.
	CO2	Understand the importance and benefits of Consumer Protection Act.
	CO3	Apply the role of different agencies in establishing product and service standards.
	CO4	Analyze to handle the business firms' interface with consumers.
	CO5	Assess Quality and Standardization of consumer affairs

Syllabus

UNIT I

(6 Hours)

Conceptual Framework - Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology. Experiencing and Voicing Dissatisfaction: Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000 suite

UNIT II

(6 Hours)

The Consumer Protection Law in India - Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, restrictive trade practice. Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

UNIT III

(6 Hours)

Grievance Redressal Mechanism under the Indian Consumer Protection Law - Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties. Leading Cases decided under Consumer Protection law by Supreme Court/National Commission: Medical Negligence;

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Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

UNIT IV

(6 Hours)

Role of Industry Regulators in Consumer Protection

- i. Banking: RBI and Banking Ombudsman
- ii. Insurance: IRDA and Insurance Ombudsman
- iii. Telecommunication: TRAI
- iv. Food Products: FSSAI
- v. Electricity Supply: Electricity Regulatory Commission
- vi. Real Estate Regulatory Authority

UNIT V

(6 Hours)

Contemporary Issues in Consumer Affairs - Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview.

Note: Unit 2 and 3 refers to the Consumer Protection Act, 2006. Any change in law would be added appropriately after the new law is notified.

Reference Books

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) Consumer Affairs, Universities Press.
2. Choudhary, Ram Naresh Prasad (2005). Consumer Protection Law Provisions and Procedure, Deep and Deep Publications Pvt Ltd.
3. G. Ganesan and M. Sumathy. (2012). Globalisation and Consumerism: Issues and Challenges, Regal Publications
4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, New Delhi
5. Rajyalaxmi Rao (2012), Consumer is King, Universal Law Publishing Company
6. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.

e-Resources

1. E-books : www.consumereducation.in
2. Empowering Consumers e-book, www.consumeraffairs.nic.in
3. The Consumer Protection Act, 2006 and its later versions.

Question paper pattern

Duration: 3 Hours

Max: 75 Marks

Section A (5 x 5=25)

Short notes

Either – or / type – question from each unit.

Section B (5 x 10=50)

Essay type

Either – or / type – question from each unit.

ALL UG COURSES		
Title of the paper: HEALTH AND WELLNESS		
Batch 2026 – 2027	Semester IV	Credits 2

Skill Areas:

Physical Fitness, Nutrition, Mental Health, Awareness on Drug addiction and its effects

Purpose:

The Health & Wellness course focuses on teaching the elements of physical, mental, emotional, social, intellectual, environmental well-being which are essential for overall development of an individual. The course also addresses the dangers of substance abuse and online risks to promote emotional and mental health.

Learning Outcomes:

Upon completion of the Health & Wellness course, students will be able to:

1. Demonstrate proficiency in sports training and physical fitness practices.
2. Improve their mental and emotional well-being, fostering a positive outlook on health and life.
3. Develop competence and commitment as professionals in the field of health and wellness.
4. Awareness on drug addiction and its ill effects

Focus:

During the conduct of the Health & Wellness course, the students will benefit from the following focus areas:

1. Stress Management.
2. Breaking Bad Habits.
3. Improving Interpersonal Relationships.
4. Building Physical Strength & Inner Strength.

Role of the Facilitator:

The faculty plays a crucial role in effectively engaging with students and guiding them towards achieving learning outcomes. Faculty participation involves the following areas:

1. **Mentorship & Motivation:** The Facilitator mentors students in wellness and self-discipline while inspiring a positive outlook on health. Faculty teach stress management, fitness, and daily well-being.
2. **Promoting a Safe and Inclusive Environment:** The facilitator ensures a safe, inclusive, and respectful learning environment for active student participation and benefit.
3. **Individualised Support and Monitoring Progress:** The facilitator plays a crucial role in providing personalized support, monitoring and guidance to students.

Guided Activities:

In this course, several general guided activities have been suggested to facilitate the achievement of desired learning outcomes. They are as follows:

1. Introduction to Holistic Well-being.
2. Holistic Wellness Program- Nurturing Body and Mind
3. Breaking Bad Habits Workshop.
4. Improving the elements of physical, emotional, social, intellectual, environmental and mental well-being.
5. Creating situational awareness, digital awareness.
6. Understanding substance abuse, consequences and the way out.

Period Distribution

The following are the guided activities suggested for this Audit course.

The Physical Director should plan the activities by the students.

Arrange the suitable Mentor / Guide for the wellness activities.

Additional activities and programs can be planned for Health and Wellness.

S.No	Guided Activities	Period
1	Introduction to Holistic Well-being 1. Introduce the core components of Health & Well-being namely Physical, mental and emotional well-being 2. Provide worksheets on all the four components individually and explain the interconnectedness to give an overall understanding.	
2	Wellness Wheel Exercise (Overall Analysis)	

	● Guide students to assess their well-being in various life dimensions through exercises on various aspects of well – being, and explain the benefits of applying wellness wheel. ● Introduce Tech Tools: ● Explore the use of technology to support well-being. ● Introduce students to apps for meditation, sleep tracking, or healthy recipe inspiration.	
3	Breaking Bad Habits (Overall Analysis) ● Open a discussion on bad habits and their harmful effects. ● Provide a worksheet to the students to identify their personal bad habits. ● Discuss the trigger, cause, consequence and solution with examples. ● Guide them to replace the bad habits with good ones through worksheets.	
4	Physical Well-being 1. Fitness Introduce the different types of fitness activities such as basic exercises, cardiovascular exercises, strength training exercises, flexibility exercises, so on and so forth. (Include theoretical explanations and outdoor activity). 2. Nutrition Facilitate students to reflect on their eating habits, their body type, and to test their knowledge on nutrition, its sources and the benefits. 3. Yoga & Meditation Discuss the benefits of Yoga and Meditation for one's overall health. Demonstrate different yoga postures and their benefits on the body through visuals (pictures or videos)	

	4. Brain Health Discuss the importance of brain health for daily life. Habits that affect brain health (irregular sleep, eating, screen time). Habits that help for healthy brains (reading, proper sleep, exercises). Benefits of breathing exercises and meditation for healthy lungs. 5. Healthy Lungs Discuss the importance of lung health for daily life. Habits that affect lung health (smoking, lack of exercises). Benefits of breathing exercises for healthy lungs. 6. Hygiene and Grooming Discuss the importance of hygienic habits for good oral, vision, hearing and skin health. Discuss the positive effects of grooming on one's confidence level and professional growth. <u>Suggested Activities (sample):</u> Nutrition: Invite a nutritionist to talk among the students on the importance of nutrition to the body or show similar videos shared by experts on social media. Organize a 'Stove less/fireless cooking competition' for students where they are expected to prepare a nutritious dish and explain the nutritive values in parallel.	
5	Emotional Well-being 1. Stress Management Trigger a conversation or provide self-reflective worksheets to identify the stress factors in daily life and their impact on students' performance. Introduce different relaxation techniques like deep breathing, progressive muscle relaxation, or guided imagery. (use audio recordings or visuals to guide them through these techniques). After practicing the techniques, have them reflect on how these methods can help manage stress in daily life. 2. Importance of saying 'NO'.	

	Explain the students that saying 'NO' is important for their Physical and mental well-being, Academic Performance, Growth and Future, Confidence, Self-respect, Strong and Healthy Relationships, building reputation for self and their family (avoid earning a bad name). Factors that prevent them from saying 'NO'. How to practice saying 'NO'. 3. Body Positivity and self-acceptance Discuss the following with the students. • What is body positivity and self-acceptance? • Why is it important? • Be kind to yourself. • Understand that everyone's unique. <u>Suggested Activities(Sample):</u> (Importance of saying 'NO') Provide worksheets to self-reflect on... ...how they feel when others say 'no' to them ...the situations where they should say 'no' Challenge students to write a song or rap about the importance of saying no and how to do it effectively. Students can perform their creations for the class.	
6	Social Well-Being 1. Practicing Gratitude Discuss the importance of practicing gratitude for building relationships with family, friends, relatives, mentors and colleagues. Discuss how one can show gratitude through words and deeds. Explain how practicing gratitude can create 'ripple effect'. 2. Cultivating Kindness and Compassion Define and differentiate between kindness and compassion. Explore practices that cultivate these positive emotions. Self-Compassion as the Foundation.	

	The power of small gestures. Understanding another's perspective. The fruits of compassion. 3. Practising Forgiveness Discuss the concept of forgiveness and its benefits. Forgiveness: What is it? and What it isn't? Benefits of forgiveness. Finding forgiveness practices. 4. Celebrating Differences Appreciate the value of individual differences and foster inclusivity. The World: A Tapestry of Differences (cultures, backgrounds, beliefs, abilities, and appearances). Finding strength in differences (diverse perspectives and experiences lead to better problem-solving and innovation). Celebrating differences, not ignoring them (respecting and appreciating the unique qualities). Activities for celebrating differences (share culture, learn about others, embrace new experiences). 5. Digital Detox Introduce the students to: The concept of a digital detox and its benefits for social well-being. How to disconnect from devices more often to strengthen real-world connections. <u>Suggested Activities (sample):</u> (Practicing Gratitude) Provide worksheets to choose the right ways to express gratitude. Celebrate 'gratitude day' in the college and encourage the students to honour the house keeping staff in some way to express gratitude for their service.	
7.	Intellectual Well-being 1. Being a lifelong Learner Give students an understanding on: The relevance of intellectual well-being in this 21st century to meet	

	the expectations in personal and professional well-being The Importance of enhancing problem-solving skills Cultivating habits to enhance the intellectual well-being (using the library extensively, participating in extra-curricular activities, reading newspaper etc.) 2. Digital Literacy Discuss: The key aspects of digital literacy and its importance in today's world. It is more than just liking and sharing on social media. The four major components of digital literacy (critical thinking, communication, problem-solving, digital citizenship). Why is digital literacy important? Boosting one's digital skills. 3. Transfer of Learning Connections between different subjects – How knowledge gained in one area can be applied to others. <u>Suggested Activities(sample):</u> Intellectual Well-being. Provide worksheets to students for teaching them how to boost intellectual well-being. Ask the students to identify a long-standing problem in their locality, and come up with a solution and present it in the classroom. Also organize an event like 'Idea Expo' to display the designs, ideas, and suggestions, to motivate the students to improve their intellectual well-being.	
8	Environmental Well-being 1.The Importance of initiating a change in the environment. The session could be around: Defining Environmental well-being (physical, chemical, biological, social, and psychosocial factors) – People's behaviour, crime, pollution, political activities, infra-structure, family situation etc. Suggesting different ways of initiating changes in the environment (taking responsibility, creating awareness, volunteering,	

	approaching administration). <u>Suggested Activities (sample):</u> Providing worksheets to self-reflect on how the environment affects their life, and the ways to initiate a change. Dedicate a bulletin board or wall space (or chart work) in the classroom for students to share their ideas for improving environmental well-being. Creating a volunteers' club in the college and carrying out monthly activities like campus cleaning, awareness campaigns against noise pollution, (loud speakers in public places), addressing anti-social behaviour on the campus or in their locality.	
9	Mental Well-being 1. Importance of self-reflection Discuss: Steps involved in achieving mental well-being (self-reflection, self-awareness, applying actions, achieving mental well-being). Different ways to achieve mental well-being (finding purpose, coping with stress, moral compass, connecting for a common cause). The role of journaling in mental well-being. 2. Mindfulness and Meditation Practices Benefits of practicing mindful habits and meditation for overall well-being. 1. Connecting with nature Practising to be in the present moment – Nature walk, feeling the sun, listening to the natural sounds. Exploring with intention – Hiking, gardening to observe the nature. Reflecting on the emotions, and feeling kindled by nature. 2. Serving people Identifying the needs of others. Helping others. Volunteering your time, skills and listening ear. Finding joy in giving. 3. Creative Expressions	

	Indulging in writing poems, stories, music making/listening, creating visual arts to connect with inner selves. <u>Suggested Activities(Sample):</u> (Mindfulness and Meditation) – Conducting guided meditation every day for 10 minutes and directing the students to record the changes they observe.	
10	Situational Awareness (Developing Life skills) 1. Being street smart Discuss: Who are street smart? Why is it important to be street smart? Characteristics of a street smart person: Importance of acquiring life skills to become street smart – (General First-aid procedure, CPR Procedure, Handling emergency situations like fire, flood etc). 2. Digital Awareness Discuss: Cyber Security Information Literacy Digital Privacy Fraud Detection <u>Suggested Activities</u> (sample): (Street Smart) Inviting professionals to demonstrate the CPR Procedure Conducting a quiz on Emergency Numbers	
11	Understanding Addiction Plan this session around: Identifying the environmental cues, triggers that lead to picking up this habit. Knowing the impact of substance abuse – Adverse health conditions, social isolation, ruined future, hidden financial loss and damaging the family reputation. Seeking help to get out of this addiction. <u>Suggested Activities:</u>	

	Provide Worksheets to check the students' level of understanding about substance addiction and their impacts. Share case studies with students from real-life. Play/share awareness videos on addiction/de-addiction, experts talk. *Conduct awareness programmes on Drugs and its ill effects. (Arrange Experts from the concerned government departments and NGOs working in drug addiction issues) and maintain the documents of the program.	
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Closure:

Each student should submit a Handwritten Summary of their Learnings & Action Plan for the future.

Assessments:

- Use Self-reflective worksheets to assess their understanding.
- Submit the worksheets to internal audit/external audit.
- Every student's activities report should be documented and the same have to be assessed by the Physical Director with the mentor. The evaluation should be for 100 marks. No examination is required.

Scheme of Evaluation

Part	Description	Marks
A	Report	40
B	Attendance	20
C	Activities (Observation During Practice)	40
Total		100

References/Resource Materials:

The course acknowledges that individual needs for references and resources may vary. However, here are some general reference materials and resources that may be helpful:

1. The Well-Being Wheel:

2. Facilities & Spaces: Some activities may require access to specific facilities, resources or spaces. Students may need to coordinate with the college administration to reserve these as required.

3. Online Resources:

1. United Nations Sustainable Development Goals - Goal 3 - Good Health & Well-Being: <https://www.un.org/sustainabledevelopment/health/>
2. Mindfulness and Meditation: Stanford Health Library offers mindfulness and meditation resources: <https://healthlibrary.stanford.edu/books-resources/mindfulness-meditation.html>

3. Breaking Bad Habits: James Clear provides a guide on how to build good habits and break bad ones: <https://jamesclear.com/habits>
4. 6 Ways to Keep Your Brain Sharp
<https://www.lorman.com/blog/post/how-to-keep-your-brain-sharp>
5. What Is Social Wellbeing? 12+ Activities for Social Wellness
<https://positivepsychology.com/social-wellbeing/>
6. How Does Your Environment Affect Your Mental Health?
<https://www.verywellmind.com/how-your-environment-affects-your-mental-health-5093687>
7. How to say no to others (and why you shouldn't feel guilty)
<https://www.betterup.com/blog/how-to-say-no>

Allied Physics

Allied Subject II - Physics I (26UPH3A1)

Allied Subject II - Physics II (26UPH4A2)

ALLIED PHYSICS PAPER FOR B.Sc. MATHEMATICS / CHEMISTRY

Programme code: 03		For B.Sc. Mathematics and B.Sc. Chemistry			
Title of the Paper		Allied Subject II – Physics I			
Batch 2026-2027	Semester 3	Hours/Week 4	Total Hours 60	Credits 4	Skill Development

Course Objectives

To enable the learners

1. To know about mechanics, properties of matter and sound
2. To understand thermal physics
3. To know about light, electricity and electromagnetism

Course Outcomes (CO)

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

K1 - K5	CO1	Know about simple harmonic motion and projectile motion
	CO2	Understand moduli of elasticity and propagation of sound
	CO3	Acquire knowledge about thermal Physics
	CO4	Gain knowledge on optics
	CO5	Gain knowledge on current electricity and electromagnetism.

Syllabus**UNIT I****(12 Hours)****Mechanics**

Composition of two simple harmonic motions along a line and at right angles – Lissajou's figures, uniform circular motion - Acceleration of a particle in a circle - Centripetal and centrifugal forces - Banking on curved tracks. Projectile - Motion in a horizontal plane - Maximum height – Time of flight – Range – Path of a Projectile – Range and time of flight in a horizontal plane.

UNIT II**(12 Hours)****Elasticity and Sound**

Elasticity: Elastic constants – Bending of beams – Young's modulus by uniform and non-uniform bending – Energy stored in a stretched wire – Torsion in a wire – Determination of rigidity modulus – Torsional oscillation – Static torsion.

Sound: Interference of sound waves – Beats – Doppler Effect – Applications – Production of ultrasonics: Piezoelectric method – Applications.

UNIT III**(12 Hours)****Thermal Physics**

Specific heat of solids and liquids – Dulong and Petit law – Newton's law of cooling – Thermal conductivity – Lee's disc method – Variation of specific heat with temperature – Vander waal's equation of state – derivation of critical constants – Black body radiation – Stefan's law – Laws of thermodynamics – Change of entropy in reversible and irreversible processes.

UNIT IV**(12 Hours)****Optics**

Condition for interference – Young's double slit experiment – Interference due to transmitted light – Airy's disc – Newton's rings – Determination of refractive index of a liquid – Diffraction - Diffraction at a single slit – Transmission grating – Polarization – Production and analysis of circularly and elliptically polarized light – Optical activity – Specific rotation – **Half shade Polarimeter***.

UNIT V**Electricity and Electromagnetism**

Kirchhoff's laws – Wheatstone's network – Condition for balance – Carey Foster's bridge – measurement of resistance – Capacitor – Energy of a charged capacitor – Loss of energy due to sharing of charges - Electromagnetic induction - Faraday's laws – AC circuits : Mean – rms – Peak values – LCR in series and in parallel – Sharpness of resonance – Ballistic Galvanometer – Theory – Measurement of capacitance – Transformer and its applications.

*** denotes Self study**

Text Books:

- 1.R. Murugesan, (2018), Allied Physics - S.Chand & Co., New Delhi.
- 2.R. Murugesan, (2018), Modern Physics - S.Chand & Co., New Delhi.

Reference Books:

- 1.D.S.Mathur, (2018), Properties of Matter - Shyamlal Charitable Trust, New Delhi.
- 2.Brijlal and Subramaniam, (2004), Heat and thermodynamics - S. Chand & Co., New Delhi.
- 3.Brijlal and Subramaniam, (1997), Electricity and Magnetism - Rathan Prakasam, Mandir, India.

e-Resources:

1. https://www.youtube.com/watch?v=_psIWtPBHzA
2. https://www.youtube.com/watch?v=cQtFR0Qwm_E
3. <https://www.youtube.com/watch?v=2vm1WkXg4EY>
4. <https://www.youtube.com/watch?v=e2MArppYcM4&list=PLCvpYrhOPdiWKu734tjeevs2-O0B7MJ1g>
5. <https://www.youtube.com/watch?v=rtlJoXxlSFE&list=PLyQSN7X0ro2314mKyUiOILaOC2hk6Pc3j>

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	S	S	H
CO 2	H	S	H	H	S
CO 3	H	S	H	H	S
CO 4	S	S	H	S	H
CO 5	H	S	H	S	S

S- Strong

H-High

M-Medium

L – Low

ALLIED PHYSICS PAPER FOR B.Sc. MATHEMATICS / CHEMISTRY

Programme code: 03		For B.Sc. Mathematics and B.Sc. Chemistry			
Title of the Paper		Allied Subject II – Physics II			
Batch 2026-2027	Semester 4	Hours/Week 4	Total Hours 60	Credits 4	Skill Development

Course Objectives

To enable the learners

1. To know about atomic physics and concepts of relativity
2. To understand nuclear and quantum Physics
3. To know the basics of lasers, electronics and communication Physics

Course Outcomes (CO)

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

K1- K5	CO1	Understand atomic Physics and concepts of relativity
	CO2	Know about nuclear Physics
	CO3	Know about quantum Physics
	CO4	Acquire knowledge on laser Physics
	CO5	Understand electronics and communication Physics

Syllabus**UNIT I****(12 Hours)****Atomic Physics and Elements of Relativity**

Atom models: Sommerfeld atom model – Vector atom model – Periodic table – Pauli's exclusion principle – excitation and ionization potentials – Frank and Hertz method – Postulates of theory of relativity – Lorentz transformation equations – derivations – Length contraction – Time dilation – Mass- energy equivalence.

UNIT II**(12 Hours)****Nuclear Physics**

Classification of nuclei – General properties of nuclei – Characteristics of nuclear forces – Nuclear structure – Liquid drop model – Shell model – Particle accelerators – Betatron – Electron synchrotron – Artificial transmutations by α particles – Photon particles - Nuclear fission and fusion (Quantitative) Elementary particles – Mesons – Baryons – Leptons.

UNIT III**(12 Hours)****Quantum Physics**

Photoelectric effect - Laws of photoelectric effect – Millikan's experiment – Photoconductive and photovoltaic cells – **Photomultiplier ***– Applications of photocells – Production and properties of x rays x ray spectrum – Mosley's law – Compton effect – Relation for change in wavelength - x ray diffraction Bragg's law – Miller indices – Determination of h, k, l values of cubic crystals.

UNIT IV**(12 Hours)****Laser Physics**

Purity of spectral lines – Coherence length and time – Spontaneous and induced emissions – population inversion – Meta stable state – Conditions for laser action – Ruby laser – He-Ne lasers – Applications of lasers – Raman effect – Raman shift – Stokes and antistokes lines – Laser Raman Spectrometer.

UNIT V**Electronics and Communication Physics**

Characteristics of PN junction diode – Zener diode – Uses of Zener diode - Principles of LED and LCD - Number systems: Conversion of Binary into Decimal – Decimal into Binary – Binary addition – Subtraction – Basic logic gates – Boolean algebra – De Morgan's theorems – Modulation: AM and FM – Basic principles of antenna and RADAR.

* denotes Self study

Text Books:

1. R. Murugesan, (2018), Allied Physics - S.Chand & Co., New Delhi.
2. R. Murugesan, (2018), Modern Physics - S.Chand & Co., New Delhi.

Reference Books:

1. B.L.Theraja, (2006), Basic Electronics - S.Chand & Co., New Delhi.
2. V.K.Mehta, (2014), Principles of Electronics - S.Chand & Co., New Delhi.

e-Resources:

1. https://www.bhattadevuniversity.ac.in/docs/studyMaterial/UpakulMahanta_Physics_6thSem_NuclearPhysics.pdf
2. <https://physics.info/photoelectric/>
3. <https://slideplayer.com/slide/5789401/>
4. <https://www.slideshare.net/HebaRageh/laser-physics-lect1-1>
5. <https://nith.ac.in/upload/phyece.pdf>

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	S	S	H
CO 2	H	S	H	H	S
CO 3	H	S	H	H	S
CO 4	S	S	H	S	H
CO 5	H	S	H	S	S

S- Strong

H-High

M-Medium

L – Low

ALLIED PHYSICS PRACTICALS FOR B.Sc. MATHEMATICS / CHEMISTRY

Programme code: 03		For B.Sc. Mathematics and B.Sc. Chemistry			
Title of the Paper		Allied Physics Practical			
Batch 2026-2027	Semester 3 & 4	Hours/Week 3	Total Hours 90	Credits 2	Skill Development

Course Objectives

To enable the learners to:

1. Understand Physical phenomena and fundamentals of general Physics.
2. Perform experiments in Physics and understanding the results.
3. Interpret the experimental results to support the theory

Course Outcomes (CO)

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

K3 - K5	CO1	Provide hands-on experiences in conducting laboratory experiments.
	CO2	Analyze relationship between theory and experimental results.
	CO3	Conduct experimental investigations on mechanical and heat and optical Physics.
	CO4	Conduct experimental investigations on optics, electricity and electronics
	CO5	Practice record keeping of experimental work

List of Experiments (Any fifteen)

1. Determination of Young's Modulus – Uniform bending – Optic lever
2. Determination of Young's modulus – Cantilever – Static method
3. Determination of Rigidity Modulus – Static torsion
4. Determination of moment of inertia and rigidity modulus - Torsional pendulum
5. Determination of acceleration due to gravity – Compound pendulum
6. Measurement of terminal velocity of falling balls - Stokes method
7. Determination of thermal conductivity – Lee's disc
8. Determination of refractive index of a solid prism - Spectrometer
9. Determination of wavelength - Minimum deviation method – Grating - Spectrometer
10. Determination of radius of curvature of lens - Newton's ring
11. Calibration of low range voltmeter - Potentiometer
12. Calibration of low range ammeter – Potentiometer
13. Determination of specific resistance - Potentiometer
14. Determination of Moment of a magnet – Tan C position
15. Determination of AC frequency - Sonometer

16. Determination of frequency of a tuning fork– Melde's method
17. Characteristics of PN Junction diode
18. Characteristics of Zener diode
19. Verification of the truth tables of OR, AND, NOR, NOT, NAND gates using IC'S
20. Verification of De Morgan's theorems.

e-Resources:

1. <https://www.learncbse.in/to-find-the-frequency-of-the-ac-mains-with-a-sonometer/>
2. <https://www.youtube.com/watch?v=oRch7irmLvo>
3. <https://www.youtube.com/watch?v=DD5woC4ZYAQ>

Mapping

CO	PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1		S	H	H	H	S
CO 2		H	S	H	H	S
CO 3		S	H	H	S	H
CO 4		H	S	H	S	H
CO 5		H	S	H	S	S

S- Strong

H-High

M-Medium

L – Low

Add on Courses

1. Job Oriented Course
2. Advanced Learners Course

Programme Code: 03		B.Sc. Physics			
Title of the Paper		JOC - Electrical Appliances: Maintenance and Servicing			
Batch 2026-2027	Semester 3 / 5	Hours/Week 2	Total Hours 30	Extra Credits 2	Employability

Course Objectives

To study about

1. Fundamentals of electricity, electrical connections and wiring
2. Heating and motorized appliances
3. Refrigerator, air cooler and air conditioner appliances

Course Outcomes (CO)

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

K1- K5	CO1	Understand the fundamentals of electricity
	CO2	apply the fundamentals of electrical connections and wiring
	CO3	Know about heating appliances
	CO4	Apply motorized appliances
	CO5	Know about refrigerator, air cooler and air conditioner appliances

Syllabus**UNIT I****(6 Hours)****Fundamentals of electricity**

Electrical charge – current – potential – Ohm's law – electrical energy – power – consumption of electrical power – resistance – capacitance – inductance – Meters: Galvanometer, ammeter, voltmeter and Megger - Measuring and Checking: Basics and usage of Multimeter - Checking transistors and diodes in circuit measurements.

Unit II**(6 Hours)****Electrical connections and wiring**

Soldering station: Soldering Iron – Flux – lead - Zero defect soldering – Desoldering pump - AC and DC – single phase and three phase connections. Switches – ceiling rose – lamp holders, sockets – Fuse base – Distribution box – Miniature Circuit Breaker (MCB) – Electromagnetic relays - Earthing Process - Electrical Wiring – Main board preparation – Distribution – Cut-out preparation – Switch board preparation – Safety precautions.

Unit III**(6 Hours)****Heating appliances**

Heater types – working principle – Heating Rod – Iron Box – Iron box with steamer – Toasters – Geysers – Microwave Oven: Oven disassembling and assembling procedure – Fault indicator – Testing and troubleshooting methods.

Unit IV**(6 Hours)****Motorized appliances**

Types of Motors: DC and AC motors – fans – mixers – blenders – wet grinders: circuit connection - testing methods - Washing machine: Electrical connections – assembly – Dish washer : Electrical connection – Testing and troubleshooting methods.

Unit V**(6 Hours)****Refrigerator and Air conditioner appliances**

Refrigerator: Electrical connection – Compressor – coolants – automatic defrost circuits – Testing and troubleshooting of refrigerators – Air coolers and Air conditioners: Mounting and fixing of air conditioners – testing and troubleshooting methods.

Text Books:

1. B.L.Theraja, A.K.Theraja, (2006), A Textbook of Electrical Technology - S.Chand & Co., New Delhi.
2. J.B.Gupta, (2013), An Integrated Course in Electrical Engineering - S.K.Kataria & Sons, New Delhi.

Reference Books:

1. Eric Kleinert, (2012), Troubleshooting and Repairing Major Appliances - Mc Graw Hill, India.
2. H.Partas, (2017), Arts And Science of Utilization of Electrical Energy - Dhanpat Rai & Sons, New Delhi.

e-Resources :

1. <https://openstax.org/details/books/physics-2e>
2. <https://www.scribd.com/search?query=Electrical+Technology+B.L.+Theraja>
3. <https://www.hvacrschool.com>

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	S	S	H
CO 2	H	S	S	S	S
CO 3	S	S	S	H	S
CO 4	S	H	S	S	S
CO 5	H	S	S	S	H

S- Strong**H-High****M-Medium****L - Low**

Programme Code: 03		B.Sc. Physics			
Title of the Paper		ALC - Measurement techniques and Data analysis			
Batch 2026-2027	Semester -	Hours/Week -	Total Hours -	Extra Credits 2	Entrepreneurship

Course Objectives

To study about

1. Basic concept of measurement & transducers
2. Measurement of error and standards of measurements
3. Electronic and vibration measuring instruments

Course Outcomes (CO)

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

K1 - K5	CO1	Understand the basic concept of measurement & transducers
	CO2	Know about measurement of error
	CO3	Gain idea on standards of measurements
	CO4	Know about electronic measuring instruments
	CO5	Know about vibration measuring instruments

Syllabus**Unit I****(6 Hours)****Basic concept of measurement & transducers**

Introduction - System configuration – Problem Analysis – Basic Characteristics of measuring devices, Calibration - Transducers: capacitive, transducer - Photoelectric effect – Photoconductive Transducers - Piezoelectric transducers - temperature and pressure transducers.

Unit II**(6 Hours)****Measurement of errors**

Accuracy, precision, Significant Figures - types of errors - Statistical Analysis - Probability of errors - limiting error

Unit III**(6 Hours)****Standards of measurements**

Classification of standards - Standards for Mass, Length and Volume - time and frequency standards, electrical standards, standards of temperature and luminous intensity.

Unit IV**(6 Hours)****Electronic Measuring Instruments**

Q meter - Vector impedance meter - Digital frequency meter – Digital voltmeter – Phase meter - RF power and voltage measurement – Power factor meter – Vector voltmeter.

Unit V**(6 Hours)****Vibration measuring instruments**

Random vibration – Shock – analyzing vibration sensing devices – generalized second order system – Absolute displacement – Absolute velocity and acceleration vibrating sensing devices - Banded strain gauge accelerators – Piezoelectric accelerometer.

Text Books:

1. Hefrick. A.O, Cooper, (2019), Modern Electronic Instrumentation and Measurement Techniques Prentice Hall India, New Delhi.
2. C.S. Rangan, G.R. Sharma, (1997), Instrumentation Devices and Systems - Tata McGraw Hill

Reference Books:

1. WD. Cooper, (2015), Electronic Instrumentation and Measurement Techniques – Prentice Hall India, New Delhi.
2. William Bolton, (1996), Measurement and Instrumentation Systems – Newnes Books, UK.

e – Resources :

1. https://www.youtube.com/results?search_query=sensors+and+transducers+ekeeda
2. https://www.youtube.com/results?search_query=piezoelectric+transducer+working
3. https://www.youtube.com/watch?v=uZ0ILIG_17w
4. <https://www.khanacademy.org/math/arithmetic-home/arith-review-decimals/arithmetic-significant-figures-tutorial/v/significant-figures>
5. https://www.youtube.com/results?search_query=electronic+measuring+instruments+digital+voltmeter+frequency+meter

Mapping

CO PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	S	S	H
CO 2	H	S	S	S	S
CO 3	S	S	S	H	S
CO 4	S	H	S	S	S
CO 5	H	S	S	S	H
S- Strong	H-High		M-Medium		L - Low

KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
COIMBATORE - 641029



Certificate Course
Certificate Course in Astronomy and Astrophysics

DEPARTMENT OF PHYSICS
CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)
(2026-2027)

Certificate Course in Astronomy and Astrophysics

Scheme of Curriculum

Duration: 6 months

Sub. Code	Subject	Instr. Hours /week	Internal	External	Max marks	Exam. Hours.	Credits
26CAA101	Theory - Astronomy and Astrophysics	2	25	75	100	3	2
26CAA102	Practicals on Astronomy and Astrophysics	2	25	75	100	3	2
26CAA1Z1	Project and Viva-voce	-	100	-	100	3	2
Total Marks					300		6

Question Paper Pattern

Theory Examination

External Max. Marks: 75

Section - A ($10 \times 1 = 10$ Marks)
Multiple Choice (2 Questions from Each Unit)

Section -B ($5 \times 5 = 25$ Marks)
Either or type (1 Question from Each Unit)

Section - C ($5 \times 8 = 40$ Marks)
Either or type (1 Question from Each Unit)

Project and viva-voce:	Max. Marks: 100
Project Report	75 Marks
Viva-voce	25 Marks

Programme Code: 03		B.Sc. Physics			
Title of the Paper		Astronomy and Astrophysics			
Batch 2026-2027	Semester Odd	Hours/Week 2	Total Hours 30	Credits 2	Skill Development

Course Objectives

To enable the learners

1. To know about the telescopes used in Astronomy
2. To know about the Solar system and the earth
3. To know about the different stars and its activity

Course Outcomes (CO)

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

K1 - K5	CO1	Understand the nature of Universe
	CO2	Gain knowledge on Starry sky
	CO3	Acquire knowledge on Telescopes
	CO4	Acquire knowledge on The Solar system
	CO5	Understand the nature of The Sun and its activity

Syllabus

Unit 1: Understanding the Universe

(6 Hours)

The Universe: The Big bang - The first Stars – The first galaxies, The naked eye sky: The Constellations – Our Galactic neighbours – The Galaxy we live in, The Planets – Formation of Planets, Star: Star's born and stellar death - Evaluation of supergiant star, Observing Stars: Brightness and colour -The Hertzsprung-Russell Diagram – Binary and Multiple Stars – Variable Stars, Nebulae: Types of Nebulae, Star Clusters: Open clusters – Globular clusters – Observing star clusters and notable star clusters, Galaxies: Types of galaxies – Type of galaxies – Active galaxies – Observing galaxies. Dividing light – Observing other wavelengths.

Unit 2: Understanding the starry sky

(6 Hours)

Stargazer's view, Constellations, Circumpolar Constellations, How to use the Star Maps, How to Identify Constellations, Star names, Location on earth, Celestial Coordinates, Location on the Celestial Sphere, Local Reference Lines, Celestial Meridian, Latitude and Stargazing, Apparent Daily Motion of the Stars, Apparent Annual Motion of the Stars, The Ecliptic, Apparent Annual Motion of the Sun, Earth's Seasons, Equinoxes and Solstices, The Day, Precession.

Unit 3: Telescope

(6 Hours)

Binocular, Telescope Optics: Light-gathering ability - the parts of a telescope - Focal length and ratio, Optics and magnification, Eyepieces, Telescopes and Mounts: Types of telescopes (Reflector, Refractor, Catadioptric) - Altitude-azimuth (alt-az) mount - Equatorial mount, Astro imaging, Telescope Aberrations, Telescope Design and Selection, Telescope Enhancements, Radio Astronomy, Radio Telescope, Infrared Astronomy, Ultraviolet, X-ray and Gamma-ray astronomy. Telescope Optics,

Unit 4: The Solar system**(6 Hours)**

View of the Solar System: Planets in orbit – The Path of the Planets, Observing the Planets: Relative Motion – Retrograde Motion, Mercury and Venus, Mars, Jupiter, Saturn, Uranus and Neptune, Dwarf Planets and Asteroids, The Sun, The Moon, Comets and Meteors

Unit 5: The Sun

Sun and Earth, Distances and Size, Makeup, The Sun's Structure, Rotation, Observations, Seething Surface, Sunspots, Activity Cycles, Magnetism, Flares and Coronal Mass Ejections, How Solar eruptions affect earth, Solar Wind, Probing the Interior.

*** denotes Self Study**

TEXT BOOKS:

1. Stargazing for Beginners Explore the Wonders of the Night Sky, (2020), Will Gater and Anton Vamplew, 3rd Edition, Penguin Random House Company, UK. (Unit 1, 3 and 4)
2. Astronomy - A Self Teaching Guide (2009), Dinah L. Moche, John Wiley & Sons, Inc. Seventh Edition. (Unit 2, 3 and 5)

REFERENCE BOOKS:

1. An introduction to Astrophysics, Baidyanath Basu, Tanuka Chattopadhyay, Sudhindra Nath Biswas, (2010), Second Edition, PHI Learning Private Limited, New Delhi
2. An Introduction to Modern Astrophysics, (2014), Bradley W. Carroll Dale A. Ostlie, Second Edition, Pearson Education Limited.

e-Resources :

1. <https://www.youtube.com/@NASA>
2. <https://www.youtube.com/@ESA>
3. <https://www.youtube.com/@NASASun>
4. <https://www.youtube.com/@NASAheliophysics>
5. <https://www.youtube.com/playlist?list=PL8dPuuaLjXtPAJr1ysd5yGIyiSFuh0mIL>

Mapping

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	S	H	H
CO 2	H	S	H	S	S
CO 3	S	S	H	H	S
CO 4	H	H	S	S	S
CO 5	H	S	H	S	H

S- Strong**H-High****M-Medium****L - Low**

Programme Code: 03		B.Sc. Physics			
Title of the Paper		Practicals on Astronomy and Astrophysics			
Batch 2026-2027	Semester Odd	Hours/Week 2	Total Hours 30	Credits 2	Skill Development

Course Objectives

To enable the learners

1. To know about the telescopes used in Astronomy
2. To know about the Solar system and the earth
3. To know about the astrophotography

Course Outcomes (CO)

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

K1 - K5	CO1	Understand the working of telescopes
	CO2	Gain knowledge on Solar activity
	CO3	Acquire knowledge on The Sun spots and Sun flare
	CO4	Acquire knowledge on many celestial bodies
	CO5	Gain knowledge on different stars and planets

List of Experiments
(Any ten)

1. Telescope Handling: Assembling, aligning (polar alignment),
2. Operating automated (GoTo) telescopes and imaging techniques.
3. Stellarium (software), star maps, binoculars, and various telescopes.
4. Constellation Mapping: Identifying constellations and navigating the night sky using star charts.
5. Solar Observation: Using solar filters to observe sunspots.
6. Solar Observation: Using solar filters to observe solar prominences.
7. Lunar Features: Mapping craters, maria, and mountain ranges on the Moon.
8. Planetary Motion: Observing Jupiter's moons (Galilean moons).
9. Planetary Motion: Observing Saturn's rings.
10. Planetary Motion: Observing phases of Venus.
11. Spectral Analysis: Analyzing stellar spectra to determine chemical composition and temperature.
12. Observing Double Stars and binary stars.
13. Deep Sky Observation: Using averted vision and filters to view Andromeda Galaxy.
14. Deep Sky Observation: Using averted vision and filters to view Orion Nebula.
15. Sundial Construction: Building horizontal/equatorial sundials to understand solar time.
16. Light Pollution Evaluation: Measuring local sky brightness and determining limiting magnitude.

e-Resources :

1. <https://www.youtube.com/watch?v=plx6XXDgf2E>
2. <https://www.celestron.com/pages/manuals>
3. <https://skyandtelescope.org/observing/star-charts/>
4. <https://www.youtube.com/watch?v=V2mM9f6WiEk>
5. <https://www.youtube.com/watch?v=G6h0vM7n5oQ>

Mapping

CO	PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
	CO 1	S	H	S	H	H
	CO 2	H	S	H	S	S
	CO 3	S	S	H	H	S
	CO 4	H	H	S	S	S
	CO 5	H	S	H	S	H
S- Strong		H-High		M-Medium		L - Low

Programme Code: 03		B.Sc. Physics			
Title of the Paper		Project and Viva Voce			
Batch 2026-2027	Semester Odd	Hours/Week -	Total Hours -	Credits 2	Skill Development

Course Objectives

To enable the learners

1. To know about the telescopes used in Astronomy
2. To know about the Solar system and the earth
3. To know about the astrophotography

Course Outcomes (CO)

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

K1 – K5	CO1	Construct working models
	CO2	Gain expertise to present their ideas systematically through PPT
	CO3	Get familiarized to develop a report on the project work
	CO4	Accomplish the result accumulation and data graphing
	CO5	Gain knowledge on different stars and planets

Marks Distribution

Particulars	Marks
Project Report Presentation	75
Viva Voce	25
Total Marks	100

Mapping

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	H	H	H	H
CO 2	H	S	S	S	S
CO 3	H	H	S	S	H
CO 4	S	H	H	H	S
CO 5	H	S	H	S	H

S- Strong

H-High

M-Medium

L – Low

* Projects report and Viva-voce will be evaluated by Internal examiners.

