GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES(A)
DEPARTMENT OF PHYSICS
I B.Sc. Honours MAJOR (PHYSICS)
W.E.F. AY 2023-24
COURSE STRUCTURE (SEMESTER-I)

Course	Total Marks	Mid. Sem.	Sem. End		Teaching Hours Per Week	Credits
LANGUAGES, MULTI DISCIPLINARY AND SKILL ENHANCEMENT COURSES (COMMON FOR ALL)						
1. First Language: Telugu/ Hindi/ Sanskrit	100	40	60		4	3
2. Second Language: English	100	40	60		4	3
3. Multi Disny-1: Indian History	50	---	50		2	2
4. Skill Enhancement Course -1 Communication Skills	50	--	50		2	2
5. Skill Enhancement Course -2 Analytical Skills	50	-	50		2	2
TOTAL	350	80	270		14	12
PART II - CORE SUBJECTS MAJOR and MINOR						
B.Sc.						
1. MAJOR-1 Course-1 (i) Essentials and Applications of Mathematical, Physical and Chemical Sciences.	100	40 (Mid + Activities) (20+20)	60		3	3
Lab / Practical/ Activities	-	-	-		2	1
2. MAJOR-2 Course-2 (i) Advances in Mathematical, Physical and Chemical Sciences.	100	40 (Mid + Activities) (20+20)	60		3	3
Lab / Practical/ Activities	-	-	-		2	1
TOTAL	200	80	120		10	8
GRAND TOTAL	550	160	390		24	20

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COURSE STRUCTURE (SEMESTER-II)

Course	Total Marks	Mid. Sem.	Sem. End	Teaching Hours Per Week	Credits
LANGUAGES, MULTI DISCIPLINARY AND SKILL ENHANCEMENT COURSES (COMMON FOR ALL)					
1. First Language: Telugu/ Hindi/ Sanskrit	100	40	60	4	3
2. Second Language: English	100	40	60	4	3
3. Skill Enhancement Solar Energy	50	--	50	2	2
4. Skill Enhancement Business Writing	50	-	50	2	2
5. Multidisciplinary Indian History	50	-	50	2	2
TOTAL	350	80	270	14	12
PART II - CORE SUBJECTS MAJOR and MINOR					
B.Sc.					
6. MAJOR- Course-3 Mechanics and Properties of Matter	100	40	60	3	3
Lab / Practical:	50	25	25	2	1
7. MAJOR Course-4 Waves and Oscillations	100	40	60	3	3
Lab/Practical::	50	25	25	2	1
8. MINOR Course-1 Mechanics and Properties of Matter	100	40	60	3	3
Lab/Practical:	50	25	25	2	1
TOTAL	450	195	255	15	12
GRAND TOTAL	750	180	470	29	24

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DEPARTMENT OF PHYSICS
BLUE PRINT FOR MAJOR SUBJECTS

SECTION-A **5X2=10**			
I	**UNIT**	**MARKS**	**CO'S**
1	UNIT-1	2	CO-1
2	UNIT-2	2	CO-2
3	UNIT-3	2	CO-3
4	UNIT-4	2	CO-4
5	UNIT-5	2	CO-5
II **SECTION-B** **5X10=50**			
6 A or B	UNIT-1	10	CO-1
7 A or B	UNIT-2	10	CO-2
8 A or B	UNIT-3	10	CO-3
9 A or B	UNIT-4	10	CO-4
10 A or B	UNIT-5	10	CO-5

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES(A)DEPARTMENT OF PHYSICS
B.Sc., Honours in PHYSICS MAJOR(THEORY)
Syllabus w.e.f 2023-24 Admitted Batch

SEMESTER	COURSE	TITLE	CREDITS	HOURS	MARKS
II	**3**	MECHANICS AND PROPERTIES OF MATTER	**3**	**4**	**100**

Course Objective:

The course on Mechanics and Properties of Matter aims to provide students with a fundamental understanding of the behavior of physical systems, both in terms of mechanical motion and in terms of the properties of matter

Course Outcomes

Upon successful completion of the course, a student will be able to:

1. understand and apply the concepts of scalar and vector fields, calculate the gradient of a scalar field, determine the divergence and curl of a vector field.
2. Apply the laws of motion, solve equations of motion for variable mass systems
3. Define a rigid body and comprehend rotational kinematic relations
4. Define and understand the characteristicsand conservative nature of central forces, derive equations of motion under central forces.
5. Able to differentiate between Galilean relativity and the concept of absolute frames, comprehend the postulates of the special theory of relativity

UNIT-I VECTOR ANALYSIS 9hrs

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation. Vector integration (line, surface and volume), Statement and proof of Gauss and Stokes theorems.

UNIT-II MECHANICS OF PARTICLES 9hrs

Laws of motion, motion of variable mass system, Equation of motion of a rocket. Conservation of energy and momentum, Collisions in two and three dimensions, Concept of impact parameter, scatteringcross-section, Rutherford scattering-derivation.

UNIT-III MECHANICS OF RIGID BODIES AND CONTINUOUS MEDIA 9hrs

Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, Precession of a top, Gyroscope, Precession of the equinoxes. Elastic constants of isotropic solids and their relations, Poisson's ratio and expression for Poisson's ratio. Classification of beams, types ofbending, point load, distributed load.

UNIT-IV CENTRAL FORCES 9hrs

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, conservative force as a negative gradient of potential energy, equations of motion under a . Derivation of Kepler’s laws. Motion of satellites

UNIT-V SPECIAL THEORY OF RELATIVITY 9hrs

Galilean relativity, Absolute frames. Michelson-Morley experiment, The negative result. Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation.

REFERENCE BOOKS: 1. BSc Physics -Telugu Akademy, Hyderabad
2. Mechanics - D.S. Mathur, Sulthan Chand & Co, New Delhi
3. Mechanics - J.C. Upadhyaya, Ramprasad & Co., Agra
4. Properties of Matter - D.S. Mathur, S.Chand & Co, New Delhi ,11th Edn., 2000
5. Physics Vol. I - Resnick-Halliday-Krane ,Wiley, 2001
6. Properties of Matter – Brijlal & Subrmanyam, S. Chand &Co. 1982
7. Dynamics of Particles and Rigid bodies– Anil Rao, Cambridge Univ Press, 2006
8. Mechanics-EM Purcell, Mc Graw Hill 9. University Physics-FW Sears, MW Zemansky & HD Young, Narosa Publications, Delhi 10. College Physics-I. T. Bhima sankaram and G. Prasad. Himalaya Publishing House.
11. Mechanics, S. G. Venkata chalapathy, Margham Publication, 2003

PRACTICAL COURSE 3: MECHANICS AND PROPERTIES OF MATTER

Hours: 30 **Credits:1** **2hrs/week**

COURSE OBJECTIVE:

To develop practical skills in the use of laboratory equipment and experimental techniques for measuringproperties of matter and analyzing mechanical systems.

LEARNING OUTCOMES:

1. Mastery of experimental techniques: Students should become proficient in using laboratory equipment and experimental techniques to measure properties of matter and analyze mechanicalsystems.
2. Application of theory to practice: Students should be able to apply theoretical concepts learned inlectures to real-world situations, and understand the limitations of theoretical models.
3. Accurate recording and analysis of data: Students should be able to accurately record and analyze experimental data, including understanding the significance of error analysis and statistical methods.
4. Critical thinking and problem solving: Students should be able to identify sources of error, troubleshoot experimental problems, and develop critical thinking skills in experimental design andanalysis.
5. Understanding of physical principles: Students should develop an understanding of the physical principles governing mechanical systems and the properties of matter, including elasticity, viscosity,and thermal expansion.

Minimum of 6 experiments to be done and recorded

1. Viscosity of liquid by the flow method (Poiseuille's method)
2. Young's modulus of the material of a bar (scale) by uniform bending
3. Young's modulus of the material a bar (scale) by non- uniform bending
4. Surface tension of a liquid by capillary rise method
5. Determination of radius of capillary tube by Hg thread method
6. Viscosity of liquid by Searle's viscometer method
7. Bifilar suspension –moment of inertia of a regular rectangular body.
8. Determination of moment of inertia using Fly-wheel
9. Determination of the height of a building using a sextant.
10. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)

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COURSE 4: WAVES AND OSCILLATIONS

Hours: 45 **Credits: 3** **3hrs/week**

SEMESTER	COURSE	TITLE	CREDITS	HOURS	MARKS
II	4	WAVES AND OSCILLATIONS	3	4	100

COURSE OBJECTIVE:

This course provides students with a broad understanding of the physical principles of the oscillations, to help themdevelop critical thinking and quantitative reasoning skills, to empower them to think creatively and critically about scientific problems and experiments.

LEARNING OUTCOMES:

The student should be able

1. To describe the basic characteristics of waves such as frequency, wavelength, amplitude, period,and speed.
2. To utilize mathematical relationships related to wave characteristics.
3. To compare particle motion and wave motion in different types of waves.
4. To distinguish between Longitudinal and Transverse waves.
5. To get the knowledge about how to construct and analysis the square waves, saw tooth waves,etc. from Fourier analysis

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UNIT-I Simple Harmonic oscillations 9hrs

Simple harmonic oscillator and solution of the differential equation-Physical characteristics of SHM, torsion pendulum-measurements of rigidity modulus, compound pendulum- measurement of ‘g’, Principle of superposition, beats, combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies. Lissajous figures.

UNIT-II Damped and forced oscillations 9hrs

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with un-damped harmonic oscillator, logarithmic decrement, relaxationtime, quality factor, differential equation of forced oscillator and its solution, amplitude resonance and velocity resonance.

UNIT-III Complex vibrations 9hrs

Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave, triangular wave, saw tooth wave, simple problems on evolution of Fourier coefficients.

UNIT-IV Vibrating Strings and Bars **9hrs**

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones and harmonics. Energy transport and transverse impedance. Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends (ii) bar fixed at the midpoint (iii) bar fixed at one end. Tuning fork.

UNIT-V Ultrasonics: **9hrs**

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magneto strictive methods, detection of ultrasonics, determination of wavelength of ultrasonic waves.Applications and uses of ultrasonic waves.

REFERENCE BOOKS:

1. BSc Physics Vol.1, Telugu Academy, Hyderabad.
2. Fundamentals of Physics. Halliday/Resnick/Walker, Wiley India Edition 2007.
3. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy,Orient Longman.
4. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
5. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004
   Introduction to Physics for Scientists and Eng.

PHYSICS EXPERIMENTS

Minimum of 6 experiments to be done and recorded

1. Volume resonator experiment
2. Determination of ‘g’ by compound/bar pendulum
3. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean bystatistical analysis
4. Determination of the force constant of a spring by static and dynamic method.
5. Determination of the elastic constants of the material of a flat spiral spring.
6. Coupled oscillators
7. Verification of laws of vibrations of stretched string –sonometer
8. Determination of frequency of a bar –Melde’s experiment.
9. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant anddamping correction of the amplitude.
10. Formation of Lissajous figures using CRO.

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DEPARTMENT OF PHYSICS

B.Sc., Honours in PHYSICS MAJOR COURSE

BLUE PRINT FOR MAJOR SUBJECTS

SECTION-A **5X2=10**			
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10 A or B	UNIT-5	10	CO-5