RAYALASEEMA UNIVERSITY, KURNOOL

ANDHRA PRADESH

B.Sc., Physics Syllabus

Semesters - I (wef 2022-23)

B.O.S OF PHYSICS

Physics Board of Studies

S.No	Name & Designation of Person	Mobile No.	Chairman/ Member
1.	**Dr. D. Ramakrishna Reddy** **Principal** **GTRM Govt. Degree College,** **Yerraguntla, Nandyal District**	**9347291971**	Chairman
2.	**Sri Y. Gishnu Nag Vijay** **Lecturer in Physics** **PSC & KVSC Govt. College, Nandyal,** **Nandyal District**	**9395122131**	Member
3.	**Smt. R. Shashikala** **Lecturer in Physics** **PSC & KVSC Govt. College, Nandyal,** **Nandyal District**	**9618488128**	Member

Minutes of Meeting

The following resolutions made in the meeting of Physics BOS held on 29.09.2022

1. It is resolved to follow the Common core syllabus of APSCHE for B.Sc. Physics for the Semesters I, II, III, IV & V w.e.f from 2020-21 Academic year
2. The members of the board of studies Committee thoroughly discussed the syllabi proposed by APSCHE in its Model curriculum and accordingly framed syllabi of B.Sc. Physics.
3. It is Resolved to implement Choice Based Credit System **(CBCS) f**rom 2020-21 for three year B.Sc. Physics Course.

RAYALASEEMA UNIVERSITY, KURNOOL

B.Sc. PHYSICS SYLLABUS UNDER CBCS

[For Mathematics combinations]

w.e.f. 2022-23(Revised in October 2022)

First Semester
Course I: Mechanics, Waves and Oscillations
Practical Course I (Lab-1)

Second Semester
Course II: Wave Optics
Practical Course II (Lab-2)

Third Semester
Course III: Heat and Thermodynamics
Practical Course III (Lab-3)

Fourth Semester
Course IV: Electricity, Magnetism and Electronics
Practical Course IV (Lab- 4)

Course V:Modern Physics
Practical Course V (Lab-V)

B.Sc. PHYSICS COURSE STRUCTURE UNDER CBCS

Year	***Semester***	***Course***	***Title of the Course***	***Marks***	***No.of.Hrs /Week***	***No.of Credits***
I	I	I	Mechanics, Waves and Oscillations	100	4	03
			Practical Course- I	50	2	02
	II	II	Wave Optics	100	4	03
			Practical Course – II	50	2	02
II	III	III	Heat and Thermodynamics	100	4	03
			Practical Course – III	50	2	02
	IV	IV	Electricity, Magnetism and Electronics	100	4	03
			Practical Course – IV	50	2	02
		V	Modern Physics	100	4	03
			Practical Course –V	50	2	02
Total No. of Courses : **05 (Five)**						

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CBCS w.e.f 2022-2023

B. Sc. Physics – Scheme of Instruction – 2022-23.

A - Theory

Semester	Paper	Teaching Hours/ week	Total Hours	Total Marks	University Exam	Internal Exam	Credits
I	I	4	60	**100**	75	25	**03**
II	II	4	60	**100**	75	25	**03**
III	III	4	60	**100**	75	25	**03**
IV	IV	4	60	**100**	75	25	**03**
	V	4	60	**100**	75	25	**03**

B-Internal Assessment Examination(IAE)

MID-I	MID-II	Average of Tests I & II A	Assignment B	Seminar/ Any Other Co-curricular Activity C	TOTAL Marks (A+B+C)
15	15	15	05	05	**25**

C - Practical

Semester	Practical Course	Hours/ week	Total Hours	Total Marks	Credits
I	I: Mechanics, Waves and Oscillations	2	30	**50**	**02**
II	II: Wave Optics	2	30	**50**	**02**
III	III: Heat and Thermodynamics	2	30	**50**	**02**
IV	IV: Electricity, Magnetism and Electronics	2	30	**50**	**02**
	V: Modern Physics	2	30	**50**	**02**

Question Paper Pattern

Semester End Examinations

The Pattern of Question Paper for Semester End Examination for B.Sc. Physics is as follows:

The Semester End Examination is for 75 Marks. The time duration is 3 Hours.

Section. A: 25 Marks

I. Multiple choice Questions - 10 TWO from each unit. Each carries one mark. Total 10Marks.

II. Fill in the Blanks - 5 ONE from each unit. Each carries one mark. Total 5 Marks

III. Short answer questions - 5 One from each unit. Each carries two marks. Total 10 Marks.

Section. B: Essay type Questions: One Question from each unit with Internal choice. Each carries 10 marks. 5x10M = 50 Marks

Internal Assessment Examinations

Pattern Of Internal Assessment Examination for B.Sc. Physics is as follows:

The **Internal Assessment** is for **25** marks. The Internal Assessment consists of two Midterm theory examination for **15** marks with1 Hour duration.

5 marks for **Assignment** and **5** marks for **Seminar / Project Work /Field Trip / Any other Co-curricular activity**

Average of Two Midterms is taken for Final Evaluation: In each course / paper two internal theory examinations for 15 marks are to be conducted per semester and the average oftwo examinations should be taken for final evaluation for 15 marks.

Practical Examinations

Scheme of valuation for Practical Examination

External Practical Examination	50 Marks
Formula and explanation of symbols, Tabular forms with circuit diagram(wherever necessary)	10 Marks
Observations	10 Marks
Calculation and graph	10 Marks
Result with Units	05 Marks
Viva-voce	05 Marks
Practical Record	10 Marks

RAYALASEEMA UNIVERSITY, KURNOOL

B.Sc. PHYSICS SYLLABUS UNDER CBCS

For Mathematics Combinations

[2022-23 Batch onwards]

I Year B.Sc.-Physics: I Semester

Course I: MECHANICS, WAVES AND OSCILLATIONS

Work load:60 hrs per semester **4 hrs/week**

Course outcomes:

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

CO1*: Understand Newton's laws of motion and motion of variable mass system and its application to rocket motion and the concepts of impact parameter, scattering cross section.*

CO2*: Apply the rotational kinematic relations, the principle and working of gyroscope and it applications and the precessional motion of a freely rotating symmetric top.*

CO3*: Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.*

CO4*: Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.*

CO5*: Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.*

CO6*: Appreciate the formulation of the problem of coupled oscillations*

CO7*: Figure out the formation of harmonics and overtones in a stretched string and acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.*

UNIT-I

1.Mechanics of Particles (5 hrs)

Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Concept of impact parameter, scattering cross-section, Rutherfordscattering-Derivation.

2.Mechanics of Rigid bodies (7 hrs)

Rigid body, rotational kinematic relations, Equation of motion for a rotating body, Angular momentum and Moment of inertia tensor, Euler equations, Precession of a spinning top, Gyroscope, Precession of atom and nucleus in magnetic field, Precession of the equinoxes

Unit-II

3.Motion in a Central Force Field (12hrs)

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion- Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS), weightlessness, Physiological effects of astronauts

UNIT-III

4. Relativistic Mechanics (12hrs)

Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation

Unit-IV

5. Undamped, Damped and Forced oscillations (07 hrs)

Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance, Logarithmic decrement, Relaxation time and Quality factor.

6.Coupled oscillations: (05 hrs)

Coupled oscillators-Introduction, Two coupled oscillators

Unit-V

7. Vibrating Strings: (07 hrs)

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.

8. Ultrasonics: (05 hrs)

Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectricand magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR

REFERENCE BOOKS:

- B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
- Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007 College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
- University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications, Delhi
- Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.
- Waves and Oscillations. N. Subramanyam and Brijlal, VikasPulications.
- Unified Physics - Waves and Oscillations, Jai PrakashNath&Co.Ltd.
- Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, Orient Longman.
- The Physics of Waves and Oscillations, N.K.Bajaj, Tata McGraw Hill
- Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004

Practical Course 1: Mechanics, Waves and Oscillations

Work load: 30 hrs per semester **2 hrs/week**

Course outcomes (Practicals):

On successful completion of this practical course, the student will be able to;

- Perform experiments on Properties of matter such as the determination of moduli of elasticity *viz.*, Young's modulus, Rigidity modulus of certain materials; Surface tension of water , Coefficient of viscosity of a liquid , Moment of inertia of some regular bodies by different methods and compare the experimental values with the standard values.
- Know how to determine the acceleration due to gravity at a place using Compound pendulum and Simple pendulum.
- Notice the difference between flat resonance and sharp resonance in case of volume resonator and sonometer experiments respectively.
- Verify the laws of transverse vibrations in a stretched string using sonometer and comment on the relation between frequency, length and tension of a stretched string under vibration.
- Demonstrate the formation of stationary waves on a string in Melde's string experiment.
- Observe the motion of coupled oscillators and normal modes.

Minimum of 6 experiments to be done and recorded:

1. Young's modulus of the material of a bar (scale) by uniform bending
2. Young's modulus of the material a bar (scale) by non- uniform bending
3. Surface tension of a liquid by capillary rise method
4. Viscosity of liquid by the flow method (Poiseuille's method)
5. Bifilar suspension –Moment of inertia of a regular rectangular body.
6. Fly-wheel -Determination of moment of inertia
7. Rigidity modulus of material of a wire-Dynamic method (Torsional pendulum)
8. Volume resonator experiment
9. Determination of 'g' by compound/bar pendulum
10. Simple pendulum- normal distribution of errors-estimation of time period and the errorof the mean by statistical analysis
11. Determination of the force constant of a spring by static and dynamic method.
12. Coupled oscillators

13. Verification of laws of vibrations of stretched string –Sonometer

14. Determination of frequency of a bar –Melde's experiment.

15. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.

RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;

- The oral and written examinations (Scheduled and surprise tests)
- Problem-solving exercises
- Practical assignments and Observation of practical skills
- Individual and group project reports
- Efficient delivery using seminar presentations
- Viva voce interviews.

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B.Sc. PHYSICS

[For Mathematics combinations]

w.e.f. 2022-23 (Revised in October 2022)

MODEL QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION FOR ALL THE ABOVE COURSES

Time: 3 hrs. **Max. marks: 75**

SECTION - A

I. Answer ALL questions. Marks: 5x2M = 10M

1. Short answer type question from Unit-I
2. Short answer type question from Unit-II
3. Short answer type question from Unit-III
4. Short answer type question from Unit-IV
5. Short answer type question from Unit-V

II. Multiple Choice Questions - 10 Marks: 1x10 = 10M

TWO from Each Unit Q.No. from 6 to 15

III. Fill in the Blanks - 5 Marks: 1x5 = 5M

ONE from Each Unit. Q.No. from 16 to 20

SECTION-B

Answer all the following questions Marks: 5x10M = 50M

21. Essay type question from Unit-I
OR
Essay type question from Unit-I

22. Essay type question from Unit-II
OR
Essay type question from Unit-II

23. Essay type question from Unit-III
OR
Essay type question from Unit-III

24. Essay type question from Unit-IV
OR
Essay type question from Unit-IV

25. Essay type question from Unit-V
OR
Essay type question from Unit-V

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MODEL QUESTION PAPER PATTERN FOR MID TERM EXAMINATION FOR ALL THE ABOVE COURSES

Time: 1 hrs. **Max. marks: 15**

SECTION - A

I. Answer ALL questions.

Marks: 2x2M = 4 M 1. Short answer type question

2. Short answer type question

II. Multiple Choice Questions - 4 Marks: 1x4 = 4M

TWO from Each Unit Q.No. from 3 to 6

III. Fill in the Blanks - 2 Marks: 1x2 = 2M

ONE from Each Unit. Q.No from 7 to 8

SECTION-B

Answer all the following questions

Marks: 1x5M = 5M

9. Essay type question

OR

Essay type question

PHYSICS BOARD OF STUDIES

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