**ANNEXURE – I**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**

**N - SCHEME**

(Implements from the Academic year 2019-2020 onwards)

Course Name : All branches of Diploma in Engineering and Technology and Special

Programmes except DMOP, HMCT and film & TV.

Subject Code : 40013

Semester : I Semester

Subject Title : **ENGINEERING PHYSICS – I**

**TEACHING AND SCHEME OF EXAMINATION**

Number of weeks per semester: 15 weeks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Subject | Instructions | | Examination | | | |
| ENGINEERING PHYSICS - I | Hours / Week | Hours / Semester | Marks | | | Duration |
| 5 Hrs. | 75 Hrs. | Internal Assessment | Board Examination | Total |
| 25 | 100 \* | 100 | 3 Hrs. |

\* Examination will be conducted for 100 Marks and it will be reduced to 75 Marks.

**Topics and Allocation of Hours:**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **Topic** | **Time** |
| 1 | S I UNITS AND STATICS | 13 Hrs. |
| 2 | PROPERTIES OF MATTER | 13 Hrs. |
| 3 | DYNAMICS- I | 13 Hrs. |
| 4 | DYNAMICS–II | 13 Hrs. |
| 5 | SOUND AND MAGNETISM | 13 Hrs. |
|  | REVISION, ASSESMENT TEST AND MODEL EXAM | 10 Hrs. |
|  | **Total** | **75 Hrs** |

**RATIONALE:**

The exponential growth of Engineering and Technology has benefited the mankind with extreme sophistication and comfort. To sustain this development, continuous research and development should take place not only in Engineering and Technology but also in Basic Science such as Physics.

The various divisions of Physics like Statics, Dynamics, Elasticity, Rotational Motion, Sound, Magnetism etc provide the Foundation by enlightening the Fundamental facts, Principles, Laws and Correct sequence of events to develop the Engineering and Technology field for the prosperity of human beings.

**OBJECTIVES:**

At the end of the study of I Semester the student will be able to

* Understand the importance of SI units and dimensional .formulae.
* Acquire broad ideas about resultant, moment of force and torque of a couple.
* Understand the elastic property and the types of Modulus of elasticity.
* Explain the surface tension of liquids and viscosity of fluids.
* Understand Newton’s laws of motion and equations of different types of motion.
* Acquire knowledge about projectile motion, circular motion and its application.
* Gain knowledge about rotational kinetic energy and angular momentum.
* Acquire broader ideas about variation of acceleration with respect to height and its importance in launching polar and geostationary satellites.
* Understand the propagation of sound and acoustics of buildings.
* Explain the importance of hysteresis of magnetic materials and its uses.
* Solve simple problems involving expressions derived in all the above topics.

**40013 ENGINEERING PHYSICS – I**

**DETAILED SYLLABUS**

**Contents: Theory**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **Name of the Topic** | **Hours** |
| **I** | **S I UNITS AND STATICS**  ***1.1 UNITS AND MEASUREMENTS***  Unit-Definition-Fundamental Quantities-Definition-Seven fundamental quantities; their SI units and symbol for the units- Supplementary quantities-plane angle and solid angle; their SI units and symbol for the units Derived physical quantities.  Dimensional formula for length, mass and time-derivation of dimensional formula for area, volume, density, velocity, momentum, acceleration, force, impulse, work or energy and power. Uses of Dimensional formula. Conventions followed in SI –Units Multiples & sub-multiples and prefixes of units.  ***1.2 STATICS***  Scalar and vector quantities–Definitions and examples–Concurrent forces and coplanar forces–Definition-Resolution of a vector into two perpendicular components-Resultant and equilibrant–Definitions-Parallelogram law of forces-statement-Expressions for magnitude and direction of the resultant of two forces acting at a point with an acute angle between them-Lami’s theorem-Statement and explanation-Experimental verification of parallelogram law of forces and Lami’s theorem. Simple problems based on expressions for magnitude and direction of resultant.  Moment of a force-Clockwise and anti-clockwise moments-Principle of moments-Couple–Torque acting due to a Couple–Experimental determination of mass of the given body using principle of moments. | 4Hrs    9 Hrs |
| **II** | **PROPERTIES OF MATTER**  ***2.1 ELASTICITY***  Elastic and plastic bodies–Definition-stress, strain-Definitions–Hooke’s law –statement-three types of strain–Elastic and plastic limit–Young’s modulus, Bulk modulus, Rigidity modulus–Definitions-Uniform and non-uniform bending of beams-Experimental determination of the Young’s modulus of the material of a beam by uniform bending method. Simple problems based on stress, strain and Young’s modulus.  ***2.2 VISCOSITY***  Viscosity–Definition-Coefficient of viscosity-Definition, SI unit and dimensional formula-Stream line flow, turbulent flow-Explanation-Critical velocity–Definition-Experimental comparison of coefficient of viscosity of two low viscous liquids–Terminal velocity–Definition-Experimental determination of coefficient of viscosity of a highly viscous liquid by Stokes method–Practical applications of viscosity.  ***2.3 SURFACE TENSION:-***  Surface tension & angle of contact-Definitions-Expression for surface tension of a liquid by capillary rise method-Experimental determination of surface tension of water by capillary rise method–Practical applications of capillarity. Simple problems based on expression for surface tension. | 4 Hrs  5Hrs  4Hrs |
| **III** | **DYNAMICS–I**  ***3.1.STRAIGHTLINE MOTION***  Introduction-Newton’s Laws of motion-Fundamental Equations of motion for objects- horizontal motion-falling freely-thrown vertically upwards.  ***3.2 PROJECTILE MOTION***  Projectile motion, angle of projection, trajectory, maximum height, time of flight, and horizontal range–Definitions-Expressions for maximum height, time of flight and horizontal range–Condition for getting the maximum range of the projectile. Simple problems based on expressions for maximum height, time of flight and horizontal range.  ***3.3 CIRCULAR MOTION***  Circular motion, angular velocity, period and frequency of revolutions–Definitions–Relation between linear velocity and angular velocity–Relation between angular velocity, period and frequency–Normal acceleration, centripetal force and centrifugal force–Definitions–Expressions for normal acceleration and centripetal force. Banking of curved paths–Angle of banking–Definition–Expression for the angle of banking of a curved path. { tanθ= v2/ (r g) } Simple problems based on the expressions for centripetal force and angle of banking. | 2 Hrs.  4Hrs.  7Hrs. |
| **IV** | **DYNAMICS–II**  ***4.1 ROTATIONAL MOTION OF RIGID BODIES***  Rigid body–Definition-Moment of inertia of a rigid body about an axis–expressions–Radius of gyration–Definition– Expression for the kinetic energy of a rotating rigid body about an axis–Angular momentum–Definition–Expression for the angular momentum of a rotating rigid body about an axis–Law of conservation of angular momentum–Examples.  ***4.2 GRAVITATION***  Newton’s laws of gravitation–Acceleration due to gravity on the surface of earth–Expression for variation of acceleration due to gravity with altitude  ***4.3 SATELLITES***  Satellites–Natural and artificial–Escape velocity and orbital velocity–Definitions–Expression for escape velocity–Polar and Geostationary satellites –Uses of artificial satellites. Simple problems based on the expressions for escape velocity. | 6Hrs  3Hrs  4Hrs |
| **V** | **SOUND AND MAGNETISM**  ***5.1 SOUND***  Wave motion–Introduction and definition–Audible range-Infrasonic-Ultrasonics-Progressive waves, longitudinal and transverse waves–Examples- Amplitude,  Wave length, period and frequency of a wave – Definitions - Stationary or standing waves. Vibrations-Free & forced vibrations and resonance–definitions and examples–Sonometer–Experimental determination of frequency of a tuning fork. Acoustics of buildings–Echo-Reverberation, reverberation time, Sabine’s formula for reverberation time (no derivation) –Coefficient of absorption of sound energy–Noise pollution. Simple problems based on expression for frequency of vibration.  ***5.2 MAGNETISM***  Pole strength –Definitions–Magnetic moment, intensity of magnetisation, magnetising field intensity, magnetic induction, hysteresis, saturation, retentivity and coercivity – Definitions - Method of drawing hysteresis loop of a specimen using a solenoid–Uses of Hysteresis loop. Simple problems based on intensity of magnetization. | 8Hrs  5Hrs |

Reference Book:

1. Physics–Resnick and Haliday–Wisley Toppan publishers–England
2. Engineering Physics–B.L.Theraja–S. Chand Publishers
3. A text book of sound–R.L. Saighal & H.R. Sarna–S.Chand & Co.
4. Mechanics–Narayana Kurup–S. Chand Publishers.

**Board Examination-Question Paper Pattern**

**(Relevant data should be provided in the Question paper for solving the problems)**

Time: 3 Hrs Max.Marks:100

The Question paper will be in the pattern as indicated below.

PART- A – **5** Question to be answered out of **8** for **2** marks each.

PART- B – **5** Question to be answered out of **8** for **3** marks each.

PART-C - **10** Question to be answered out of **15** for **5** marks each.

These Questions is to be numbered from 1 to 31 continuously where in the Question No.17 pertaining to the very first question of PART—C would be compulsory question (can be asked from any one of the units) which would test the analytical ability of the student.

The complete syllabus is covered with equal weightage.

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| --- | --- | --- | --- | --- | --- |
| **PART A** | 5 | X | 2 | Marks | 10 Marks |
| **PART B**  Short answer type questions | 5 | X | 3 | Marks | 15 Marks |
| **PART C**  Descriptive answer type questions | 10 | X | 5 | Marks | 50 Marks |
| Total | 75 Marks | | | | |