**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 : 40023

Semester : II Semester

Subject Title : **ENGINEERING PHYSICS – II**

**TEACHING AND SCHEME OF EXAMINATION**

Number of weeks per semester: 15 weeks

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| --- | --- | --- | --- | --- | --- | --- |
| Subject | Instructions | | Examination | | | |
| ENGINEERING PHYSICS - II | Hours / Week | Hours / Semester | Marks | | | Duration |
| 4 Hrs. | 60 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 | HEAT | 10 Hrs. |
| 2 | THERMODYNAMICS, LIQUEFACTION OF GASES& NON-CONVENTIONAL ENERGY | 10 Hrs. |
| 3 | LIGHT AND REMOTE SENSING | 10 Hrs. |
| 4 | ELECTRICITY | 10 Hrs. |
| 5 | ELECTRONICS | 10 Hrs. |
|  | REVISION, ASSESMENT TEST AND MODEL EXAM | 10 Hrs. |
|  | **Total** | **60 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 Heat, Optics, Acoustics, Semiconductor Physics, Nuclear Physics, Energy Studies, Materials Science, 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 II Semester the student will be able to

* Analyze the relation between pressure, volume and temperature of gas. And to interpret the results.
* Understand the process of Isothermal and Adiabatic changes of gas and basic laws of thermodynamics.
* Acquire knowledge about liquefaction process of gases.
* Realize the inevitable need for tapping Alternate energy to address the looming energy crisis.
* Identify the characteristics and properties of LASER, Optical fiber and its applications.
* Acquire broader ideas about the process of remote sensing in tapping .the earth resources for human benefits.
* Acquire knowledge about heating, chemical and magnetic effects of electric current.
* Gain broader ideas of capacitors, diodes, transistors, integrated circuits and logic gates.
* Identify, analyze and solve Engineering field related problems involving expressions derived in all the above topics.

**40023-ENGINEERING PHYSICS – II**

**DETAILED SYLLABUS**

**Contents: Theory**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **Name of the Topic** | **Hours** |
| **I** | **HEAT**  **1.1 TRANSFER OF HEAT**  Concept of Heat and Temperature - Centigrade, Fahrenheit and Kelvin scales of temperature measurement- Conduction, convection and radiation - Definitions and explanations-Properties of thermal radiation.  **1.2 KINETIC THEORY OF GASES**  Postulates –Mean square velocity and Root Mean Square (RMS) velocity of molecules - Definitions and expressions – Expression for the pressure of a gas on the basis of postulates of kinetic theory of gases - Relation between pressure and kinetic energy of the gas–Simple problems based on the expression for the pressure of a gas.  **1.3 SPECIFIC HEAT CAPACITY**  Specific heat capacity of a substance (solids and liquids) –Definition – Specific heat capacity of a gas at constant volume – Specific heat capacity of a gas at constant pressure– Ratio of specific heat capacities – Derivation of Mayer’s relation – calculation of Universal gas constant R from the gas equation PV= RT. Simple problems based on Mayer’s relation. | 3 Hrs  4 Hrs  3 Hrs |
| **II** | **THERMODYNAMICS, LIQUEFACTION OF GASES - AND NON CONVENTIONAL ENERGY**  **2.1 THERMODYNAMICS**  First law of thermodynamics – Statement - Isothermal and Adiabatic changes - Explanation – Equations for isothermal and adiabatic changes (No derivation) Simple problems based on equations P1V1 = P2V2 and P1V1γ= P2V2γ. Second law of thermodynamics – Clausius statement and Kelvin’s statement.  **2.2 LIQUEFACTION OF GASES**  Critical temperature, critical pressure and critical volume – Definitions – Principle used in cascade process –Cascade process of liquefaction of oxygen –Disadvantages of cascade process - Joule Thomson effect – Temperature of inversion – Liquefaction of air by Linde’s process.  **2.3 NON – CONVENTIONAL ENERGY**  Introduction – Non-renewable and Renewable (Alternate) energy sources – Examples – Solar energy, wind energy, – Advantages and disadvantages of renewable energy. | 4 Hrs  4 Hrs  2 Hrs |
| **III** | **LIGHT AND REMOTE SENSING**  **3.1 OPTICS**  Refraction – Laws of refraction – Refractive index of a medium – Definition –Spectrometer – Experimental determination of refractive index using spectrometer- Phenomenon of total internal reflection – Fiber optics - Introduction –Optical Fiber Cable as a wave guide – advantages of OFC – problems using the refractive index .  **3.2 LASER**  LASER – Characteristics of LASER – principle of LASER –Spontaneous emission – Stimulated emission – population inversion – Ruby laser-Construction and working- Uses of LASER.  **3.3 REMOTE SENSING**  Remote sensing – Introduction – Active and passive remote sensing – Explanation and examples – Components of remote sensing – Data acquisition and data analysis–RADAR – principle and working with block diagram. | 4 Hrs  3 Hrs  3 Hrs |
| **IV** | **ELECRICITY**  **4.1 ELECTRICAL CIRCUITS**  Ohm’s law – Laws of resistances – Resistivity, Conductivity, Super conductivity and Meissner effect- Definitions – Kirchhoff’s current and voltage laws. Simple problems based on expression for resistivity. Capacitance of a capacitor – Definition – ‘farad’– Definition– expressions for effective capacitance when capacitors are connected in series and in parallel. Simple problems based on effective capacitance for series and parallel connections of capacitors.  **4.2 EFFECTS OF CURRENT**  Joule’s law of heating – Experimental determination of specific heat capacity of a liquid using Joule’s calorimeter – Faraday’s laws on electrolysis – Electro chemical equivalent (e.c.e) of an element – Definition – Experimental determination of e.c.e. of copper - Simple problems based on expressions for e.c.e.  **4.3 MEASURING INSTRUMENTS**  Expression for the force acting on a current carrying straight conductor placed in a uniform magnetic field – Fleming’s Left Hand rule – Expression for the torque experienced by a rectangular current carrying coil placed inside a uniform magnetic field – Working of a moving coil galvanometer and its merits – Conversion of galvanometer into an Ammeter and Voltmeter. | 3 Hrs  3 Hrs  4 Hrs |
| **V** | **ELECTRONICS**  **5.1 SEMI CONDUCTORS**  Semi conductors – Intrinsic semiconductors -Concept of holes - Doping – Extrinsic semiconductors – P type and N type semiconductors.  **5.2 DIODES AND TRANSISTORS**  P-N junction diode – Forward bias and reverse bias –Rectification action of diode – Working of full wave rectifier using P N junction diodes -PNP and NPN transistors – Three different configurations – Working of NPN and PNP transistor in common base configuration.  **5.3 DIGITAL ELECTRONICS**  Digital electronics – Introduction – Logic levels – Basic logic gates: OR, AND , NOT gates – Universal logic gates: NAND and NOR gates – Symbolic representation, Boolean expression and Truth table for all above logic gates – Integrated circuits– Levels of integration – SSI, MSI, LSI and VLSI-Advantages of ICs. | 2 Hrs  5 Hrs  3 Hrs |

**Reference Book:**

1. Fundamentals of physics – Brijlal and Subramaniam.
2. Fundamentals of Electricity – D.N. Vasudeva – S. Chand & co
3. Non- Conventional energy sources – G.D. Rai.- Khanna publishers
4. Text book of Remote sensing and Geographical information systems – M. Anji Reddy BS publications.

**Board Examination-Question Paper Pattern**

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

Time: 3 Hrs Max.Marks:75

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 | | | | |