Code No. 1705

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OSMANIA UNIVERSITY
FACULTY OF ENGINEERING
UNIVERSITY COLLEGE OF ENGINEERING (AUTONOMOUS)
B.E. (Civil, EEE, Mech., Mining ) I-Semester (Main) Examinations April 2022

## ENGINEERING PHYSICS

**Time : 3 hours** **Max. Marks : 70**

**Note :** *i) Each question carries **14** Marks.*
*ii) **First Question** is compulsory and answer all **sub** questions. Answer any **four** questions from remaining **six** questions **(Q.2 - Q.7).***
*iii) Answers to each question must be written at one place only and in the same order as they occur in the Question Paper.*
*iv) **Missing data, if any, may suitably be assumed.***

| | | Marks | BT | CO |
|---|---|---|---|---|
| 1. a) | Quality factor of second's pendulum is 3.14 then find its Relaxation time. | 2 | 1 | 1 |
| b) | Calculate the spacing of (202) planes, if the lattice constant of a unit cell of Sodium is 4.049. | 2 | 2 | 2 |
| c) | Why P-N diode reverse bias resistance is more than forward bias? | 2 | 3 | 3 |
| d) | What do mean by Ionic Polarization in dielectric material? | 2 | 1 | 4 |
| e) | The critical temperature for mercury with isotopic mass 199.5 is 4.195K. Calculate its critical temperature with its isotopic mass increased to 203.4 | 2 | 2 | 5 |
| f) | With which experiment, we find the nature of charge carriers in semiconductors? | 2 | 1 | 3 |
| g) | Mention any two methods of production of nanomaterials. | 2 | 1 | 5 |
| 2. a) | Derive the general equation of damped harmonic oscillator. | 7 | 2 | 1 |
| b) | Find the position of a harmonic oscillator where kinetic and potential energies are equal. | 7 | 2 | 1 |
| 3. a) | Evaluate an equation to find the interplanar distance of two parallel planes. | 7 | 4 | 2 |
| b) | Deduce an expression for the concentration of Frenckel defects in a crystal. | 7 | 3 | 2 |
| 4. a) | Explain how a P-N diode will be formed. Discuss its V-I characteristics and applications. | 7 | 2 | 3 |

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|---|---|---|---|---|
| | b) Discuss the theory of determination of velocity of ultrasonic waves in the liquid using Debye-Sears method. | 7 | 3 | 3 |
| 5. | a) What do you mean by Ferroelectric material? Explain crystal structure of Barium Titanate. | 7 | 2 | 4 |
| | b) Prove that a Light wave is a Transverse wave. | 7 | 3 | 4 |
| 6. | a) Discuss the General properties of Superconductors. | 7 | 4 | 5 |
| | b) Explain the method of synthesis of nanomaterials by Sol-Gel method. | 7 | 2 | 5 |
| 7. | a) Obtain an expression for the carrier concentration in intrinsic semiconductors. | 7 | 3 | 3 |
| | b) What are High Tc Superconductors. Write any four applications of superconductors. | 7 | 1 | 5 |

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