

**I B. Tech I Semester Supplementary Examinations, December - 2021****ENGINEERING PHYSICS**

(Com. to CE, ME, Agri E)

Time: 3 hours

Max. Marks: 75

**Answer any five Questions one Question from Each Unit**  
**All Questions Carry Equal Marks**

**UNIT-I**

1. a) What are inertial and non- inertial frames of reference? Give one example for each. Derive an expression for the force acting on a particle moving with velocity 'v' with respect to a uniformly rotating frame of reference. (10M)
- b) Show that for a conservative force  $F = - \text{grad } U$  (5M)

**Or**

2. a) What are Damped oscillations? Derive the equation of motion of damped oscillator and find its solution. (10M)
- b) A damped oscillator starting from rest reaches a first amplitude of 500mm. It reduces to 50mm after 100 oscillations. The periodic time is 2.3 sec. Find the damping constant and relaxation time. (5M)

**UNIT-II**

3. a) Define the terms 'Reverberation time' and 'Absorption Coefficient'. Derive Sabine's formula for reverberation time. (10M)
- b) A hall has dimensions  $20 \times 15 \times 5 \text{ m}^3$ . The reverberation time is 3.5 sec. Calculate the total absorption of its surfaces and the average absorption coefficient. (5M)

**Or**

4. a) State Magnetostriction effect. Draw the magnetostrictive ultrasonic generator circuit and explain its working. (10M)
- b) Mention some applications of Ultrasonics. (5M)

**UNIT-III**

5. a) State Hooke's law? Explain Stress versus Strain curve. (6M)
- b) Define three moduli of elasticity and obtain the relation between them. (9M)

**Or**

6. a) A rectangular bar of iron is supported at its two ends on knife edges and a load is applied at the middle point. Calculate the depression at the middle point. (10M)
- b) A load of 2 kg produces an extension of 1 mm in a wire of 3 m in length and 1 mm in diameter. Calculate the Young's modulus of the wire. (5M)

**UNIT-IV**

7. a) Distinguish between Spontaneous and Stimulated emissions. (5M)  
b) Describe the construction and working of He-Ne laser with the help of energy level diagram. (10M)

**Or**

8. a) Derive the expression for energy density of radiation in terms of Einstein coefficients. (9M)  
b) What is a sensor? Write a note on Strain sensor. (6M)

**UNIT-V**

9. a) What is ferromagnetism? Explain the properties of ferromagnetic materials. (6M)  
b) Explain the Hysteresis curve in magnetism on the basis of domains. Distinguish between Soft and Hard magnetic materials. (9M)

**Or**

- 10 a) Distinguish between electronic, ionic and orientation polarization and discuss the effect of temperature on each of them. (6M)  
b) Deduce an expression for internal field relating to a dielectric material. (9M)