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I B.Tech I Sem Regular Examination, Dec 2019/Jan 2020

ENGINEERING PHYSICS

(CIVIL & MECH)

Time: 3 Hours.

Max. Marks: 70

- Note: 1. This question paper contains two parts A and B.
 2. Part- A is Compulsory. Answer all Questions which carries 20 marks.
 3. Part – B consists 5 units. Answer any one question from each unit.
 Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10 x 2 Marks = 20 Marks)

1. a) Write a note on completeness of Newton's laws in describing motion of a particle. 2 M
- b) What are the forces in nature? 2 M
- c) Distinguish between damped and forced oscillations. 2 M
- d) A body having a mass 40grams executes SHM. If the period is 4sec, find the force acting on the body when displacement is 4cm. 2 M
- e) What are harmonic waves? 2 M
- f) Define impedance matching. 2 M
- g) State Huygen's principle of secondary wavelets. 2 M
- h) Write about the types of interference. 2 M
- i) What are the conditions to achieve laser action? 2 M
- j) Define total internal reflection and critical angle. 2 M

PART - B

(5 x 10 Marks = 50Marks)

- 2 a) Derive the least inclined force required to drag body resting on a horizontal plane in terms of weight of the body, angle of the inclined force and angle of friction. 5 M
- b) Explain the use of spherical co-ordinates in describing the motion of a particle. 5 M

OR

- 3 a) Explain about transformation of vectors under rotational transformation. 5 M
- b) Write about cylindrical co-ordinates in describing the motion of particle. 5 M

4 a) Derive the differential equation of motion of damped harmonic oscillator and obtain the solution for the same. 5 M

b) What are critical damped, under damped and over damped motions in a damped harmonic oscillator? Explain with necessary equations. 5 M

OR

5 a) Define reactance and impedance. Give the theory of LCR series resonant circuit with related circuits. 5 M

b) A capacitance of $50\mu\text{F}$ and an inductance of 0.2025H are connected in series. If the resistance of the circuit is negligible, find the frequency at which resonance occurs. 5 M

6 a) Define longitudinal wave. Derive the wave equation when longitudinal plane waves passes through air. 10 M

OR

7 a) Derive wave equation on a string. 5 M

b) Explain about standing waves and their Eigen frequencies. 5 M

8 a) Explain the formation of Newton's rings in reflected light system and obtain the formula to determine the wavelength of monochromatic light. 10 M

OR

9 a) Describe the Fraunhofer diffraction at a single slit and explain the positions of maximum and minimum intensities with necessary theory. 5 M

b) At what angle will 650nm light produce a second order maximum when falling on a grating whose slits are $1.2 \times 10^{-3} \text{ cm}$ apart? 5 M

10 a) Explain the principle and working of a He-Ne Laser with energy level diagram. 5 M

b) What are the applications of lasers? 5 M

OR

11 a) Define numerical aperture and acceptance angle. Derive expressions for the same with necessary diagrams. 5 M

b) Calculate the angle of acceptance of an optical fibre, if the refractive indices of the core and cladding are 1.563 and 1.498 respectively. 5 M

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