R19

I B. Tech I Semester Regular Examinations, Jan - 2020
ENGINEERING PHYSICS
(MECHANICAL ENGINEERING)

Time: 3 hours   Max. Marks: 60

Note: Answer **ONE** question from each unit (**5 × 12 = 60 Marks**)
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UNIT - I

1. a) Discuss the theory of thin films with ray diagram and derive the conditions for constructive and destructive interference in case of reflected system.   (10M)
    b) If two waves having amplitudes in the ratio 5:1 produce interference, calculate the ratio of the maximum to the minimum intensity.   (2M)

(OR)

2. a) Explain with theory how wavelength of spectral line is determined using plane diffraction grating.   (8M)
    b) Calculate the maximum no of orders possible, if the wavelength of light is 5000Å and numbers of lines per centimeter on the grating is 6655.   (4M)

UNIT – II

3. a) Discuss different types of pumping mechanisms used in lasers.   (4M)
    b) Derive the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein's coefficients.   (8M)

(OR)

4. a) Differentiate holography and photography.   (6M)
    b) Mention applications of holography   (6M)

UNIT – III

5. a) Define the terms (i) Magnetization (ii) Magnetic susceptibility (iii) Magnetic permeability   (6M)
    b) What is Ferromagnetism? Explain the properties of ferromagnetic materials.   (6M)

(OR)

6. a) Derive an expression for electronic polarizability in terms of radius of the atoms.   (8M)
    b) Explain the frequency dependence of different polarizations.   (4M)

UNIT – IV

7. a) Derive the Sabine's formula for reverberation time.   (10M)
    b) The volume of a hall is 475 m^3. The area of wall is 200 m^2, area of floor and ceiling each is 100 m^2. If absorption coefficient of the wall, ceiling and floor are 0.025, 0.02 and 0.55 respectively, calculate the reverberation time for the hall.   (2M)

(OR)

8. a) What are ultrasonics? (2M)
   b) Explain the working of ultrasonic flaw detector (pulse echo system) (10M)

UNIT –V

9. a) State and Explain Hooke's law. (4M)
   b) Define bending moment of a beam and derive an expression for the bending moment. (8M)

(OR)

10. a) What force is required to stretch a steel wire to double its length when its area of cross-section is 1 sq. cm and Young's modulus 2×10^{11} N / m^2. (2M)
    b) Derive the expression for depression for a cantilever supported at its ends and loaded in the middle. (10M)

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