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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)  
**B.Tech I Year II Semester Regular & Supplementary Examinations October-2022**  
**ENGINEERING PHYSICS**  
(Mechanical Engineering)

Time: 3 Hours

Max. Marks: 60

(Answer all Five Units the Questions 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a State and explain principle of superposition. L2 4M  
b Discuss the theory of interference of light due to thin films by reflection with suitable ray diagram. L2 8M

OR

- 2 a Explain the theory of Fraunhofer diffraction due to single slit. L2 8M  
b Obtain conditions for bright and dark fringes in single slit diffraction pattern and draw intensity distribution. L3 4M

**UNIT-II**

- 3 a Define coordination number and atomic packing factor. L1 2M  
b Show that FCC is more closely packed structure than BCC and SC. L2 10M

OR

- 4 a State and explain Bragg's law of X-ray diffraction. L2 8M  
b Find the angle at which the third order reflection of X-ray of  $0.79\text{\AA}$  wavelength can occur in a calcite crystal of  $3.04 \times 10^{-10}$  spacing. L3 4M

**UNIT-III**

- 5 a Develop the Sabine's formula for reverberation time. L3 8M  
b A class room of volume  $360\text{ m}^3$  has a reverberation time of 1.6 seconds. Estimate the total sound absorption coefficient of the class room. L5 4M

OR

- 6 a Outline the properties and detection methods of ultrasonic waves. L2 8M  
b Calculate the capacitance to produce ultrasonic waves of  $10^6$  Hz with an inductance of 1 henry. L3 4M

**UNIT-IV**

- 7 a Define shear strain. Explain how shear strain is related to modulus of rigidity. L2 8M  
b Calculate Poisson's ratio for silver. L3 4M  
Given its Young's modulus =  $7.25 \times 10^{10}$  N/m<sup>2</sup> and bulk modulus =  $11 \times 10^{10}$  N/m<sup>2</sup>.

OR

- 8 a Deduce an expression for energy stored per unit volume in a stretched wire. L4 8M  
b Estimate the work done in stretching a wire of cross section  $1.25\text{ mm}^2$  and length 1.9 m through 0.14 mm. The Young's modulus of wire is  $45 \times 10^9$  N/m<sup>2</sup>.

**UNIT-V**

- 9 a Distinguish Type-I and Type-II superconductors. L5 8M  
b Calculate the critical current for a lead wire of 0.5 mm radius at 4.2 K. Given for lead  $T_c = 7.18\text{ K}$ ,  $H_0 = 6.5 \times 10^4$  A/m.

OR

- 10 a Describe the sol-gel method of synthesis of nanomaterials. L1 8M  
b Write any four applications of nanomaterials. L1 4M

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