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**INSTITUTE OF AERONAUTICAL ENGINEERING**

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech I SEMESTER END EXAMINATIONS (REGULAR) - APRIL 2022

Regulation:UG-20

ENGINEERING PHYSICS

(Common to AE|ECE|EEE|ME|CE Branches)

Time: 3 Hours**Max Marks: 70****Answer ALL questions in Module I and II****Answer ONE out of two questions in Modules III, IV and V****All Questions Carry Equal Marks****All parts of the question must be answered in one place only****MODULE – I**

1. (a) Discuss the Davisson-Germer experiment. Explain the verification of De-broglie hypothesis using Davisson-Germer experiment. [7M]
- (b) Find the De-Broglie wavelength for an electron moving with $1/10$ of the velocity of light. [7M]

MODULE – II

2. (a) Draw and explain the band diagram of p type and n type extrinsic semiconductors at $T=0K$ and $T=300K$. Discuss the effect of both temperatures. [7M]
- (b) A copper strip 2.0 cm wide and 1.0 mm thick is placed in a magnetic field with $B=1.5 \text{ Wb/m}^2$. If a current of 200 A is setup in the strip, calculate the Hall voltage that appears across the strip. Assume $R_H = 6 \times 10^{-7} \text{ m}^3/\text{C}$. [7M]

MODULE – III

3. (a) Explain construction and working of He-Ne laser. Write four applications of lasers. [7M]
- (b) Find the energy band gap in eV in a He-Ne laser that produces light of wavelength $5318 \text{ \AA}$. [7M]
4. (a) Discuss optical fiber communication system with block diagram. What are the applications of fiber optics? [7M]
- (b) A step-index fiber has a core index of refraction of $n_1 = 1.425$. The acceptance angle for light entering the fiber from the air is found to be 8.5° . What is the numerical aperture of the fiber? [7M]

MODULE – IV

5. (a) Obtain the conditions for observing dark and bright circular fringes in Newton rings experiment. [7M]
- (b) In Newton's rings experiment, the diameter of the 15^{th} ring was found to be 0.59 cm and that of the 5^{th} ring is 0.336 cm. If the radius of curvature of the lens is 100 cm, find the wavelength of the light. [7M]
6. (a) Discuss Fraunhofer diffraction from the single slit. Extend this to get conditions for maxima and minima. [7M]

- (b) A diffraction grating used at normal incidence gives a line of $5500\text{\AA}$ in a certain order superposed on the violet line $4050\text{\AA}$ of the next higher order. If the angle of diffraction is 40° , how many lines per cm are there in the grating? [7M]

MODULE – V

7. (a) Find differential equation for damped harmonic motion and discuss various types of damping. [7M]
(b) A particle executes SHM of period 10 sec and amplitude 5 cm. Calculate the maximum velocity of oscillation. [7M]
8. (a) What is the difference between transverse and longitudinal waves? Obtain equation of motion of transverse waves [7M]
(b) Calculate the speed of transverse waves in a wire of 1mm^2 cross section under the tension produced by 0.1 kg wt. Specific gravity of material of wire is 9.81gm/cm^3 and $g = 9.81\text{m/sec}^2$. [7M]

