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Total Number of Pages : 02

B.Tech
BS1102

1st Semester Back Examination 2018-19
PHYSICS - I

BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE,
ELECTRICAL, ENV, ETC, FASHION, FAT, IEE, IT, ITE, MANUFAC, MANUTECH,
MARINE, MECH, METTA, METTAMIN, MINERAL, MINING, MME, PE, PLASTIC, TEXTILE

Time : 3 Hours

Max Marks : 70

Q.CODE : E908

Answer Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions : (2 x 10)

- a) A particle executes SHM with amplitude 4 cm and frequency 5 Hz. Find the maximum value of velocity and acceleration.
- b) Define logarithmic decrement.
- c) What are coherent sources? Write the methods of producing coherent sources.
- d) Why are the fringes in Newton's ring experiment circular?
- e) In a plane transmission grating the width of each slit is equal to half of the width of the opaque portion. Which order spectra will be absent?
- f) What do you mean by angle of polarization? How is it related to refractive index of material?
- g) Find the value of divergence of position vector 'r'.
- h) State Faraday's law of electromagnetic induction and express it mathematically.
- i) What do you mean by normalization of wave function Ψ ?
- j) What is stopping potential in Photo electric effect? Is it dependent on intensity or frequency of radiation?

Q2 a) What do you mean by normal mode oscillation in a coupled oscillator? Compare between Q_1 and Q_2 mode oscillation. (5)

- b) (i) What is damping constant? (5)
- (ii) Ten sinusoidal waves of equal amplitude superpose incoherently to produce a resultant wave of intensity 0.5 watt/m². What would be the resultant if these waves superpose coherently?

Q3 a) Find out the expression for diameter of dark ring in Newton's ring experiment and explain how the wavelength of a monochromatic light can be measured by it. (5)

- b) (i) Define wavefront. (5)
- (ii) In a Newton's rings experiment the diameter of 5th dark ring is reduced to three fourth of its value after introducing a liquid below the convex surface. Calculate the refractive index of liquid .

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Q4 a) Obtain an expression for intensity of the diffracted beam by a single slit. Discuss the condition of Principal maximum and minima. **(5)**

b) Mention the similarities and differences between zone plate and convex lens. **(5)**

Q5 a) With basic principle describe the construction and working of Nicol prism. **(5)**

b) (i) Define specific rotation and state its unit. **(5)**

(ii) The plane of polarization of a linearly polarized light is rotated by 4° when it passes through a 20 cm long tube containing a sugar solution. Find the specific rotation if the concentration of sugar solution is 0.03 g/cm^3 .

Q6 a) Mathematically show the transverse nature of electromagnetic wave. **(5)**

b) Evaluate curl of position vector ' \mathbf{r} '. **(5)**

Q7 a) Particles of energy E incident on a one dimensional potential step of height V_0 . Discuss in detail about reflection and transmission coefficient for $E > V_0$. **(5)**

b) A beam of electrons of energy 15 eV is incident at the boundary of step potential of height 5 eV. Find the fraction of the beam reflected and transmitted. **(5)**

Q8 Write short answer on any TWO : **(5 x 2)**

a) Resonance

b) Quarter Wave and Half wave plate

c) Poynting theorem

d) Heisenberg's Uncertainty Principle.