Silicon

beyond teaching

Silicon Institute of Technology

Silicon Hills, Bhubaneswar

| An Autonomous Institute |

2nd Semester B.Tech. Mid Term Examination 2019-2020
ENGINEERING PHYSICS(18BS1T06)

Duration: 01:30   Full Marks: 25

1 Answer All

a   A plane diffraction grating has 12500 rulings and a width and a width of 2.5 cm. Find the grating element.   1

b   Twenty sinusoidal waves of equal amplitude superpose incoherently to produce a resultant wave of intensity 0.8 watt/m^2. What would be the resultant intensity if the waves superpose coherently?   1

c   Do you expect any fringe pattern in case of incoherent superposition? Give justification to your answer.   1

d   State the physical significance of curl of a vector field.   1

e   Show that in a vacuum, electromagnetic waves travel with the velocity of light.   1

2 Answer any Two

a   How are grating spectra formed? Write its important characteristics.   2

b   Newton's rings are observed between a plano-convex lens of radius of curvature of 120 cm and a plane glass plate. The diameter of the 15th bright ring is 0.58cm. Calculate (i) the diameter of the 25th bright ring and (ii) the wavelength of the light used.   2

c   Distinguish between Fresnel's and Fraunhofer's diffraction.   2

3 Answer any Two

a   Differentiate between conduction current and displacement current.   2

b   State Ampere's circuital law in electromagnetism. Write its integral and differential form.   2

c   A medium is characterized by relative permittivity 50 and relative permeability 4. Calculate the speed of an electromagnetic wave in the medium and the refractive index of the medium.   2

4 Answer any One

a   Explain with suitable theory, the interference patterns viewed with reflected light and that in the transmitted light in Newton's rings experiment are complimentary.   6

b   Show that coherent superposition in two beams of same frequency but different amplitude and phases traveling in same direction leads an interference pattern.   6

5 Answer any One

a   State Gauss's law in electrostatics. Obtain its differential form. Find the (a) divergence and (b) curl of the position vector.   6

b   Write four Maxwell's equations in electromagnetism. Develop an electromagnetic wave equation in terms of electric vector when the wave is propagating in a charge free non-conducting medium. Obtain an expression for its velocity.   6