PC374

[6358]-102

F.E. (Common) (Insem)
ENGINEERING PHYSICS
(2019 Pattern) (Semester - I) (107002)

Time : 1 Hour]   *[Max. Marks : 30*

Instructions to the candidates:
1) *Solve Q1 or Q2, Q3 or Q4.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data, if necessary.*

Q1) a) For a single slit, state the equations for resultant amplitude and resultant intensity when rays are diffracted at an angle θ. Starting from these equations derive the conditions for principal maxima and minima of diffraction pattern. Draw intensity distribution curve. **[6]**

b) What are electromagnetic radiations? State one application for any four regions in the electromagnetic spectrum. **[5]**

c) The axes of polarizer and analyzer are kept parallel to each other so that light is transmitted with maximum intensity. By what angle should either polarizer or analyzer be rotated so that intensity of transmitted light is (i) 42% and (ii) 68% of the original intensity. **[4]**

OR

Q2) a) What is double refraction? Draw a neat and labelled diagram showing double refraction in a birefringent crystal. Explain in brief properties of o-ray and e-ray. **[6]**

b) What is anti-reflection coating (ARC)? Explain with a neat & labelled diagram how the principle of interference is used to design ARC. Derive the equation for thickness of ARC. **[5]**

c) A plane diffraction grating has 5000 lines/cm. A light of wavelength 558 nm incident normally over it. Determine the highest order spectrum that is visible. **[4]**

P.T.O.

Q3) a) With the help of an energy level diagram, explain construction and working of CO_2 laser. **[6]**

b) What is Holography? Why laser is preferred in holography? With a suitable diagram, explain the process of recording a hologram by using laser. **[5]**

c) In a certain optical fiber, the angle of acceptance is 34.8° and refractive index of cladding is 1.52. Calculate the values of numerical aperture and refractive index of core. **[4]**

OR

Q4) a) In an optical fiber, Explain in brief why refractive index of cladding should be slightly less than that of the core. Differentiate between step index and graded index fiber (any four points). **[6]**

b) What is acceptance angle? In an optical fiber, core and cladding has refractive indices 1.61 and 1.42 respectively. Calculate the values of acceptance angle and numerical aperture. **[5]**

c) In laser, explain in brief : **[4]**

   i)   Spontaneous emission

   ii) Stimulated emission

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