

Third Year B.Sc. Examination

Physics: Paper-302

MARCH-2017

(Electrostatics, Electrodynamics, Laser, Fiber Optics, X-rays)

Time: 2 Hours]

[Total Marks: 75

code \rightarrow 8938

Instructions: (i) Symbols have their usual meaning.

(ii) Figures on right hand side show marks of that question.

Q-1

(a). For a Non-Polar dielectric derive Claussius-Mossotti relation. (12)

(b). Find out potential and electric field at external point due to a polarized sphere. (07)

Q.1

OR

(a). Prove that the divergence of magnetic vector potential is zero. (12)

(b). Prove that $\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$. (07)

Q-2

(a). Derive Maxwell's equations in integral form. (10)

(b). Prove that the normal component of electric displacement is discontinuous across the interface. (07)

(c). If the average density of electrons in an ionosphere is given by 6×10^{10} electrons m^{-3} then calculate plasma frequency and phase constant. (02)

Q.2

OR

(a). Discuss propagation of plane electromagnetic waves in ionized gas and derive the

formula of conductivity $\sigma = -\frac{jNe^2}{m\omega}$ in an ionized media. (10)

(b). Prove that the normal component of electric displacement is discontinuous across the interface. (06)

(c). Write Maxwell's equations in differential form. (03)

(P.T.O.)

Q-3

- (a). Derive formula for Einstein's coefficients A_{12} , B_{21} and B_{12} . (10)
- (b). Explain continuous X-ray spectra. (07)
- (c). Define meta stable states. (02)

Q. 3

OR

- (a). Explain Construction and working of Ruby LASER. (07)
- (b). Explain Construction and working of He-Ne LASER. (10)
- (c). Define population inversion. (02)

Q-4

- (a). Explain the principle of light transmission in a optical fiber. Derive the formula for the Numerical aperture (NA) and explain acceptance angle and acceptance cone. (12)
- (b). Explain dispersion effect in optical fiber. (06)

Q. 4

OR

- (a). Explain uses of optical fiber. (09)
- (b). Explain with block diagram elementary optical fiber communication system. (09)