M.sc Mathematics Semester – III C.No : 3471

NOV 2014

Time - 2:30 Paper No : 10 Relative – I Marks : 70

Q.1 (a) State and prove Gauss-flux theorem . [7]

(b) Prove that if a closed equipotential surface contains no charge , the potential is constant through out the surface. [7]

OR

Q.1 (a) Discuss principle of superposition . [7]

(b) Discuss with all details electric dipole. [7]

Q.2 (a) Discuss Faraday's law of induction . [7]

(b) Assuming that the charge distribution has spherically symmetric , solve $\nabla^2\phi = 0$ using the method of separation of variables. [7]

OR

Q.2 (a) Discuss with all details gauge's transformations. [7]

(b) in usual notation derive $\overline{E} = -\frac{1}{c}\cdot\frac{\partial \overline{A}}{\partial t} - \nabla\phi$ [7]

Q. 3 In usual notation derive $F_{ij,k} + F_{jk,i} + F_{ki,j} = 0$ [14]

OR

Q.3 (a) Discuss Michelson-Morley experiment and explain outcome of this experiment. [14]

Q. 4 (a) Show that $x^2 + y^2 + z^2 - c^2t^2$ is invariant under Lorentz's transformation . [7]

(b) Write a short note on time dilation. [7]

OR

Q.4 (a) Show that $-dx^2 - dy^2 - dz^2 + c^2dt^2$ is invariant under Lorentz's transformation. [7]

(b) Obtain the relativistic formulae for the composition of velocities. [7]

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Q. 5 (a) Obtain Lorentz's transformation and show that they form a group . [14]

OR

Q.5 (a) Obtain Galilean transformation . [7]

(b) Write a short note on Length contraction. [7]

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