Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 31358

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fourth Semester

Electronics and Communication Engineering

EC 2253/EC 43/10144 EC 404/EC 1253/080290021 — ELECTROMAGNETIC FIELDS

(Regulation 2008/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the relationship between electric field and potential.

2. Define gradient.

3. What is magnetic dipole moment?

4. Write the Lorentz force equation.

5. Write the equation of continuity.

6. Compare self inductance and mutual inductance.

7. State Faraday's law.

8. Define dissipation factor.

9. Write the constitutive relations concerning the characteristics of the medium in which the fields exist.

10. Write the equation for Brewster angle.

PART B — (5 × 16 = 80 marks)

11. (a) Apply Gauss law to find charge enclosed in hollow sphere whose surface is uniformly charged. Derive the equation for potential due to a system of point charges. (16)

Or

(b) State and prove stoke's theorem and divergence theorem. (16)

12. (a) Derive the expression for Biot–savart law. Derive the equation for torque on a current carrying loop. (16)

Or

(b) Find H–field on the axis of a ring carrying a constant current. Highligth the similarities between Biot–savart law and coulomb's law. (16)

13. (a) Derive the boundary relations for

(i) E – field (8)

(ii) H – field. (8)

Or

(b) A composite conductor of cylindrical cross section used in overhead line is made of a steel inner wire of radius "a" and an annular outer conductor of radius "b", the two having electrical contact. Evaluate the H–field within the conductors and the internal self – inductance per unit length of the composite conductor. (16)

14. (a) State and prove poynting theorem. Write the expression for instantaneous, average and complex poynting vector. (16)

Or

(b) Write the inconsistency of Ampere's law. Is it possible to construct a generator of EMF which is constant and does not vary with time by using EM induction principle? Explain. (16)

15. (a) Derive the wave equations from Maxwell's equations. Give the illustration for plane waves in good conductors. (16)

Or

(b) Explain the parallel polarization with respect to oblique incidence. Discuss the types of polarization. (16)

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