[Total No. of Questions - 9] [Total No. of Printed Pages - 2]
(2125)

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B. Tech 5th Semester Examination

Electromagnetic Field Theory (NS)

EC-314

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question each from sections A, B, C and D. Section E (Question no. 9) is compulsory.

SECTION - A

1. (i) State and prove Stokes's law. (10)

   (ii) Give the expression for energy stored in static electric field. (10)

2. Derive the equation for the potential at a point inside a solid sphere having uniform charge density. (20)

SECTION - B

3. State and explain Biot-Savart law. How this law may be applied in obtaining the flux density B at a distance R from a thin linear conductor of infinite length with a current I? (20)

4. (i) Discuss boundary conditions for current density. (10)

   (ii) Prove that the electric field intensity is equal to the negative gradient of the potential. (10)

SECTION - C

5. (i) Derive the relation between E and H in uniform plane wave. (10)

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   (ii) How Maxwell's equation can be used to determine the condition at boundary surface of two different media? (10)

6. (i) State and prove Poynting's theorem. (10)

   (ii) Discuss polarization and relative permittivity. (10)

SECTION - D

7. (i) What is meant by (a) Characteristic impedance (b) Propagation constant of a transmission line? (10)

   (ii) Deduce an expression for the input impedance of a given line at a given frequency, when terminated by given impedance. (10)

8. Discuss the importance of impedance matching in transmission lines. Describe two methods by which impedance matching may be effected. (20)

SECTION - E

9. (a) What is scalar product? Explain.

   (b) What is the need of surface integral?

   (c) Discuss the physical interpretation of divergence.

   (d) State Gauss's law.

   (e) What is analogy between electric field and magnetic field?

   (f) Explain reflection of waves by perfect insulators briefly.

   (g) Define EM wave in homogeneous medium.

   (h) Define reflection coefficient.

   (i) What are primary line constants and secondary constants and why they exist?

   (j) What do you mean by reflected wave and standing wave ratio. (2×10=20)