Hall Ticket Number:

Code No. : 13414 S

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
B.E. (ECE: CBCS) III-Semester Supplementary Examinations, June-2019
Electromagnetic Theory

Time: 3 hours

Max. Marks: 60

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2=20 Marks)

1. State Coulomb's law for electrostatic fields.

2. A point charge of 3 nC is on the z-axis, 2m away from the origin. Find the resultant V and $\overline{E}$?

3. Explain the Biot-Savart's Law?

4. State Uniqueness theorem?

5. Differentiate between self and mutual inductances? Also give the applicable expressions?

6. Find the inductance of a solenoid 30 cm long and 3 cm diameter wound with 100 turns of wire carrying a current of 10A?

7. What is the inconsistency of Ampere's law?

8. Define polarization of an electromagnetic wave?

9. Distinguish between parallel and perpendicular polarization?

10. Justify why Brewster's angle is known as Polarizing angle?

Part-B (5 ×8=40 Marks)

11. a) State and prove Gauss law with neat diagram? [4]

    b) A point charge of 15nC is situated at the origin and another point charge of –12 nC is located at the point (3,3,3). Find $\overline{E}$ at the point (0,-3,-3)? [4]

12. a) Establish Poisson's equations from gauss law? [4]

    b) Derive the boundary conditions for the tangential and normal components of Electrostatic fields at the boundary between two perfect dielectrics? [4]

13. a) Obtain the field due to a straight current carrying filamentary conductor of finite length using Biot Savart's Law? [4]

    b) For a N turn Solenoid of circular cross section, carrying a current I, determine the magnetic field inside? [4]

14. a) Distinguish between good conductors and good dielectrics. [4]

    b) Derive Maxwell's equations for time varying fields in Differential form? [4]

15. a) Derive the expressions for the transmission coefficient and Reflection coefficient of Normal Incidence at a plane of perfect dielectric with neat illustrations? [4]

    b) A traveling wave has two linearly polarized components E_x = 2 Coswt and [4]

    E_y = 3 Cos (wt + π/2). Calculate the axial ratio and the tilt angle of the major axis of the elliptical polarization?

16. a) Explain how divergence theorem can be applied for electrostatic domain? Give necessary mathematical forms? [4]

    b) Derive the expression for propagation constant, attenuation constant and phase constant when an electromagnetic wave propagates through dielectric medium? [4]

17. Answer any *two* of the following:

   a) Write down the magnetic boundary conditions? [4]

   b) Starting from the wave equation, show that for a good conductor the surface impedance is equal to the intrinsic impedance? [4]

   c) With necessary mathematical expressions discuss Poynting vector theorem? [4]

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