Hall Ticket Number:

#### Code No. : 13405 O3

## VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD B.E. (ECE) II Year I-Semester Old Examinations, May/June-2018

#### **Electromagnetic Theory**

Time: 3 hours

Max. Marks: 70

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

### Part-A $(10 \times 2 = 20 \text{ Marks})$

- 1. State Coulomb's law.
- 2. Describe about Azimuthal symmetry.
- 3. Write about importance of uniqueness theorem.
- 4. Compare homogeneous and isotropic mediums.
- 5. What is the inconsistency in Ampere's circuital law?
- 6. Describe the sources for steady magnetic fields.
- 7. List Maxwell's equations in dielectric medium for static fields.
- 8. Write important characteristics of Uniform Plane Wave.
- 9. Relate reflection coefficient with transmission coefficient of an electromagnetic wave.
- 10. Differentiate Elliptical and circular wave polarizations.

#### Part-B $(5 \times 10 = 50 \text{ Marks})$ (All bits carry equal marks)

- 11. a) Write various charge distributions in electrostatics. Write down integral expressions for finding total charge of these distributions.
  - b) The surface of a spherical conducting shell carries a uniform charge density  $\rho c/m^3$ . Find the field intensity due to a spherical shell both inside and outside.
- 12. a) Derive Poisson's equation.
  - b) The surface at x = 0 separates two perfect dielectrics. For  $x > 0 \in_{r_1} = 3$  and  $x < 0 \in_{r_2} = 5$ . If  $\vec{E}_1 = 80\hat{a}_x - 60\hat{a}_y - 30\hat{a}_z$  V/m. Find  $\vec{D}_1, \vec{E}_2$  and  $\vec{D}_2$  if the boundary is charge free.
- 13. a) Explain about magnetic potentials.
  - b) A current sheet  $\vec{K} = 8\hat{a}_x$  A/m flows in the region -2 < y < 2 in the plane Z = 0. Show that  $\vec{H}$  at P(0,0,3) is  $-8\hat{a}_{\gamma}$ .
- 14. a) Formulate wave equation for magnetic field in dielectric medium.
  - b) The magnetic field intensity associated with a uniform plane wave propagating in free space is given by  $\vec{H} = H_0 \left[ \cos(9\pi \times 10^8 t + 3\pi y) \hat{a}_x + \sin(9\pi \times 10^8 t + 3\pi y) \hat{a}_y \right] \text{A/m.}$ Find the frequency, the direction of propagation and the associated electric field intensity.

- 15. a) Differentiate the average Poynting vector from the instantaneous Poynting vector. Give a proof of the Poynting theorem.
  - b) A plane wave travelling in free space has an electric field intensity of 61.39 v/m. Find Poynting vector.
- 16. a) An infinite sheets with charge density of  $10\eta c/m^2$  is located at y = 4 m. Find electric field at i) origin ii) y = 5m.
  - b) State and derive Continuity of current equation.
- 17. Answer any two of the following:
  - a) Applications of Biot-Savarts law.
  - b) Write short note on Phasor Maxwell's equations.
  - c) Reflection of plane waves by a perfect dielectric.

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- Reinte reflection coefficient with transmission coefficient of an electron
  - 10. Differenziate Elliptication, gitcular wave potenzations.

# (All bits carry spant marks)

- a) Write various thatge listributions in electrostatics. Write down its grad expressions are finding total charge of PhDre difficiences.
- b) The surface of a spherical symbolic ting shell carries a millorm of rise density prefactor.
  Find the field intensity due to a spherical shell both inside and outside.
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  - b) The survive at X = 0 reparates two perfect distortions.
  - $116 x > 0 \ e_{r1} = 3 \text{ and } x < 0 \ e_{r2} = 3$   $11 \ e_{r1} = 30 \ a_{r} = 60 \ a_{r} = 30 \ a_{r} = 0 \ c_{r1} = 1$ 
    - Find B<sub>22</sub> fr<sub>2</sub> and t<sub>22</sub> if it is boundary in charge nee
      - a) Explain about magnetic polynthis.
- i) A current sheaf  $\vec{K} = 2d_c$ . A inclines in the region  $-3 \le d \le 2\pi$ , the plane C = 0. Shire that  $\vec{R}$  at P(0.0.3) is -80.
  - H. a) Particulate wave equation for magnetic field in dialectric meditura
- b) The magnetic field intensity insociated with a patiform plane wave provingaling in invospace is given by  $\vec{H} = H_0 \left[ \cos(9\pi \times 10^{5}) + 3\pi y \right] \delta$ , we sin  $(9\pi \times 10^{5}) + 3\pi y d_0 \right]$ . And Find the frequency, the direction of parametrization and the accordinal electric field intensity.