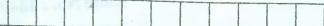
Time: 3 hours



VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD B.E. (ECE: CBCS) III-Semester Supplementary Examinations, May/June-2018

Electromagnetic Theory

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. Determine Laplacian of scalar field $A = x^2y + xyz$.

2. State Gauss law and give its applications.

3. Prove that electrostatic field is conservative.

4. Write the statement of uniqueness theorem.

- 5. Write Poisson's equation for steady Electric field.
- 6. Prove that magneto static fields have no sources or sinks and field lines are always continuous.
- 7. Convert the Maxwell's equations for mmf and emf from integral form to differential form related to the time varying fields.
- 8. Define is skin depth.
- 9. Differentiate Critical angle and Brewster angle with an example.
- 10. State Poynting theorem.

Part-B $(5 \times 10 = 50 \text{ Marks})$

- 11. a) A sphere is defined with volume charge density $\rho_v c/m^3$ and has radius 'r'. Obtain the expressions for the electric field strength and electric displacement density inside and outside the sphere using Gauss law. [6]
 - b) Determine the charge densities corresponding to the given displacement densities [4]

 $D = 4x^2 y a_x + 3x y^2 a_y C/m^2$

 $D = 2\rho \cos \phi \, a_{\rho} + 3\rho \sin \phi \, a_{\phi} + 5z a_z \, C/m^2.$

- a) Determine the capacitance between two parallel plates each one them having Area 'A'. [6] (the distance of separation between the parallel plates is 'd').
 - b) The potential distribution is given as $V = 10y^3 + 2x^2$. Find the volume charge density at [4] the point (2, 0).
- a) State and explain Ampere's circuital law for steady currents. Mention its applications and [6] limitations.
 - b) Find the magnetic field strength H on the z-axis at a point P(0,0,4) due to a current [4] carrying conductor loop, $x^2 + y^2 = 4$ in z = 0 plane.
- 14. a) For free space propagation, derive the wave equations from Maxwell's equations. [6]
 - b) In a non-magnetic medium, the wave has an electric field vector given by [4] $\vec{E} = 50 \cos(10^9 t - 8x)a_y + 40 \sin(10^9 t - 8x)a_z$. Find the dielectric constant ϵ_r and the corresponding magnetic field vector H.

15. a) Find the reflection of the	05 S
 15. a) Find the reflection coefficients of a plane wave when the reflection is from a plane surface b) Determinent 	[6]
b) Determine the reflection coefficient for an EM wave incident normally on a sheet of iron. The corresponding parameters are: frequency (f) = 1 MHz, $\sigma = 1 \times 10^6$ mho/m and $\mu = 1000\mu_0$.	[4]
16. a) Discuss the uniform and non uniform charge distributions.b) Derive continuit	
b) Derive continuity equation.	[5]
	[5]
17. Answer any <i>two</i> of the following:	[-]
a) Mutual inductanceb) Wave polarization	1
c) Oblique incidence.	[5]
Westerhoe.	[5] [5]
ଔଔଷଧ୍ୟରାହ୍ୟର	[2]
 Preventual measure entrols fields brief no sources or surface and field (interactions) a contraction. 	
related to the time setty ing the off-	
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 a) Determine the expression between two parallel phase each tax hear taxing Area 'A', (the distance of separation between the product plates is 'd'). 	
b) The potential distribution is fiven as k = 10x ² + 2x ² . Find the veltage devoid at the point (2, 0).	
3.5 at Stars and explain Ampere's constant law for stendy contents. Meanion it's opplications and lanitometers.	
b) First has meanche field strength if on the s-axis at a point Point, $(0, 0)$ due the control carried carried and $x^2 + y^2 = 4$ in $x = 0$ plane	
the corresponding mount in field vessor H.	

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