

II B. Tech I Semester Supplementary Examinations, September - 2021**ELECTRO MAGNETIC FIELDS**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions each Question from each unitAll Questions carry **Equal** Marks

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- 1 a) The potential at a point A is 10 volts and at B it is 15 volts. If a charge , [8M]  
 $Q=10\mu\text{C}$  is moved from A to B, what is the work required to be done?

- b) Define Gauss's law and explain any 2-applications? [7M]

Or

- 2 a) Find E at (2,0,2) if a line charge of 10 PC/m lies along the y-axis? [8M]

- b) Define potential difference and prove that it is independent on the shape of the path? [7M]

- 3 a) An electric dipole of  $100a_z\text{pC-m}$  is located at the origin. Find V and E at point(0,0,10)? [8M]

- b) Prove that  $E_{\tan 1}=E_{\tan 2}$  if the medium1 and medium 2 are dielectrics? [7M]

Or

- 4 a) A pair of negative and positive charges of  $10\mu\text{C}$  each are separated by A distance of 0.1m along the x-axis . Find the dipole moment? [8M]

- b) If a dielectric material of  $\epsilon_r=4.0$  is kept in an electric field  $E= 3.0a_x + 2.0a_y + a_z$  , V/m, find the polarization? [7M]

- 5 a) Derive the H-field equation due to infinitely long current element? [8M]

- b) An electron has a velocity of 1km/s along  $a_x$ , in a magnetic field whose Magnetic flux density is  $B=0.2a_x-0.3a_y+0.5a_z$  Wb/m<sup>2</sup>. i) Find the force on the electron under the influence of both E and B when  $E=(a_x+a_y+a_z)\text{KV/m}$ ? [7M]

Or

- 6 a) Given magnetic flux density ,  $B=\rho a_\phi$  ,find the total flux crossing the Surface  $\Phi = \pi/2$  ,  $1 \leq \rho \leq 2$  m and  $0 \leq z \leq 5$  m? [8M]

- b) Define Ampere's circuital law? Explain any one of its applications? [7M]

- 7 a) In a magnetic flux density of  $B=1.0a_x+ 3.0 a_y$  Wb/m<sup>2</sup> , a current element,  $10a_z$  mA/m is placed. Find the force on the current element? [8M]

- b) With suitable circuit, Define and derive the equation of mutual inductance? [7M]

Or

- 8 a) A Toroid has air core and has a cross-sectional area of 10 mm<sup>2</sup>. It has 1000 turns and its mean radius is 10 mm. Find its Inductance? [8M]

- b) Define Inductance ? Derive the Inductance equations in different forms? [7M]



- 9 a) A charge of 2.0 C moving with a velocity of  $V=(a_x+a_y)$  m/s experiences no force [8M]  
in electric and magnetic fields. If the magnetic field intensity is  
 $1/\mu_0[2a_x+2a_y+a_z]$ , A /m, find the electric field?
- b) Explain and derive the equation for mutual Inductance? [7M]
- Or
- 10 a) Explain the result due to Moving Loop in Time-Varying field? [8M]
- b) Listout the four Maxwell's equations in time-varying fields and the Laws which [7M]  
are helped to derive?

