

Code No: R21024

R10**SET -1****II B. Tech I Semester Supplementary Examinations, Oct/Nov- 2017****ELECTRO MAGNETIC FIELDS**

(Electrical and Electronics Engineering)

(2010,2011 ADMITTED B.TECH AND 2011,2012 LATERAL ENTRY B.TECH)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

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1. a) Derive the expression for electric field due to a sheet of charge. (8M)  
b) An infinite uniform line charges of 5 nC/m lie along the x and y axis in free space. (7M)  
Find E at (0, 0, 4) and (0, 3, 4).
2. a) Discuss about behavior of conductors in electric field. (8M)  
b) Calculate numerical values for V and  $\rho_v$  at point P in free space if (i)  $V = \frac{4yz}{x^2 + 1}$ , (7M)  
at P(1, 2, 3) (ii)  $V = 5\rho^2 \cos 2\Phi$  at P( $\rho = 3$ ,  $\Phi = \pi/3$ ,  $z = 2$ ).
3. Derive the boundary conditions for perfect dielectric materials. (16M)
4. a) State and explain Biot – Savart's Law. (8M)  
b) A thin ring of radius 5 cm is placed on plane  $z = 1$  cm so that its center is at (0, 0, 1) cm. If the ring carries 50 mA along  $\mathbf{a}_\Phi$ , find H at (i) (0, 0, -1) cm and (0, 0, 10) cm. (7M)
5. a) Derive the third Maxwell equation from Ampere's circuit law. (8M)  
b) Determine the magnetic field due to infinite long coaxial transmission line using Ampere's circuit law. (7M)
6. a) Discuss about force on current element in magnetic field. (8M)  
b) Show that a charged particle in a uniform magnetic field describes a circular orbit with an orbital period that is independent of the radius. (7M)
7. a) Explain the term scalar magnetic potential and write the use of it. (8M)  
b) Derive the expression for energy in magnetostatic field. (7M)
8. a) Explain about Poynting theorem and Poynting vector. (8M)  
b) In free space,  $\mathbf{E} = 20 \cos(\omega t - 50x) \mathbf{a}_y$  V/m, Calculate  $\mathbf{J}_d$ ,  $\mathbf{H}$  and  $\omega$ . (7M)