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SEAT No. :

PD4295

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T.E. (E & TC Engineering)

ELECTROMAGNETIC FIELD THEORY

(2019 Pattern) (Semester - V) (304182)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data if necessary.***
4) ***Use of a Calculator is allowed.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Derive the boundary conditions of the normal and tangential components of electric field at the inter face of two media with different dielectrics. **[6]**

b) Derive boundary conditions for dielectric material. **[6]**

c) A region y > = 0 consists of a dielectric medium and the region y < 0 is a conductor. For surface charge of 4nC/m^2 on the conductor and εr1 = 3 (for dielectric medium). Find E' and D' at the points : **[6]**

i) M(4, –2, 1)

ii) N(–3, l, 4)

OR

Q2) a) Two extensive homogeneous isotropic dielectrics meet on plane z = 0, for z > = 0, εr1 = 4 and z < = 0, εr2 =3. A uniform electric field El' =5ax' –2ay' + 3az' kV/m exists for z > = 0. Find : **[10]**

i) E2' for z < = 0

ii) Angles El and E2 make with interface

iii) The energy densities in J/m^3 in both dielectrics.

b) Derive an expression for capacitance of a spherical capacitor. **[8]**

Q3) a) State and Explain Displacement Current Density and Displacement Current. Explain Physical Significance of displacement current. **[8]**

b) b)Calculate displacement current through parallel plate air filled capacitor having plates if area 10cm^2 separated by a distance 2 mm connected to 300 V, 1 MHz source **[8]**

OR

P.T.O.

Q4) a) State and Explain Faraday's Law and Lenz's Law **[8]**

b) Write Maxwell equation for free space in point form and integral form. **[8]**

Q5) a) Derive the wave equation (Helmoltz Equation) for free space in terms of electric field. **[8]**

b) Derive the parameters of propagation constant, phase constant, intrinsic impedance, and velocity for free space medium. **[10]**

OR

Q6) a) Explain the terms Depth of penetration and Loss tangent in detail. **[8]**

b) Explain the Incidence, reflection and transmission parameters for normal incidence with suitable diagram and derive the terms Transmission coefficient and Reflection coefficient. **[10]**

Q7) a) Explain different distortions of transmission lines? What is mean by distortion less line and explain the condition of distortion less lines? **[8]**

b) Derive the equations for primary constants (R. L, G, C) if known the secondary constant (γ, Zo). **[10]**

OR

Q8) a) Explain the following terms in detail with respect to open, short and matched terminations of transmission Lines. **[8]**

i) Reflection Coefficient

ii) Return Loss

iii) VSWR

b) A lossless 100Ω transmission line is terminated in an impedance 50+j60 Ω. Using smith chart calculate : **[10]**

i) VSWR

ii) Reflection coefficient

iii) Impedance of 0.35λ from the load.