Total No. of Questions : 8]

SEAT No. : [ ]

PA-1485

[Total No. of Pages : 2

[5926]-104

T.E. (E&TC Engineering)

ELECTROMAGNETIC FIELD THEORY

(2019 Pattern) (Semester-I) (304182)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, and Q7 or Q8.***
2) ***Figures to the right side 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) Region-1 is semi-infinite space in which $2x-5y>0$. While for region-2, $2x-5y<0$. Let $\mu r1=3$, $\mu r2=4$, H1'=30 ax' A/m. Find |B1'| and |H2'|. **[10]**

b) Derive an expression for energy stored and energy density in electrostatic field. **[8]**

OR

Q2) a) Derive an expression for the potential gradient $E=-\nabla V$ **[8]**

b) Derive an expression for the capacitance of a parallel plate capacitor having two dielectric media. **[10]**

Q3) a) State and explain displacement current density and displacement current. Explain physical significance of displacement current. **[8]**

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

Q4) a) State and explain faraday's law and lens's law. **[8]**

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

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Q5) a) What is polarization? Explain the different types of polarization in detail with. **[10]**

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

OR

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

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

Q7) a) A generator of 1V, 1KHz supplies power to 100 km long transmission line, terminated in Zo and having following parameters. R=10.4Ω/km, L=0.00367 H/km, G=0.8 × 10-6 mho/km, and C=0.00835 ×10-6 F\km calculate characteristics impedance, propagation constant, wavelength and velocity?**[8]**

b) Explain different distortions of transmission lines? What is mean by distortion less line and explain the condition of distortion less lines? **[10]**

OR

Q8) a) Explain the secondary constants (Zo,γ,α,β)of transmission line in detail **[8]**

b) A transmission line has a characteristic impedance 300Ω and terminated in a load Z_L=150+j150Ω. Find the following using smith chart. **[10]**

i) VSWR

ii) Reflection coefficient

iii) Input impedance at a distance 0.1λ from the load

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