Total No. of Questions: 8]

SEAT No. : [ ]

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[6003]-393
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 Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
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 Poisson's and Laplace's equation from Gauss's Law. State Laplace's equation in three co-ordinate system **[10]**

b) Derive an boundary expression for dielectric-dielectric medium **[8]**

OR

Q2) a) For a parallel plate capacitor, area of plate A=12cm^2, spacing between plate d = 5mm separated by dielectric of $\in_r = 12$, connected to 40 V battery find: **[8]**

i) Capacitance
ii) E
iii) D
iv) Energy stored in capacitor

b) Derive an boundary expression for an interface between two magnetic medium with permeability μ_1 and μ_2 **[10]**

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

b) Write a Short note on Faradays' Law and Lenz's law **[8]**

OR

Q4) a) State and Prove Poynting Theorem **[8]**

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

P.T.O.

Q5) a) Explain Snell's law of refraction. Derive the same. **[10]**

b) Explain reflection of Uniform Plane wave **[8]**

OR

Q6) a) Define depth of penetration, Derive the expression for depth of penetration for good conductor. **[8]**

b) Define **[10]**

i) Phase velocity

ii) Group Velocity

iii) Propogation Constant

iv) Intrinsic impendence

v) Wavelength

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) A lossy dielectric is characterized by $\in_r = 2.5$ $\mu_r = 4$ and $\sigma = 10^3$ per ohm.m at frequency 10 MHz find **[10]**

i) attenuatin Constant

ii) Phase constant

iii) Velocity of Propagation

iv) Wavelength and

v) Intrinsic impendence

OR

Q8) a) Derive relation between Primary constant and secondary constant of transmission line **[8]**

b) A 50 ohm transmission line is terminated in a load $Z_L = 25 + j50\ \Omega$. The length of transmission line is 3.3 lambada Find the following using smith chart **[10]**

i) VSWR

ii) Reflection coefficient

iii) Input impedance

iv) input admittance.