Code: 15A04403 **R15**

B.Tech II Year II Semester (R15) Regular & Supplementary Examinations May/June 2018

ELECTROMAGNETIC THEORY & TRANSMISSION LINES

(Electronics & Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define vector product of two vectors.

(b) Write down Laplace's and Passions equations.

(c) State Biot-Savarat law.

(d) Describe magnetic vector potential.

(e) What is the specialty of Maxwell's third equation?

(f) State Faraday's law.

(g) Write down the complex poynting vector in rectangular coordinates.

(h) Find the velocity of a plane wave in a loss less medium with $\varepsilon r = 4\ and\ \mu r = 1$.

(i) A 50Ω line is terminated in load $Z_R = 90 + j60\Omega$. Determine VSWR due to this load.

(j) What is the need for stub matching in transmission lines?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Derive the expression for capacitance of a parallel plate capacitor having:
(i) Two dielectric media. (ii) Three dielectric media.

OR

3 Four positive point charges 10^{-9} each are situated in x-y plane at points (0, 0), (0, 1) and (1, 0) m. Find the electric field intensity and electric potential at (1/2, 1/2).

UNIT – II

4 A circular loop located at $x^2 + y^2 = 25,\ z = 0$ carries a current of 8 A along $\overrightarrow{a_\phi}$. Find the magnetic flux density at (0, 0, 6 m).

OR

5 Derive an expression for the torque experienced by a rectangular current loop placed in a magnetic field.

UNIT – III

6 Derive the Maxwell's equation both in integral and differential forms.

OR

7 A circular loop having radius 0.1 m and resistances 5Ω lies in the z = 0 plane. The circular loop is subjected to a magnetic field of $\vec{B} = 0.2\sin(10^3 t)\,\overrightarrow{a_z}(Wb/m^2)$. Find the current in the loop due to induced e.m.f.

UNIT – IV

8 Derive and explain the wave propagation in good dielectric.

OR

9 State and prove poynting theorem.

UNIT – V

10 An open wire transmission line has R = 10 ohms per km, L = 0.0037 Henry per km, G = 0.4 x 10^{-6} mhos per km and C = 0.0083 x 10^{-6} Farad per km. Determine the characteristic impedance and propagation constant. Assume frequency as 1000 Hz.

OR

11 Derive the equations of attenuation constant and phase constant of a transmission line in terms of R, L, C & G.

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