Code No: 135AP

IV-I ECE

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, December - 2019

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

(Common to ECE, ETM)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	State Coloumb's Law.	[2]
b)	What is Electric Potential? Give relation between E and V.	[3]
c)	State Faraday's Law of electromagnetic induction.	[2]
d)	What is a dielectric material? What are its applications?	[3]
e)	Define Uniform Plane waves.	[2]
f)	State Poynting Theorem.	[3]
g)	Define Characteristic Impedance.	[2]
h)	What are the different types of Transmission lines?	[3]
i)	What are primary and secondary constants of Transmission line?	[2]
j)	Explain about reflection coefficient.	[3]

PART – B

(50 Marks)

2.a) Explain in detail about Electric Potential.

b) Two point charges -4 μC and 5 μC are located at (2,-1, 3) and (0, 4, -2) respectively. Determine the potential at (1, 0, 1) assuming zero potential at infinity. [5+5]

OR

3.a) Prove that Electric field intensity E is the negative gradient of V.

b) Formulate the Continuity of Current equation. [5+5]

4. In a certain conducting region $H=yz(x^2 + y^2)\, a_x - y^2xz a_y + 4x^2y^2 a_z$ A/m

a) Determine J at (5, 2, -3)

b) Determine current passing through x=-1, 0<y, z<2

c) Prove that ∇.B=0. [4+3+3]

OR

5. Explain the following boundary conditions with necessary equations:

a) Dielectric-dielectric Interface

b) Dielectric-conductor Interface. [5+5]

6. Explain the Reflection of plane waves at oblique incidences for
a) Perfect Conductor
b) Perfect Dielectric. [5+5]

OR

7. Describe the following in detail
a) Brewster Angle
b) Critical angle and Total Internal Reflection
c) Surface Impedance. [3+4+3]

8.a) A transmission line operating at 500MHz has Z_o=80 Ω, α=0.04Np/m, β=1.5 rad/m. Determine the line parameters R, L, G and C.
b) Formulate the condition for Distortionless and minimum attenuation transmission. [5+5]

OR

9.a) Explain the different types of loading in transmission lines.
b) A distortionless line has Z_o=60 Ω, α=20mNp/m, u=0.6c, where c=3×10^8m/sec. Determine R, L, G, C and λ at f=100MHz. [5+5]

10. Formulate expressions for input impedance of: [5+5]
a) Lossy Transmission line
b) Lossless Transmission line.

OR

11.a) A 30m long lossless Transmission line with Z_o=50 Ω operating at 2 MHz is terminated by a load of Z_L=60 +j40 Ω. If u=0.6c on the line, Determine
i) Reflection coefficient
ii) Standing Wave Ratio
iii) Input Impedance
b) Explain in detail the applications of Smith Chart. [6+4]

---ooOoo---