R09

Code No: 54011

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, July/August - 2021
ELECTROMAGNETIC THEORY AND TRANSMISSION LINES
(Electronics and Communication Engineering)

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

Answer any five questions
All questions carry equal marks

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1.a) State and explain Coloumb's Law in detail.
b) Point charges 5 nC and -2 nC are located at (2,0,4) and (-3,0,5) respectively. Determine:
i) Force on a 1 nC point charge located at (1,-3,7)
ii) Electric field E at (1,-3,7) [7+8]

2.a) Discuss in detail about Isotropic and Homogeneous dielectrics.
b) Derive Laplace and Poisson's Equations. [8+7]

3. Determine magnetic field intensity H by applying Ampere's Law to the following:
a) Infinite line current
b) Infinite sheet of current
c) Infinitely long coaxial transmission line. [5+5+5]

4.a) Express Maxwell's Equations in different final forms.
b) Explain in detail about Displacement current density. [8+7]

5.a) Determine wave equations for perfect dielectric media.
b) What are conductors and dielectrics? Explain. [10+5]

6.a) Explain Reflection and Refraction of plane waves for normal incidence.
b) Discuss in detail about Total Internal Reflection. [10+5]

7.a) Write short notes on the following:
i) Characteristic Impedance
ii) Propagation constant
iii) Phase and group velocities.
b) A distortion-less line has Z_0=60Ω, α=20mNp/m, u=0.6c, where c is the speed of light in vaccum. Find R, L, G, C and λ at 100 MHz. [9+6]

8.a) A certain transmission line operating at $\omega=10^6$ rad/sec has α=8dB/m, β=1 rad/m and Z_0=60+j40Ω, and is 2m long. If the line is connected to a source of $10\angle 0^0$ V, Z_g=40Ω and terminated by a load of 20+j50 Ω, determine:
i) Input Impedance
ii) Sending end current
b) Explain the configuration and applications of Smith Chart. [6+9]

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