

Code No: R1622043

R16**SET - 1****II B. Tech II Semester Supplementary Examinations, November - 2018****ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES**

(Com to ECE, EIE)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answer **ALL** the question in **Part-A**3. Answer any **FOUR** Questions from **Part-B**

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**PART -A**

1. a) Define Continuity equation? Write in equation form? (3M)
- b) List out the boundary conditions between dielectric to dielectric and dielectric to conductor? (3M)
- c) Define parallel and vertical polarizations? (2M)
- d) Define Poynting vector? (2M)
- e) Define loss less line and write the primary and secondary constants at this Condition? (2M)
- f) Define stub matching? (2M)

**PART -B**

2. a) Prove that  $E = -\nabla V$  (7M)
- b) The point Charges  $-1nC$ ,  $4nC$ , and  $3nC$  are located at  $(0,0,0)$ ,  $(0,0,1)$  and  $(1,0,0)$ , respectively. Find the energy in the System. (7M)
3. a) Derive the electric field boundary conditions between dielectric and conductor? (7M)
- b) An electron with velocity  $u = (3a_x + 12a_y - 4a_z) \cdot 10^5$  m/s experiences no net Force at a point in a magnetic field  $B = 10a_x + 20a_y + 30a_z$  mWb/m<sup>2</sup>. Find E at that point. (7M)
4. a) Define uniform Plane wave? What are the characteristics of plane Wave? Explain (7M)
- b) A manufacturer produces a ferrite material with  $\mu = 750\mu_0$ ,  $\epsilon = 5\epsilon_0$ , and  $\sigma = 10^{-6}$  S/m at 10MHz. i) Would you classify the material as lossless, lossy, or conducting? (7M)  
ii) Calculate  $\beta$  and  $\lambda$ .
5. a) A uniform plane wave in air is normally incident on an infinite lossless Dielectric material having  $\epsilon = 3\epsilon_0$  and  $\mu = \mu_0$ . If the incident wave is  $E_i = 10\cos(\omega t - z)a_y$  V/m, find  $\gamma$  (7M)
- b) Explain the concept of critical angle and total internal reflections (7M)

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6. a) A lossless transmission line operating at 4.5GHz has  $L=2.4\mu\text{H/m}$  and  $Z_0=85\Omega$ . Calculate the phase constant  $\beta$  and the phase velocity  $u$ . (7M)
- b) A distortion less line at 150 MHz has  $Z_0=75\Omega$ ,  $\alpha=0.06\text{ Np/m}$ , and  $u=2.8 \times 10^8\text{ m/s}$ . Calculate the line parameters  $R, G, C$  and  $L$ . (7M)
7. a) A  $75\Omega$  transmission line is terminated by a load impedance  $Z_L$ . If the line is  $5\lambda/8$  long. Calculate  $Z_{in}$  When  $Z_L=25-j65\Omega$ . (7M)
- b) Derive the  $Z_{in}$  of a short circuit Line? (7M)