

II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016**EM 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 **THREE** Questions from **Part-B****PART -A**

1. a) Define line charge and surface charge distributions. (3M)
- b) Explain the significance of boundary conditions. (4M)
- c) How can you determine the direction of wave propagation? (3M)
- d) Write the application of poynting theorem. (4M)
- e) Compare the transmission line characteristics of lossy, lossless and distortion less transmission lines. (4M)
- f) Sketch the input impedance of a lossless line for shorted and open circuited conditions. (4M)

PART -B

2. a) Define Electric potential and derive the relationship between electric potential and electric field. (8M)
- b) A circular loop located on $x^2 + y^2 = 9$, $z = 0$ carries a current of 10 A along $\mathbf{a}_\phi$. Determine $\mathbf{H}$ at (0, 0, 4) and (0, 0, -4). (8M)
3. a) What is inconsistency of Ampere's law? Explain how Maxwell modified this law. (8M)
- b) In free space, $\mathbf{E} = 20 \cos(\omega t - 50x) \mathbf{a}_y$ V/m, Calculate $\mathbf{J}_d$, $\mathbf{H}$ and ω . (8M)
4. a) Derive the expression for intrinsic impedance in a lossy dielectric medium. (8M)
- b) Given that $\mathbf{E} = 40 \cos(10^8 t - 3x) \mathbf{a}_y$ V/m (8M)
 - (i) Determine the direction of wave propagation.
 - (ii) The velocity of the wave and the wavelength.
5. a) Discuss about reflection and refraction of plane waves for oblique incidence with $\mathbf{E}$ perpendicular to the plane of incidence. (8M)
- b) An elliptically polarized wave in air has x and y components: (8M)

$$E_x = 4 \sin(\omega t - \beta z) \text{ V/m}$$

$$E_y = 8 \sin(\omega t - \beta z + 75^\circ) \text{ V/m.}$$
 Find the poynting vector.
6. a) What are secondary constants of transmission lines and explain their significance. (8M)
- b) An air line has a characteristic impedance of 70Ω and a phase constant of 3 rad/m at 100 MHz. Calculate the inductance per meter and the capacitance per meter of the line. (8M)
7. a) Explain about double stub matching. (8M)
- b) Define reflection coefficient of a transmission line and derive the expression for it. (8M)
