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**

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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 **a** . Determine **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, **E** = 20 cos(ωt -50x) **a$_y$** V/m, Calculate **J$_d$**, **H** and ω. (8M)

4. a) Derive the expression for intrinsic impedance in a lossy dielectric medium. (8M)
   b) Given that **E** = 40 cos(10^8t – 3x)**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 **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(wt – βz) V/m
      E_y = 8 sin(wt – βz + 75^U) 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 70and 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)

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