Code No: R22042   **R10**   SET - 1

II B. Tech II Semester Supplementary Examinations, November – 2017
ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES
(Com. to ECE, EIE)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) State and explain Gauss law.   (8M)

   b) Point Charges Q_1 and Q_2 are respectively located at (4, 0, -3) and (2, 0, 1). If $Q_2 = 4$ (7M)
      nC, find Q_1 such that
      (i) The **E** at (5, 0, 6) has no z-component
      (ii) The force on a test charge at (5, 0, 6) has no x-component.

2. a) State and explain Ampere's circuit law. Find magnetic field intensity due to infinite   (8M)
      line current using Ampere's circuit law?

   b) A current distribution gives rise to the vector magnetic potential $\mathbf{A} = x^2y\mathbf{a_x} + y^2x\ \mathbf{a_y}$ (7M)
      $- 4xyz\ \mathbf{a_z}$ Wb/m. Calculate the following:
      (i) **B** at (-1, 2, 5)
      (ii) The flux through the surface defined by z = 1, $0 \le x \le 1$, $-1 \le y \le 4$.

3. a) Write Maxwell equations in differential form and integral form. Write each   (8M)
      equation in word statements also.

   b) A conducting circular loop of radius 20 cm lies in the z = 0 plane in a magnetic   (7M)
      field $\mathbf{B} = 10 \cos 377t\ \mathbf{a_z}$ mWb/m^2. Calculate the induced voltage in the loop.

4. a) Discuss about wave propagation in free space.   (8M)

   b) What is meant by skin depth? Derive the expression for it.   (7M)

5. a) Discuss about Reflection and Refraction of Plane Waves at normal incidence for   (10M)
      perfect Dielectrics.

   b) Write the application of poynting theorem.   (5M)

6. Discuss about TE modes in parallel plane waveguides.   (15M)

7. a) Define the term characteristic impedance and derive the expression for it.   (8M)

   b) Calculate the line parameters R, G, L and C for a lossy line with α = 0.25 Np/m, β =   (7M)
      4.2 rad/m, $Z_0 = 100 – j5\ \Omega$, f = 60 MHz.

8. a) Explain the following: (8M)
      (i) Shorted Line
      (ii) Open circuited line
      (iii) Matched Line

   b) Explain about construction of smith chart.   (7M)

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