Reg. No.

B.Tech. DEGREE EXAMINATION, MAY 2019
Third Semester

EC0201 – ELECTROMAGNETIC THEORY AND
WAVEGUIDES

(For the candidates admitted from the academic year 2907-2008 to 2012-2013)

Time: Three hours   Max. Marks: 100

Answer ALL Questions
PART – A (10 × 2 = 20 Marks)

1. List the difference between circuit theory and electromagnetic field theory.
2. Define Stroke's theorem.
3. Define Faraday's law.
4. Write short notes on infinite line current using ampere's law.
5. Write the Maxwell's equation in phasor form.
6. Define displacement current density.
7. Define Poynting theorem and its vector.
8. Write short notes on skin depth.
9. What are waveguides?
10. Define and write an expression for cutoff frequency and cut-off wavelength.

PART – B (5 × 16 = 80 Marks)

11. a.i. A finite shut $0 \le x \le 1$, $0 \le y \le 1$ on the $Z = 0$ plane has a

charge density $\rho_s = xy\left(x^2 + y^2 + 25\right)^{3/2} nc / m^2$. Find

   (1)   Total charge on the sheet
   (2)   Electric field at (0, 0, 5)
   (3)   Force experienced by a -1mC charge located at (0, 0, 5).

ii. Check validity of the divergence theorem considering the field $\bar{D} = 2xy\bar{a}_x + x^2\bar{a}_y, \; C / m^2$ and the rectangular parallo piped formed by the plates
$x = 0, \; x = 1, \; y = 0, \; y = 2, \; z = 0, \; z = 3.$

(OR)

b. Write in detail about the spherical coordinate system and the transformations.

12. a. Explain in detail Biot Savart's law and derive the expression for magnetic field intensity.

(OR)

b. Derive an expression to find the magnetic field intensity for infinitely long coaxial transmission line using ampere's law.

13. a. Write in detail transformer and motional EMF and the ways how the flux changes with time.

(OR)

b. Discuss in detail time varying potentials.

14. a. Discuss in detail the wave propagation in lossy dielectric medium.

(OR)

b. Write in detail plane waves in lossless dielectrics.

15. a. Discuss in detail transverse electric waves in a rectangular waveguides.

(OR)

b. Discuss in detail transverse magnetic waves in a rectangular waveguides.

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