R20 Regulation *Subject code: 3P4DE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech IV Semester Regular/Supplementary Examinations, September 2023

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES
(ELECTRONICS & COMMUNICATION ENGINEERING)

Maximum Marks: 70 Date:23.09.2023 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 State coulomb's law.
2 Define electric potential.
3 Define magnetic vector potential and magnetic scalar potential?
4 Define inductance? What's the energy stored in an inductor?
5 What is Brewster angle?
6 What is uniform plane wave?
7 Define intrinsic impedance or characteristic impedance of free space
8 Define transmission line? What are the different types of transmission lines?
9 A loss less line of 300Ω characteristic impedance is terminated in a pure resistance of 200Ω. Find the value of standing wave ratio.
10 What is meant by stub matching?

Part-B

Answer All the following questions. (5X10M=50Marks)

11 A. State and prove 'Gauss's law' in electrostatics. [3M]
B. Using Gauss's law, derive the expressions for electric field intensity and electric flux density due to an infinite sheet of conductor of charge density ρ C/m^2. [7M]

OR

12 A. Derive the continuity equation. [5M]
B. The point charges -1 nC, 4 nC and 3 nC are located at (0, 0, 0), (0, 0, 1) and (1, 0, 0) respectively. Find the energy in the system. [5M]

13 A. State and prove Ampere's circuital law? [5M]
B. Derive the expression for magnetic field intensity due to infinite sheet of current using Ampere's law. [5M]

OR

14 A. State Biot-savart's law and derive an expression for H of infinitely long straight conductor with line current placed along z-axis? [5M]
B. Derive an expression for H in case of Solonoid and Toroid using Amperes circuit law? [5M]

15 State and prove Poynting theorem. [10M]

OR

16 What is the meant by polarization of wave? When the wave is linearly polarized and circularly polarized? [10M]

17 A. Derive the expression for loss less transmission line? [5M]
B. What is the condition of loading in transmission lines? What are the different types of loadings? [5M]

OR

18 Derive secondary constants of Transmission line in terms of primary constants. [10M]

19 Explain reflection coefficient and VSWR of a transmission line. [10M]

OR

20 What is single stub matching? Find the length and location of the single stub to avoid the reflections from the load end. [10M]