R20 Regulation *Subject code: 3P3BE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Regular/Supplementary Examinations, March/April 2023

ELECTRO MAGNETIC FIELDS

(EEE)

Maximum Marks: 70 Date:10.04.2023 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.
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 What is the physical significance of divergence?
2 How is the unit vectors defined in three coordinate systems?
3 List few applications of Gauss law in Electrostatics.
4 Define electric field intensity and electric potential and write the relationship between them.
5 State point form of Ohm's law.
6 What is the significance of Laplace's and Poisson's equations?
7 Write the expressions for Force on a straight and a long current carrying conductor in a magnetic field when the current in the conductors is in same direction and opposite directions.
8 Define self-Inductance and mutual Inductance.
9 Write the Maxwell's equation in point form and integral form.
10 State Poynting theorem.

Part-B

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

11 Describe different types of coordinate systems with neat sketches. 10M

OR

12 (a) Derive an expression for Curl of a vector. 6M
(b) For A Given Point (2, -3, 1) convert it into Cylindrical and Spherical coordinate system point. 4M

13 (a) Using Gauss law, derive the expression for electric field intensity due to an infinite length of line charge. 5M
(b) A circular disc of radius 'a' m is charged uniformly with a charge density of c/m^2. Find the electric field at a point 'h' m from the disc along its axis. 5M

OR

14 (a) What is an electric dipole? Obtain expression for torque experienced by an electric dipole in a uniform electric field. 5M
(b) Find the electric field at distance 'z' above the center of a flat circular disc of radius 'r', which carries a uniform surface charge. 5M

15	(a) Derive the boundary conditions of perfect dielectric materials.	5M
	(b) A filamentary current of 15A is directed in from infinity to the origin on the positive x axis and then back out to infinity along the position y-axis. Use the Biot-Savart's law to find H at P (0, 0, 1)?	5M
	OR	
16	(a) Derive the expression for magnetic field intensity due to infinitely long co-axial transmission line. Use ampere circuital law.	5M
	(b) Derive the magnetic field intensity due to an infinite length current carrying conductor by using Biot Savart's law.	5M
17	(a) Two parallel current carrying conductors separated by a distance of 4m carries current of 10A and 15A in opposite directions. Find the force on each conductor. Also find the field intensity at mid-point between the two conductors.	5M
	(b) Derive the expression for self-inductance of a toroid.	5M
	OR	
18	(a) Determine the inductance of a solenoid of 2500 turns wound uniformly over a length of 0.25m on a cylindrical paper tube, 4cm in diameter and the medium is air.	5M
	(b) Derive the expression for the force between two finite current carrying loops.	5M
19	(a) State and explain Faraday's laws of electromagnetic induction.	5M
	(b) Derive the wave equation in phasor form.	5M
	OR	
20	(a) Derive the Maxwell's equation in phasor form.	5M
	(b) Discuss about the plane waves in lossy dielectrics.	5M