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B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Third Semester

EC16302 – ELECTROMAGNETIC FIELDS*(Electronics and Communication Engineering)***(Regulation 2016)****Time: Three Hours****Maximum : 100 Marks**

Answer ALL questions

PART A - (10 X 2 = 20 Marks)

	CO	RBT
1. Give the gradient relationship between potential and electric field intensity.	1	U
2. Mention the features of Coulomb's law.	1	R
3. State Ampere's circuital law.	2	R
4. Write the expression for Lorentz force equation.	2	R
5. State Poisson's and Laplace's equations.	3	U
6. What is mutual inductance?	3	U
7. What is polarization?	3	U
8. State point form of Ohm's law.	3	R
9. Distinguish between conduction current and displacement current.	4	AP
10. State Faraday's law.	4	R

PART B - (5 X16 = 80 Marks)

11. (a) A circular disc of radius 'a' is charged uniformly with a charge density of σ Coulomb's/m². Find the electric field intensity at a point 'h' from the disc along its central axis. **(16)** 1 AP
- (OR)**
- (b) (i) Derive the expression for potential due to an electric dipole at any point P. Also find electric field intensity at the same point. **(8)** 1 AP
- (ii) State and prove Gauss's law. Also explain applications of Gauss's law. **(8)** 1 U

12. (a) Derive the boundary conditions of the normal and tangential components of electric field at the interface of conductor and free space. (16) 2 AP

(OR)

- (b) (i) Derive Poisson's and Laplace's equation. (6) 2 AP
(ii) Solve one dimensional Laplace equation to obtain the field inside a Parallel plate capacitor and also find the expression for the surface charge density at two plates. (10) 2 AN

13. (a) Using Biot-Savart's law, derive the magnetic field intensity on the axis of a circular loop carrying a steady current I. (16) 3 AP

(OR)

- (b) Derive the magnetic field intensity in the different regions of co-axial cable by applying Ampere's circuital law. (16) 3 AP

14. (a) (i) Derive an expression for the force between two current carrying wires. Assume that the currents are in the same direction. (10) 3 AP

- (ii) Two wires carrying current in the same direction of 2 A and 4 A are placed with their axes 5 cm apart. Calculate the force per unit length. (6) 3 AN

(OR)

- (b) (i) Derive the expression for inductance of a Solenoid with N turns and l meter length carrying a current of I amperes. (8) 3 AP
(ii) Classify different magnetic materials with suitable examples. (8) 3 U

15. (a) Derive Maxwell's equation in point form and integral form from basic laws and mention the significance of point form. (16) 4 AP

(OR)

- (b) (i) State and prove Poynting theorem. (10) 4 U
(ii) Derive the wave equation for uniform plane waves. (6) 4 AP