Code: 9A02404

R09

B.Tech II Year II Semester (R09) Supplementary Examinations May/June 2017

ELECTROMAGNETIC FIELDS

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

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1 (a) Define unit vectors in spherical coordinate system.
(b) State the condition for the vector to be solenoid.

2 (a) Differentiate and explain conductors and dielectrics.
(b) The electric field E in air above a block of paraffin with relative dielectric constant = 2.1 is at an angle of 45^0 with respect to the plane surface of the block. Find the angle between E and the surface in the paraffin.

3 (a) Derive the conditions at a boundary between two dielectrics.
(b) State Ohm's law in point form.

4 A single phase circuit comprises of two parallel conductors A and B, 1 cm radius and 1 m apart. The conductors carry +10A and -10A respectively. Determine the magnetic field intensity at the surface of each conductor and also in the space exactly mid way between A and B. Establish the relations used.

5 Evaluate both sides of Stoke's theorem for the field $\overline{H} = \frac{y^2 z}{x} a_x + \frac{0.5 y^2 z^2}{x^2} a_z$ A/m and find the current in a_y direction crossing the square surface in the plane y = 2 bounded by x = z = 1 and x = z = 2.

6 (a) Explain magnetic dipoles and magnetic moment.
(b) A rectangular coil of area 10 cm^2 carrying a current of 50 A lies on plane 2x + 6y - 3z = 7 such that the magnetic moment of the coil is directed away from the origin. Calculate its magnetic moment.

7 (a) Determine the inductance of a solenoid carrying N turns on a magnetic core of axial length 1 meter and cross sectional area of A m^2.
(b) A solenoid of 10 cm in length consists of 1000 turns having the cross section radius of 1 cm. find the inductance of the solenoid. What is the value of current required to maintain a flux of 1 mWb in solenoid. Take μ_r = 1500.

8 Write Maxwell's equations in good conductors for time varying fields and static fields both in differential and integral form.

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