KUMARAGURU college of technology
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Register Number: ……..

B.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2009)

Second Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

EEE102: Electro Magnetic Theory

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. A vector field A = p 1_n is given in Cartesian coordinates. In cylindrical coordinates it will be represented as
   a) A = cosφ 1_r
   b) A = cosφ 1_r + sinφ I_φ.
   c) A = sinφ 1_r.
   d) A = cosφ 1_r – sinφ 1_r

2. Which of following is zero?
   a) Grad div A
   b) div Gradient V
   c) div curl A
   d) curl curl A

3. The electric field intensity at a point situated 4 metres from a point charge is 200 N/C. If the distance is reduced to 2 metres, the field intensity will be
   a) 400 N/C
   b) 600 N/C
   c) 800 N/C
   d) 1200 N/C

4. If the sheet of a bakelite is inserted between the plates of an air capacitor, the capacitance will
   a) Decrease
   b) Increase
   c) remains unchanged
   d) become zero

5. A 2 m long conductor, carries a current of 50 A at a magnetic field of 100×10^{-3} T. The force on the conductor is
   a) 10 N
   b) 100N
   c) 1000N
   d) 10000N

6. Which of following is a vector quantity?
   a) Magnetic field intensity
   b) Flux density
   c) Magnetic potential
   d) Relative permeability

7. An emf of 16 volts is induced in a coil of inductance 4 H. The rate of change ofcurrent must be

a) 64 A / s
b) 32 A / s
c) 16 A / s
d) 4 A / s

8. For static magnetic field Maxwell's curl equation is given by.
a) $\nabla B = \mu_o J$
b) $\nabla \times B = O$
c) $\nabla \times B = \mu o/J$
d) $\nabla \times B = \mu o\, J$

9. Poynting vector is associated with which of the following?
a) Power flow in electromagnetic
b) Flux in magnetic field
c) Charge in electrostatic field
d) Current in electrostatic field

10. Electromagnetic waves are
a) longitudinal.
b) transverse
c) both longitudinal and transverse
d) Neither longitudinal nor transverse

PART B (10 x 2 = 20 Marks)

11. What is the physical significance of div D?
12. What are the sources of electromagnetic fields?
13. State coulombs law
14. Write Poisson's and Laplace's equations.
15. Define self and mutual inductance
16. What is lorentz force?
17. What is meant by displacement current?
18. What is meant by motional emf?
19. Define propagation constant.
20. Define skin depth.

PART C (5 x 14 = 70 Marks)

21. a) Explain the various co-ordinate systems in detail

(OR)

b) Determine the Divergence and Curl of the vector
$\bar{A} = x^2 \check{a}_x + y^2 \check{a}_y + y^2 \check{a}_z$

22. a) Find the potential at any point along the axis of a uniformly charged disc σ C/m^2. The disc has radius 'a' m.

(OR)

b) Derive the expression for electric field produced due to
i) infinite line charge

ii) infinite sheet of charge

iii) uniformly charged sphere

23. a) State and prove Boundary conditions for magnetic fields

(OR)

b) i) State Biot savart law and determine the magnetic field at point P due to this current carrying conductor. (7)

ii) State Ampere circuital and determine the magnetic field due to an infinitely long thin current carrying conductor (7)

24. a) i) Differentiate between circuit theory and field theory. (10)

ii) The magnetic circuit of a toroid has a uniform cross section of $10^{-3}m^2$ .If the circuit is energized by current of $L_i(t)=3\sin 100\Pi t$ amperes in the coil of N_1 =100 turns , find the emf induced in the coil of N_2 =100 turns ,$\mu=500\mu_0$ .Mean radius of toroid is 10cm. (4)

(OR)

b) Derive Maxwell's equation for static field.

25. a) Explain in detail behavior of plane waves in lossless medium

(OR)

b) State and derive Poynting theorem and also average power density.

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