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**Question Paper Code : 31392**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Third Semester

Electrical and Electronics Engineering

EE 2202/EE 34/EE 1201 A/10133 EE 303/080280017 — ELECTROMAGNETIC  
THEORY

(Regulation 2008/2010)

(Common to PTEE 2202 – Electromagnetic Theory for B.E. (Part-Time)  
Second Semester Electrical and Electronics Engineering – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How are the unit vectors defined in cylindrical coordinate systems?
2. State Stoke's theorem.
3. Define electric potential and potential difference.
4. Name few applications of gauss law in electrostatics.
5. Write down the magnetic boundary conditions.
6. What is Lorentz law of force?
7. Distinguish between transformer emf and motional emf.
8. What is displacement current?
9. State the Poynting theorem.
10. Mention any two properties of uniform plane wave.

PART B — (5 × 16 = 80 marks)

11. (a) Write short notes on the following :

- (i) Gradient
- (ii) Divergence
- (iii) Curl and
- (iv) Stokes theorem. (16)

Or

(b) Express the vector  $\vec{B}$  in Cartesian and cylindrical systems. Given,  $\vec{B} = \frac{10}{r} \vec{a}_r + r \cos \theta \vec{a}_\theta + \vec{a}_\phi$ , then find B at  $(-3, 4, 0)$  and  $(5, \pi/2, -2)$ . (16)

12. (a) Deduce an expression for the capacitance of a parallel plate capacitor having two dielectric media. (16)

Or

- (b) (i) State and derive electric boundary conditions for a dielectric to dielectric medium and a conductor to dielectric medium. (10)
- (ii) Derive the expression for energy density in electrostatic fields. (6)

13. (a) State and explain Ampere's circuital law and show that the field strength at the end of a long solenoid is one half of that at the centre. (16)

Or

- (b) (i) State and explain Biot-Savart's law. (6)
- (ii) Derive an expression for the force between two long straight parallel current carrying conductors. (10)

14. (a) Derive and explain Maxwell's equations both in integral and point forms. (16)

Or

(b) Obtain the expression for energy stored in the magnetic field and also derive the expression for magnetic energy density. (16)

15. (a) Derive the relationship between electric field and magnetic field. Derive the wave equation for magnetic field in phasor form. (16)

Or

(b) Define Brewster angle and derive its expression. (16)