

Seat No. **MAR\_APR 2025 SUMMER EXAMINATION****11731 Bachelor of Technology (NEP-2.0)****Sub. Name: Electromagnetic Engineering****Sub. Code: 63469/81065/80808****Day and Date: MAY ,07-05-2025****Total Marks: 70****Time: 02:30 PM To 05:00 PM**

- Instructions:**
1. All questions are compulsory
  2. Assume suitable data wherever necessary and mention it boldly
  3. Figures to the right indicate full marks
  4. Use of Scientific calculator is allowed

**Q1) Solve following MCQ.****[14]**

- i. According to Biot- Savart's law, which parameter is inversely proportional to the differential magnetic field intensity (dH)?
  - A. Current
  - B. Magnitude of differential length
  - C. Sine of angle between filament & line connecting differential length to point
  - D. Square of the distance from differential element to point
- ii. Electromagnetic waves travelling in a medium having relative permittivity 1.3 and relative permeability 2.14. The speed of electromagnetic waves in medium must be
  - A.  $1.8 \times 10^8$  m/s
  - B.  $1.8 \times 10^4$  m/s
  - C.  $1.8 \times 10^6$  m/s
  - D.  $1.8 \times 10^2$  m/s
- iii. The Cartesian system is also called as
  - A. Circular coordinate system
  - B. Rectangular coordinate system
  - C. Spherical coordinate system
  - D. Space coordinate system
- iv. Find the magnetic flux density when a point from a finite current length element of current 0.5A and radius 100nm.
  - A. 0
  - B. 0.5
  - C. 1
  - D. 2
- v. Ampere law states that,

- A. Divergence of H is same as the flux
- B. Curl of D is same as the current
- C. Divergence of E is zero
- D. Curl of H is same as the current density

vi. Apply divergence theorem for  $D = 5r^2/4 \hat{i}$  in spherical coordinates between  $r=1$  and  $r=2$ .

- A.  $80\pi$
- B.  $5\pi$
- C.  $75\pi$
- D.  $85\pi$

vii. Standing wave ratio is defined as the

- A. Ratio of voltage maxima to voltage minima
- B. Ratio of current minima to current maxima
- C. Product of voltage maxima and voltage minima
- D. Product of current maxima and current minim

Q2) Attempt any TWO of the following [14]

- a. State and Explain Coulombs Law. [7]
- b. Derive the expression for Electric field intensity at a point due infinite line charge? [7]
- c. Explain Method of Image for line charge. [7]

Q3) Attempt any TWO of the following [14]

- a. Evaluate both sides of Divergence theorem  $D = [5(x^3)/2]\hat{a}_x$  for the volume of cube 1 m on the edge centered at origin and with edge parallel to the axis [7]
- b. State and explain Gauss law and its application. [7]
- c. Explain Spherical co-ordinate system [7]

Q4) Attempt any TWO of the following [14]

- a. Derive and Explain wave equation for electric and magnetic field for lossless media. [7]
- b. Write a note on: i) VSWR ii) Characteristics Impedance iii) Reflection Coefficient [7]
- c. A transmission line has  $R = 4.11 \Omega/\text{KM}$ ,  $L = 0.00337 \text{ H}/\text{KM}$   $G = 0.29 \mu \text{ mho}/\text{KM}$ ,  $C = 0.00945 \mu\text{F}/\text{KM}$ . Determine input impedance, characteristic impedance and propagation constant of a 20 km long line terminated in a load [7]

$100 + j 100 \Omega$  at a frequency of 1 kHz.

- Q5)** Attempt any TWO of the following **[14]**
- a.** State and Explain Stoke's theorem. **[7]**
- b.** Derive Maxwell's equations for a static field. **[7]**
- c.** Explain Smith chart and its applications. **[7]**

## End Of Question Paper

**Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -**

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (101) Bachelor of Engineering (81065) Electromagnetic Engineering Part 3 SEM 5
- 2] (101) Bachelor of Engineering (63469) Electromagnetic Engineering Part 2 SEM 4
- 3] (1154) B.Tech. CBCS (80808) Electromagnetic Engineering Part 3 SEM 5