

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2019****Subject Code: 2151002****Date: 06/06/2019****Subject Name: Engineering Electromagnetics****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define and explain DOT and CROSS products. **03**  
 (b) Compare Cylindrical and spherical co-ordinate systems. **04**  
 (c) The three vertices of a triangle are located at A(6, -1, 2), B(-2, 3, -4) and C(-3, 1, 5). **07**  
 Find: (a)  $\mathbf{R}_{AB}$ ; (b)  $\mathbf{R}_{AC}$ ; (c) the angle  $\theta_{BAC}$  at vertex A; (d) the (vector) projection of  $\mathbf{R}_{AB}$  on  $\mathbf{R}_{AC}$ .
- Q.2** (a) Briefly explain streamlines and sketches of fields. **03**  
 (b) State and prove Divergence theorem. **04**  
 (c) Derive Maxwell's first equation using Gauss's law. **07**  
**OR**  
 (c) State and prove Gauss's law. **07**
- Q.3** (a) State Coulombs Law. Also derive vector form of coulombs law. **03**  
 (b) A charge of  $-0.3 \mu\text{C}$  is located at A(25, -30, 15) (in cm), and a second charge of  $0.5 \mu\text{C}$  is located at B(-10, 8, 12) (in cm). Find  $\mathbf{E}$  at: (a) Origin, (b) P(15, 20, 50) (in cm). **04**  
 (c) Derive equation of electric field intensity due to line charge. **07**  
**OR**
- Q.3** (a) Define potential and potential difference. **03**  
 (b) Infinite uniform line charges of  $5 \text{ nC/m}$  lie along the (positive and negative) x and y axes in free space. Find  $\mathbf{E}$  at: (a) A(0, 0, 4); (b) (0, 3, 4). **04**  
 (c) State and explain Faraday's law. **07**
- Q.4** (a) Explain measurement of curl using curl meter. **03**  
 (b) Define and explain current and current density. **04**  
 (c) Write short note on boundary conditions for metallic conductors. **07**  
**OR**
- Q.4** (a) Write Poisson's and Laplace's equations. **03**  
 (b) Briefly explain Hall effect. **04**  
 (c) Write short note on magnetic boundary conditions. **07**
- Q.5** (a) Write Maxwell's equations in point and integral form. **03**  
 (b) Briefly explain skin effect. **04**  
 (c) State and explain Amperes circuital law. **07**  
**OR**
- Q.5** (a) For TEM waves, prove that  $\mathbf{E} \cdot \mathbf{H} = 0$ . **03**  
 (b) Briefly explain stokes theorem. **04**  
 (c) State and explain Biot-Savart law. **07**

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