Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VI EXAMINATION – WINTER 2015

Subject Code:160906 **Date:11/12/ 2015**

Subject Name: Theory of Electromagnetics

Time:2:30pm to 5:00pm **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)	Explain the relationship between Cartesian and cylindrical as well as Cartesian and spherical systems.	07
(b)	The three vertices of a triangle are located at A(6,-1,2), B (-2,3,-4) and C(-3,1,5). Find (i) R_{AB} (ii) R_{AC} (iii) the angle θ_{BAC} at vertex A; (iv) the projection of R_{AB} on R_{AC}	07
Q.2(a)	Explain experimental law of Coulomb. A charge of -0.3 µC is located at A(25,-30,15) and second charge of 0.5 µC is at B(-10,8,12). Find E at origin.	07
(b)	Define (i) Electric Field Intensity (ii) Electric Flux Density (iii) Cross product (iv) Dot product	07
	OR	
(b)	Derive the necessary equation of Electric field intensity due to infinite sheet of charge.	07
Q.3(a)	State and prove Gauss's Law.	07
(b)	Define Divergence and Curl and its physical meaning.	07
	OR	
Q.3(a)	Derive Maxwell's first equation as applied to electrostatics, using Gauss's Law.	07
(b)	Show that the divergence of flux density due to point charge and uniform line charge is zero.	07
Q.4(a)	Define potential difference. Derive e the necessary equation of potential difference due to point charge.	07
(b)	A point charge of 5 nC is located at origin in free space, find potential of point A , if A is located at (1,2,3) and (i) V at origin. (ii) V =10 V at (2,3,4)	07
	OR	
Q.4(a)	Derive Poisson's and Laplace's equation.	07
(b)	Explain the advantages of Numerical techniques.	07
Q.5(a)	Explain Ampere's Circuital Law.	07
(b)	Explain the classification of magnetic materials.	07
	OR	
Q.5(a)	Explain the eddy current testing of materials.	07
(b)	Explain in brief magnetic resonance imaging and magnetic shielding.	07