

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2140909

Date:28/05/2018

Subject Name:Field Theory

Time:10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

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

		MARKS
Q.1	(a) State and explain Coulomb's law.	03
	(b) Explain physical Significance of Curl related to types of field.	04
	(c) Obtain the Spherical co-ordinates of $10\vec{a}_x$ at the point P(x = 2, y = 3, z = 4).	07
Q.2	(a) State and Explain various types of charge distribution with mathematical equation.	03
	(b) Derive relation between current density and Volume charge Density.	04
	(c) Define potential difference and potential gradient. Also Establish relation between Electrical field and potential gradient.	07
	OR	
	(c) An Electrical potential is given by $V = \frac{60 \sin \theta}{r^2}v$. Find V and E at spherical co-ordinate P (3, 60°, 25°) .	07
Q.3	(a) Give examples of different capacitor configuration.	03
	(b) If a potential $V = x^2yz + Ay^3z$ Find 'A' So that Laplace's equation is satisfied.	04
	(c) Obtain the Expression for field intensity H at the centre of a circular carrying current I, using Biot-Savart law	07
	OR	
Q.3	(a) Write Poisson's and Laplace equation. also state use of this equation and uniqueness theorem	03
	(b) State and Explain Ampere's circuit Law.	04
	(c) Derive boundary condition between two perfect Dielectrics.	07
Q.4	(a) State and Explain Stoke's theorem	03
	(b) A copper conductor having a 0.8 mm diameter and length 2 cm carries a current of 20 A. Find Current density, Electrical Field Intensity, voltage drop and resistance for 2 cm length. Take conductivity of copper is 5.8×10^7 S/m.	04
	(c) Explain force between two differential current elements.	07
	OR	
Q.4	(a) Explain magnetic dipole moment.	03
	(b) Given point C (5,-2, 3) and D (4,-1, 2) and current element $I d\vec{L} = 10^{-4}(4,-3, 1)$ Am at point C, which produce a field $d\vec{H}$ at point D .Find $ d\vec{H} $.	04
	(c) Derive Point form of Maxwell's equation for static field and time varying field using Faraday's law	07
Q.5	(a) Define term Electromagnetic Interference and Electromagnetic compatibility.	03
	(b) Write Name of EMC standards bodies.	04
	(c) Derive transmission line Equation in terms of voltage and current.	07

OR

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| Q.5 | (a) | Explain primary constant and secondary constant of transmission line. | 03 |
| | (b) | Give physical description of transmission line propagation. | 04 |
| | (c) | Discuss methods for controlling of EMI | 07 |
