

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular Semester Examination – Summer 2022

Course: B. Tech. Branch : BTech (Electrical Eng.) Semester :IV

Subject Code & Name: BTEEPE405A / Electromagnetic Field Theory

Max Marks: 60

Date:27/08/22

Duration: 3.45 Hrs.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

Q.1 Solve Any Two of the following.

- A) What is the angular separation between the vectors $A = 4i + 3j + 5k$ and $B = i - 2j + 2k$ is (in degrees) also transform the vector $A = 3i - 2j - 4k$ at $P(2,3,3)$ to cylindrical coordinates. L1/CO1 6
- B) Find the volume and surface area of cylinder with height =3m and radius =2m and convert the following to cylindrical coordinates. a) (0, -2,2), b) (3,1, -1), c) (-2,2,3). L2/CO1 6
- C) Four point are $A(2,3,-1)$, $B(1,5,2)$, $C(3,1,-5)$, $D(1,2,3)$ find $AB+CD$ and $AB-CD$ and graphically represent vector AB . L3/CO1 6

Q.2 Solve Any Two of the following.

- A) Explain the following a) coulomb law, b) Electric flux density c) Electric Field Intensity L3/CO2 6
- B) Two point charge 0.7mC and 4.9microC are situated in free space at(2,3,4) and (0,0,0). Calculate the force on the 0.7mC charge L2/CO2 6
- C) A charge Q located at the origin in free space produce a field for which $E=1Kv/m$ at point $P(-2,1,-1)$. Find i) Q and ii) E at $M(1,6,5)$ L3/CO2 6

Q.3 Solve Any Two of the following.

- A) Explain Work done and importance Properties of work done L2/CO3 6
- B) Evaluate work done in bringing a charge of 5 uC from origin to P (2,-1.4) through field $E=2xyza_x+x^2za_y+xyza_z$ (V/m) through the path Straight line segments (0, 0, 0) to (2, 0, 0) to(2,-1, 0) to (2, -1, 4) L3/CO3 6
- C) Two point charges-4 μC and 5 μC are located at (2,-1, 3) and (0,4,-2) respectively. Find the potential at (1, 0, 1) assuming zero potential at infinity L3/CO3 6

Q.4 Solve Any Two of the following.

- A) Let $V = 2xyz$ and $\epsilon = \epsilon_0$. Given point P (1, 3, -1). Find V at point P. Also find if V satisfies Laplace equation. L3/CO4 **6**
- B) The electric field intensity in polystyrene ($\epsilon_r = 2.55$) filling the space between the plates of a parallel plate capacitor is 10 kV/m. The distance between the plates is 1.5 mm. Calculate The surface charge density of free charge on the plates. (ii) The potential difference between the plates L3/CO4 **6**
- C) What do you mean by Poisson Equation. Explain in brief. L3/CO4 **6**

Q. 5 Solve Any Two of the following.

- A) In a certain conducting region $H = yz(x^2 + y^2) \mathbf{a}_x - y^2xz \mathbf{a}_y + 4x^2y^2 \mathbf{a}_z$ (Am) L3/CO5 **6**
 .Determine J at (5,2,-3)
- B) Explain the Applications of Biot-Savart Law L3/CO5 **6**
- C) Write a short note on Ampere's Circuital Law L3/CO5 **6**

*** End ***