Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code :** | **14EE2004** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ELECTROMAGNETIC FIELDS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Express vector in Cartesian and cylindrical coordinates. Given,. Then find at (-3, 4, 0) and (5, π/2, -2) | CO1 | 10 |
| b. | Obtain the expression for the volume of a sphere of radius R from the differential volume. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Transform an Cartesian vector to cylindrical coordinates at a point P(2,3,5) | CO1 | 10 |
| b. | A vector field is given by . Show that it is both irrotational and solenoidal. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Three point charges of 3\*103 µ µC are placed at 3 corners of a square. The side of a square is 0.2m. Find electric field intensity at vacant corner. | CO2 | 15 |
| b. | State and explain Columbs law in detail. | CO1 | 5 |
| **(OR)** | | | | |
| 4. | a. | An infinitely long line charge of uniform density ρL C/m is placed along *Z* –axis. Find the expression for electric field intensity at a point in *Y* –axis, which is ‘*a*’ meters away from *Z* –axis. | CO2 | 15 |
| b. | Derive Poisson equation from Gauss law and give its significance. | CO2 | 5 |
|  |  |  |  |  |
| 5. | a. | Using Biot Savart Law, formulate the due to infinitely long straight conductor. | CO2 | 15 |
| b. | The inductance of a single layer solenoid of 10 turns is 5 μH. Find the correct value of inductance when the number of turns is 20 and the length is doubled. | CO1 | 5 |
| **(OR)** | | | | |
| 6. | a. | Show the mathematical representation of Ampere’s Circuital Law. | CO1 | 5 |
| b. | Using Ampere’s circuital law, evaluate the due to a coaxial cable carrying current *I*. | CO2 | 15 |
|  |  |  |  |  |
| 7. |  | Derive the expression of Maxwell equation in integral form and differential form. | CO2 | 20 |
| **(OR)** | | | | |
| 8. | a. | Define Faraday’s law of electromagnetic induction. Describe with suitable diagrams the concept of transformer emf and motional emf. | CO2 | 10 |
| b. | Deduce the magnetic boundary conditions between a conductor and a dielectric. | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Mention the significance of Poynting theorem. | CO3 | 4 |
| b. | A copper sheet has *σ* = 5.8 × 107 siemens/m and *μr*= 1. Calculate the skin depth at the frequency of 100 Hz. | CO3 | 8 |
| c. | Using Maxwell’s equations, derive the electromagnetic wave  equations for a conducting medium. | CO3 | 8 |