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



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

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| **Code :** | **17EE2002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ELECTROMAGNETIC FIELDS** | **Max. Marks :** | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | and  Find the projection of  on  and  on . | CO1 | 6 |
| b. | Obtain the expression for the volume of a sphere of radius R from the differential volume. | CO1 | 7 |
| c. | . Find  and  at the point (2m,2m, 1m). | CO1 | 7 |
| **(OR)** | | | | |
| 2. | a. | Three point charges q1 = 10- 6 C, q2 = -10 -6 C and q3 = 0.5 x 10 -6 C are located in the corners of an equilateral triangle of 50 cm side. Determine the magnitude and direction of the force on q3. | CO1  CO4 | 10 |
| b. | Derive an expression to find the electrostatic field at a distance ρ meter away from an infinite line conductor with a charge density ρl Coulomb/ meter. | CO2 | 10 |
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| 3. | a. | A hollow sphere is charged to 12 μ C of electricity. Find the  potential (a) at its surface (b) inside the sphere (c) at a distance 0.3m  form the surface. The radius of the sphere is 0.1 m. | CO1  CO2 | 7 |
| b. | Derive Poisson’s equation. | CO2 | 6 |
| c. | Derive expressions for the energy stored in a capacitor and energy density. | CO2 | 7 |
| **(OR)** | | | | |
| 4. | a. | Derive an expression to find the capacitance of a coaxial cacle. | CO2,CO4 | 10 |
| b. | Use Laplace equation to derive the equation for the capacitance of a parallel plate capacitor. | CO2 | 7 |
| c. | Determine the capacitance of a sphere of diameter 1cm and relative permittivity 4. | CO1 | 3 |
|  |  |  |  |  |
| 5. | a. | State Ampere’s circuital law. Also use the law to determine the magnetic field intensity at various distance away from the centre of a coaxial cable. | CO2  CO4 | 9 |
| b. | A air core toroid has a mean radius of 40mm and is wound with  4000 turns of wire. The circular cross section of the toroid has a  radius of 4mm. A current of 10A is passed in the wire. Find the  inductance and the energy stored. | CO1  CO4 | 7 |
| c. | Discuss about magnetic Vector potential. | CO2 | 4 |
| **(OR)** | | | | |
| 6. | a. | State Biot Savart’s law. Derive an expression to find the magnetic field intensity H at a distance ρ meter away from an infinite conductor carrying current I amps. | CO2 | 8 |
| b. | Calculate the inductance of a solenoid 8cm in length 2cm in radius having  μr =100 and carrying 900 turns of wire. | CO1 | 8 |
| c. | State Ampere’s circuital law and discuss about its applications. | CO2 | 4 |
|  |  |  |  |  |
| 7. | a. | Derive point form of Ohm’s law. | CO2 | 5 |
| b. | Discuss about transformer and motional e.m.f. | CO2 | 8 |
| c. | Derive Maxwell’s equation in point form and integral form derived from Ampere’s law. | CO3,CO5 | 7 |
| **(OR)** | | | | |
| 8. | a. | If the magnetic field =[3x +6 y ]\*e-3t . Find current  density  ‘ | CO5 | 10 |
| b. | Discuss about all the Maxwell’s equations. | CO2,CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | State and prove Poynting theorem. | CO3 | 10 |
| b. | Obtain the wave propagation equation in conducting medium and also its possible solution. Also explain about skin effect in conducting medium. | CO3  CO6 | 10 |