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



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

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| **Code :** | **18EE2005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ELECTOMAGNETIC FIELDS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (10X1 = 10 MARKS)** | | | |
| 1. | A vector is solenoid, if () = \_\_\_\_\_\_\_\_\_\_. | CO1 | 1 |
| 2. | A unit vector has \_\_\_\_\_\_\_\_\_\_ direction to that of the main vector. | CO1 | 1 |
| 3. | The capacitance of a parallel plate capacitor having stored energy of 5µJ with a voltage between the plates of 4V is \_\_\_\_\_\_\_\_\_\_. | CO2 | 1 |
| 4. | If both the mediums are dielectrics, then boundary condition is given as \_\_\_\_\_\_\_. | CO2 | 1 |
| 5. | Two identical coaxial circular coils carry the same current I but in opposite directions. The magnitude of magnetic field at a point on the axis midway between the coil is \_\_\_\_\_\_\_\_\_\_. | CO3 | 1 |
| 6. | What is scalar magnetic potential? | CO3 | 1 |
| 7. | Mention the significance of displacement current density. | CO4 | 1 |
| 8. | Write the Maxwell’s equations in differential form. | CO5 | 1 |
| 9. | Give the characteristic impedance of free space. | CO6 | 1 |
| 10. | Define skin depth. | CO6 | 1 |

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| **PART – B (6 X 3 = 18 MARKS)** | | | |
| 11. | Find the distance between two points A(3,60o,30o) and B(3,30o,120o). | CO1 | 3 |
| 12. | State and derive Poisson’s and Laplace equations. | CO2 | 3 |
| 13. | Two wires carrying current in the same direction of 3A and 6A are placed with their axes 5 cm apart, free space permeability µo=4π x10-7 H/m. Estimate the force between them in N/m length. | CO4 | 3 |
| 14. | Calculate the inductance of a solenoid of 300 turns wound tightly on a cylindrical tube of 5 cm diameter. The length of the tube is 50 cm and the solenoid is in air. | CO3 | 3 |
| 15. | Distinguish between conduction current and displacement current. | CO5 | 3 |
| 16. | Obtain the attenuation and phase shift constant for a wave in lossy dielectrics. | CO6 | 3 |

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| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | | |
| 17. | a. | Transform the following vector to spherical coordinates at the point specified  A= 4 ax – 2 ay – 4 az at P(–2, –3, 4). | CO1 | 08 |
| b. | Determine the divergence of the vector P = ρsinφ aρ + ρ2z aφ +z cosφ az. | CO1 | 04 |
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| 18. | a. | Derive an expression to find the capacitance of a co axial cable. | CO2 | 06 |
| b. | State Gauss law. Find the electric field intensity due to a uniformly charged infinite plane sheet with surface charge density of σ C/m2. | CO2 | 06 |
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| 19. |  | **State Biot –Savart’s Law**. Using Biot-savart’s law, find the magnetic field intensity H and magnetic flux density B due to infinite wire carrying a steady current I. | CO3 | 12 |
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| 20. | a. | Explain the expression for inductance of a toroidal coil carrying current I, with N turns and the radius of toroid R. | CO4 | 08 |
| b. | A solenoid has an inductance of 20mH. If the length of the solenoid is increased by two times and the radius is decreased to half of its original value, Compute the new inductance. | CO4 | 04 |
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| 21. |  | Illustrate the integral and point form of Maxwell’s equations from Faraday’s law and Ampere’s law. | CO5 | 12 |
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| 22. | a. | What are cylindrical coordinates of field . in addition, calculate at a point A given as (r=1, =45oand z=2). | CO1 | 08 |
| b. | Derive an expression for the capacitance of a parallel plate capacitor having two dielectric media. | CO2 | 04 |
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| 23. | a. | State Ampere’s circuital law and prove the same. | CO3 | 08 |
| b. | An inductive coil of 10mH is carrying a current of 10A. Analyze the energy stored in the magnetic field. | CO4 | 04 |
|  | **Compulsory:** | | | |
| 24. | a. | Using Maxwell’s equations, derive the electromagnetic wave equations for a conducting medium. | CO6 | 08 |
| b. | State and explain the poynting theorem.  Question No.24 from Module 6 | CO6 | 04 |