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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **12EC203** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ELECTROMAGNETIC FIELDS** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |
| 1. | Define the divergence of a vector. | 1 |
| 2. | Find a unit vector in the direction of the vector | 1 |
| 3. | Express Coulomb’s law in mathematical form. | 1 |
| 4. | Write the relation between the electric field intensity and the scalar electric potential difference. | 1 |
| 5. | State Biot Savart’s law. | 1 |
| 6. | Define ‘magnetic moment’. | 1 |
| 7. | Write point form of Ohm’s law. | 1 |
| 8. | Energy density in magnetic field can be expressed as \_\_\_\_\_\_\_\_\_\_\_\_ . | 1 |
| 9. | State Faraday’s law. | 1 |
| 10. | What is meant by ‘skin effect’? | 1 |

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| **PART B(5 X 3= 15 MARKS)** | | |
| 11. | Prove that divergence of curl of a vector is zero. | 3 |
| 12. | State the principle of Superposition. How, this principle is useful in field theory ? | 3 |
| 13. | What is meant by magnetic vector potential ? Explain. | 3 |
| 14. | Derive continuity equation for current. | 3 |
| 15. | Distinguish between conduction current and displacement current. | 3 |

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| **PART C(5 X 15= 75 MARKS)** | | | |
| 16. |  | Find the total charge inside a volume having volume charge density as  10z2 e-0.1xsinπy C /m3. The volume is defined between -1≤x≤1, 0≤y≤1, 1≤z≤2. | 15 |
| (OR) | | | |
| 17. |  | A vector is defined in Cartesian coordinate system as . Express the above vector in Cylindrical and Spherical coordinate systems at the point P(x=1,y=2, z=1). | 15 |
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| 18. |  | Derive an equation to find the electric field intensity at any point due to a uniformly charged line conductor. | 15 |
| (OR) | | | |
| 19. |  | Find the force on a 50 μ c charge at (0, 02) m if 4 point charges of 10 μ c are located  on the x and y axes at ± 2m. | 15 |
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| 20. | a. | A circular coil of radius 10 cm is made up of 100 turns. It carries a current of 10A.  Calculate the magnetic field intensity at the centre of the coil. | 5 |
| b. | State Ampere’s circuital law and show mathematically that this law can be applied to find the magnetic field intensity due to various types of current carrying conductors. | 10 |
| (OR) | | | |
| 21. |  | Determine the total force exerted by both E and H on a charge Q = -1.2C which moves with a velocity v =5a x + 2ay -3az; where E = -18a x +5ay -10az  v/m ; H= -4a x + 4ay +3az Tesla. | 15 |
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| 22. | a. | Determine whether or not following potential fields satisfy the Laplace’s equation  a. V=x2 –y2+z2 b. V=rcosφ +z c. V=rcos θ +φ | 9 |
| b. | A parallel plate capacitor with d = 1.2 m and plate area 0.6 m2 has a dielectric relative  permittivity of 2.8. Find the capacitance. | 6 |
| (OR) | | | |
| 23. | a. | State and derive the general expression for magnetic boundary conditions. | 9 |
| b. | Find the inductance of an ideal solenoid with 300 turns. = 0.50m, and a circular cross section of radius 0.02m. | 6 |
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| 24. | a. | Derive Maxwell’s equations in integral and point form. | 10 |
| b. | Distinguish between transformer e.m.f. and motional e.m.f. | 5 |
| (OR) | | | |
| 25. | a. | State Poynting theorem. Discuss the applications of Poynting vector. | 7 |
| b. | Derive plane wave equation in free space. | 8 |