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

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

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| **Code :** | **18EC2023** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ELECTROMAGNETIC WAVES AND WAVE GUIDES** | **Max. Marks :** | **100** |

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| **Q. No.** | | **Questions** | | **Course**  **Outcome** | | | **Marks** | | |
| **PART – A (10X1 = 10 MARKS)** | | | | | | | | | |
| 1. | | The theorem which is used to convert line integral to surface integral is \_\_\_\_\_\_ | | CO1 | | | 1 | | |
| 2. | | Give the expression of Coulomb’s law for free space. | | CO2 | | | 1 | | |
| 3. | | The unit of volume charge density is \_\_\_\_\_\_ | | CO2 | | | 1 | | |
| 4. | | Write the point form of Ohm’s law. | | CO3 | | | 1 | | |
| 5. | | Define magnetic moment. | | CO4 | | | 1 | | |
| 6. | | Write expression for energy stored in an inductor. | | CO4 | | | 1 | | |
| 7. | | Classify the various types of transmission lines. | | CO5 | | | 1 | | |
| 8. | | Write the velocity of propagation of free space. | | CO5 | | | 1 | | |
| 9. | | Give the condition for a distortion less line. | | CO6 | | | 1 | | |
| 10. | | List the transmission line parameters. | | CO6 | | | 1 | | |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | | | | |
| 11. | Locate the point P  from Cartesian to Cylindrical Co-ordinates. | | | | CO1 | | | 3 | |
| 12. | Estimate electric field intensity  at (0, 3, 4)m in Cartesian co-ordinates due to point Charge Q = 0.5μC at the origin. | | | | CO2 | | | 3 | |
| 13. | Relate magnetic field intensity and magnetic flux density. | | | | CO3 | | | 3 | |
| 14. | State the Poynting theorem. | | | | CO4 | | | 3 | |
| 15. | Summarize the fields existing in TE and TM modes of parallel plane wave guide. | | | | CO5 | | | 3 | |
| 16. | Why TEM mode is not possible to propagate in rectangular waveguide? | | | | CO6 | | | 3 | |
| **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. | | Explain the Cartesian, cylindrical and spherical coordinate system. | | | CO1 | | | 6 |
| b. | | State and prove Divergence theorem. | | | CO1 | | | 6 |
|  |  | |  | | |  | | |  |
| 18. | a. | | Derive the electric field intensity due to infinite line charge with uniform charge density C/m2 using Coulombs Law. | | | CO2 | | | 8 |
| b. | | using Gauss’s law. Calculate the total charge enclosed by the region | | | CO2 | | | 4 |
|  |  | |  | | |  | | |  |
| 19. | a. | | Make use of Biot-Savart law to develop the expression for magnetic field intensity for infinite straight conductor carrying current ‘I’ placed on the z-axis. | | | CO4 | | | 8 |
| b. | | Discuss about scalar and vector magnetic potentials. | | | CO4 | | | 4 |
|  |  | |  | | |  | | |  |
| 20. | a. | | Determine the reflection coefficient of normal incidence in perfect dielectric for parallel polarization. | | | CO5 | | | 6 |
| b. | | Explain the various types of polarization in detail. | | | CO5 | | | 6 |
|  |  | |  | | |  | | |  |
| 21. |  | | Solve the expression to find the field components of parallel plane waveguides. | | | CO5 | | | 12 |
|  |  | |  | | |  | | |  |
| 22. | a. | | Summarize the characteristics of TE and TM modes of parallel plane waveguides. | | | CO5 | | | 6 |
| b. | | Explain the impedance matching of halfwave line. | | | C06 | | | 6 |
|  |  | |  | | |  | | |  |
| 23. |  | | Derive the field components of transverse magnetic waves of rectangular waveguides. | | | CO5 | | | 12 |
|  |  | | **Compulsory:** | | | | | |  |
| 24. | a. | | Calculate the capacitance of parallel plate using Laplace's equation. | | | CO3 | | | 6 |
| b. | | Derive the wave equation for free space. | | | CO3 | | | 6 |