**Code No.PC408EC**

**METHODIST COLLEGE OF ENGINEERING & TECHNOLOGY**

**(An Autonomous Institution)**

**B.E. (ECE) IV-Semester (Supplementary) Examination, FEB-2024**

**Subject: ELECTRO MAGNETIC THEORY AND TRANSMISSION LINES**

**Time: 3 hours Max.Marks:60**

**Note: Missing data, if any, maybe suitably assumed.**

**PART-A**

**Answer All the questions. (10X2M=20M)**

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| --- | --- | --- | --- | --- |
| **Q.No.** |  **Questions** | **Marks** | **CO** | **BTL** |
| **1. a** | Convert the point P (1,300,7) into spherical coordinate system | 2 | 1 | 1 |
| **b** | Draw the electric flux lines due to infinite sheet of charge with charge density ρsc/m2 | 2 | 1 | 1 |
| **c** | State Ampere’s Circuital law | 2 | 2 | 1 |
| **d** | Find the magnetic flux density B , given magnetic field intensity in free space is H= 5ax A/m | 2 | 2 | 2 |
| **e** | What is meant by polarization of electromagnetic wave | 2 | 3 | 1 |
| **f** | What are the differences between instantaneous Poynting vector and average Poynting vector | 2 | 3 | 1 |
| **g** | Define characteristic impedance of transmission line | 2 | 4 | 1 |
| **h** | Describe about Campbell’ formula | 2 | 4 | 1 |
| **i** | Calculate reflection coefficient of a transmission line when the VSWR is equal to 3 | 2 | 5 | 2 |
| **j** | List any four applications of Smith chart | 2 | 5 | 1 |

**PART-B**

**Answer Any Five questions**. **(5X8M=40M)**

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| **Q.No.** |  | **Questions** | **Marks** | **CO** | **BTL** |
| **2.** | **a** | Derive the electric field due to infinite line charge at any general point | **4** | **1** | **2** |
| **b** | Point Charges Q1 and Q2 are respectively located at (4, 0, -3) and (2,0,1). If Q2 = 4nC, find Q1 such that the Electric Field ($\vec{E}$) at (5, 0, 6) has no z component. | **4** | **1** | **3** |
| **3.** | **a** | A scalar potential in the certain region is given by V = $\frac{1}{r^{2}}$ . Find Electric field intensity E at point P(1,600,30) and determine D in free space | **4** | **2** | **3** |
| **b** | Formulate Maxwell’s differential equations from the corresponding integral equations using Gauss Divergence and Stokes theorems | **4** | **2** | **3** |
| **4.** | **a** | What are the applications of boundary conditions? Derive the boundary conditions for static electric fields between dielectric and dielectric media interface | **4** | **3** | **2** |
| **b** | Prove the Poynting vector theorem for electromagnetic wave | 4 | **3** | **2** |
| **5.** | **a** | Determine the characteristic impedance Z0 of a transmission line which has a capacitance of 35pF/m and an inductance of 0.25μH/m | **4** | **4** | **4** |
| **b** | Explain the characteristics of distortion less transmission line | **4** | **4** | **2** |
| **6.** | **a** | Explain the properties of different transmission length with lengths λ/4, λ/2 and λ | **4** | **5** | **3** |
| **b** | What is stub matching? Explain the impedance matching using stub matching | **4** | **5** | **2** |
| **7.** | **a** | What are the different ways of finding the electric field intensity and express electric field in terms of different charge  | **4** | **1** | **2** |
| **b** | A scalar potential in the certain region is given by V = xyz + 4y2 + 2z3 volts. Find Electric field intensity E at (7,3,5).  | **4** | **2** | **3** |
| **8.** | **a** | What are the advantages of wave equations? Derive wave equation for electric field starting from Faraday’s law of electromagnetic induction in differential form | **4** | **3** | **3** |
| **b** | What are the different ways of loading transmission line? Explain any one method in detail | **4** | **4** | **3** |
| **9.** | **a** | Estimate the characteristic impedance of a transmission line for (i) short load (ii) matched load (iii) open load | **4** | **5** | **3** |
| **b** | Define Brewster angle? Find the Brewster angle when el3electromagnetic wave propagates from free space to a dielectric medium with relative dielectric constant equal to 10 | **4** | **1** | **2** |

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