**R17**

**Code No: R17A0406**

# MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

**(Autonomous Institution – UGC, Govt. of India)**

## II B.Tech II Semester Supplementary Examinations, April 2023

**Electromagnetic Theory and Transmission Lines**

**(ECE)**

| Roll No | | | | | | | | | | |
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**Time: 3 hours** **Max. Marks: 70**

**Note:** This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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**SECTION-I**

**1** a) State and prove coulomb's law. **[7M]**

b) Distinguish between conduction and convection currents. **[7M]**

OR

**2** a) An infinitely long uniform line charge is located at y =3, z = 5 . If $\rho_l$ =30 nc/m, find field E intensity at (i) origin, (ii) P(5,6,1). **[7M]**

b) Develop an expression for potential due to dipoles **[7M]**

**SECTION-II**

**3** a) Starting with Ampere's law, derive Maxwell's equation in integral form based on this law and obtain the corresponding differential equation by applying Stroke's theorem. **[7M]**

b) State and prove the boundary conditions for E and H fields for dielectric-conductor interface. **[7M]**

OR

**4** a) Explain the utility and significance of Ampere's Force Law, and obtain an expression for the force between two current loops. **[7M]**

b) Establish the expressions for the Maxwell's curl equations in differential and integral forms, for time-varying fields **[7M]**

**SECTION-III**

**5** a) Derive the relationship between E and H field and show that E/H=120 $\pi$. **[7M]**

b) What is Brewster angle? What is its significant? **[7M]**

OR

**6** a) A UPW is normally incident from free space onto a perfect conductor medium. Find the resultant reflection coefficients for electric and magnetic fields. **[7M]**

b) Define and distinguish between 'perpendicular' and 'parallel' polarizations, when a UPW travelling in air, is obliquely incident on a perfect dielectric, with neat sketches. Also write the related boundary conditions for tangential components of electric fields in both cases **[7M]**

**SECTION-IV**

**7** a) Derive an expression for input impedance at any point in a transmission line. **[7M]**

b) Derive the secondary constants for a loss less transmission line. **[7M]**

OR

**8** Using the lossy line equivalent circuit model, derive the transmission line equations in terms of load parameters. **[14M]**

## SECTION-V

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| **9** | a) Design a quarter wave transformer section to match a 75ohm cable to a load of 150 ohms at 300 MHz, and illustrate the connectivity with a neat sketch. What are its limitations? | **[7M]** |
| | b) Determine the input impedance of the transmission lines of length λ/4, λ/2 and λ/8. Assume if any data is needed. | **[7M]** |
| | OR | |
| **10** | a) A telephone line has R=30Ω/Km, L=100mH/Km, G=0 and C=20μF/Km. At f=1 KHz, determine i) Characteristic Impedance of line ii) Propagation Constant iii) Phase Velocity. | **[7M]** |
| | b) Explain in detail about Smith Chart, its configuration. | **[7M]** |

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