

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech II Year II Semester Supplementary Examinations May/June-2024**

**ELECTRO MAGNETIC THEORY AND TRANSMISSION LINES**

(Electronics and Communication Engineering)

**Time: 3 Hours**

**Max. Marks: 60**

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a State Coulomb's law and write the equation of  $F$  that exists between two unlike Charges? CO1 L2 6M  
 b Three Point Charges  $Q_1=1$  mc,  $Q_2=2$  mc and  $Q_3=-3$  mc are respectively located at (0,0,4), (-2,6,1) and (3,-4,-8). Calculate the Power on  $Q_1$ . CO1 L3 6M

**OR**

- 2 a State the Gauss's Law. Apply Gauss's law to evaluate Electric Flux Density for a Uniformly charged Sphere. CO1 L3 6M  
 b Define Eclectic Potential. What is the Relationship Between  $\bar{E}$  and  $V$ . CO1 L4 6M

**UNIT-II**

- 3 a Define Magnetic Force. Explain about the Magnetic force on a one Current Element. CO2 L3 6M  
 b Explain about Non Existence of Magnetic Mono pole. CO2 L3 6M

**OR**

- 4 a Determine the Magnetic Flux Density due to a Infinite Sheet of Current. CO2 L4 6M  
 b Define and Derive Maxwell's Equations for Electric and magnetic Fields. CO2 L3 6M

**UNIT-III**

- 5 a Show that the Displacement Current Density  $J_D = \frac{\partial D}{\partial t}$ . CO3 L2 6M  
 b State and Explain the Faraday's laws in Electromagnetic induction. CO3 L3 6M

**OR**

- 6 a A Parallel-plate capacitor with plate area of  $5\text{cm}^2$  and Plate separation of 3 mm has a voltage  $50\sin 10^3 t$  V applied to its plates. Calculate the Displacement Current assuming  $\epsilon = \epsilon_0$ . CO3 L4 6M  
 b Derive the Expressions for Displacement Current. CO3 L4 6M

**UNIT-IV**

- 7 a Define the Conducting Medium and Obtain the Expression for Intrinsic impedance. CO4 L3 6M  
 b Define the following CO4 L3 6M  
 (i) Reflection efficient (ii) Poynting Theorem (iii) Transmission Coefficient (iv) Snell's Law (v) Surface Impedance

**OR**

- 8 a Derive the Relation between  $E$  and  $H$  in free Space. CO5 L4 6M  
 b Ensure the Transmission for Perfect Conductor with Normal incidence. CO5 L4 6M

**UNIT-V**

- 9 a Distortion line has  $Z_0=60$  Ohms,  $\alpha = 0.04$  Np/m,  $u=0.6c$ , Where  $c$  is the speed of the light in a vacuum. Find  $R, L$ , and  $G$ . CO1 L4 6M  
 b Define Transmission line and Explain the Primary Constants. CO1 L3 6M

**OR**

- 10 a Derive the Expression  $Z_0 = \sqrt{Z_{OC} - Z_{SC}}$  CO1 L4 6M  
 b What is the Characteristic Impedance? Obtain the Relation between Characteristic Impedance and the Propagation Constant. CO1 L2 6M

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