

Code No: R22042

**R10**

**SET - 1**

**II B. Tech II Semester Supplementary Examinations, April-2018**  
**ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES**  
(Com. to ECE, EIE)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

1. a) State Gauss's Law and explain any three applications of Gauss's Law.  
b) A point charge of 5 nC is located at the origin. If  $V=2$  Volts at (0, 6, -8). Find the potential at A(-3,2,6) and B(1,5,7).
2. a) State and prove Biot-savart's Law?  
b) A very long solenoid with 2x2 cm cross section has an iron core ( $\mu_r = 1000$ ) and 4000 turns per meter. It carries a current of 500 mA. Find the following (i) its self-inductance per meter (ii) The energy per meter stored in its field.
3. a) Explain the Faraday's law and Transformer emf for time varying fields?  
b) In free space,  $E=20\cos(\omega t-50x)$  ay V/m. Calculate the displacement current density ( $J_d$ ), magnetic field intensity (H) and also angular frequency ( $\omega$ ).
4. a) Explain the wave propagation in lossless and conducting media.  
b) A plane wave propagating through a medium with  $\epsilon_r=8$ ,  $\mu_r=2$  has electric field component  $E=0.5 e^{-z/3} \sin(10^8 t - \beta z) \cdot a_x$  V/m. Determine (i)  $\beta$  (ii) Wave velocity (iii) H field.
5. a) State Poynting theorem and explain its significance? Derive the point and integral form of the Poynting?  
b) Find skin depth and surface resistance of a copper conductor at 100 MHz having Conductivity  $\sigma = 5.8 \times 10^7$  S/m and  $\mu_r=100$ .
6. a) Explain the different characteristics of TE and TM waves.  
b) Derive the expression for attenuation in parallel plane waveguides.
7. a) Derive the expressions for Characteristic impedance, Propagation constant of the two-conductor transmission line.  
b) Explain the conditions of a transmission line to be distortion less and lossless.
8. a) Explain the following terms:  
i) Open-Circuited line (ii) Quarter wave transformer ( $\lambda/4$ -line)  
b) Obtain the expression for Voltage reflection coefficient at the load of a Transmission line.

