

Code: 9A04406

B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2014/2015

ELECTROMAGNETIC THEORY & TRANSMISSION LINES

(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What are equipotential surfaces? Explain.
(b) Prove that inside a conductor static electric field is zero.
- 2 (a) Compare the concept of energy storage in electric and magnetic fields.
(b) Find the energy stored in the system if five charges of $5 \mu\text{C}$ each has to be arranged at the vertices of a pentagon of side 5 cm.
- 3 State and prove all the Ampere's laws applied to magnetic field.
- 4 (a) Find the capacitance of a isolated sphere of radius 'R'.
(b) Considering earth as a conducting sphere of radius 6550 km, calculate the surface charge on it.
- 5 Derive the expression for γ , α , β , and η in a good dielectric.
- 6 (a) Define critical angle. Derive the expression for it.
(b) A uniform plane wave transmitting in free space is incident normal to the surface of a perfect conductor. If the total electric field is zero at a distance of 1m away from the surface of the perfect conductor. Determine the lowest possible frequency of the incident wave.
- 7 (a) A lossless line has a voltage wave $v(z, t) = v_0 \sin(\omega t - \beta z)$. Find the corresponding current wave.
(b) A coaxial cable has an inner conductor of radius $a = 0.8 \text{ mm}$ and an outer conductor of radius $b = 2.6 \text{ mm}$. The conductors have $\sigma_c = 5.28 \times 10^7 \text{ s/m}$, $\mu_c = \mu_0$ and $\epsilon_c = \epsilon_0$, they separated by a dielectric material having $\sigma = 10^{-5} \text{ s/m}$, $\mu = \mu_0$, $\epsilon_c = 3.5 \epsilon_0$. At 80 MHz, calculate the line parameters L, C, G, and R.
- 8 (a) Discuss about quarter wave transformer.
(b) Explain the reactance properties of transmission lines.
