

Code No: RT22044

R13
SET - 1

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

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) Define magnetic torque and magnetic dipole moment. (4M)
- b) What is Faraday's law of electromagnetic induction? (3M)
- c) Define loss tangent and loss angle. Explain the significance of these terms. (4M)
- d) What is Poynting vector? What is the physical interpretation of this vector? (4M)
- e) Sketch **E** and **H** fields in coaxial transmission line. (3M)
- f) Explain how standing wave ratio is calculated using smith chart. (4M)

PART -B

2. a) What do you mean by electric dipole and derive the expression for electric field due to dipole with center at the origin. (8M)
- b) In free space, the magnetic flux density $\mathbf{B} = y^2\mathbf{a}_x + z^2\mathbf{a}_y + x^2\mathbf{a}_z$ Wb/m² (8M)
- i) Find the magnetic flux through $x = 1, 0 < y < 1, 1 < z < 4$.
3. a) Write down the integral and differential forms of Maxwell's equations and write their physical significance. (8M)
- b) A parallel plate capacitor with plate area of 5 cm² and plate separation of 3 mm has a voltage $50 \sin 10^3 t$ applied to its plates. Calculate the displacement current assuming $\epsilon = 2\epsilon_0$. (8M)
4. a) Explain about wave propagation in free space. (8M)
- b) An EM wave propagating in a certain medium is described by $\mathbf{E} = 25 \sin(2\pi \times 10^6 t - 6x)\mathbf{a}_z$ V/m (8M)
- (i) Determine the direction of wave propagation.
- (ii) Compute the period T , the wavelength λ and the velocity
- (iii) Sketch the wave at $t = 0, T/8, T/4, T/2$.
5. a) Discuss about reflection and refraction of plane waves for oblique incidence with **E** parallel to the plane of incidence. (8M)
- b) A plane wave travelling in free space is normally incident on the interface with a perfect dielectric with $\epsilon_r = 3$. Compute the magnitudes of incident, reflected and transmitted **E** and **H** at the interface. Take $E_i = 1.5$ mV/m in medium 1. (8M)
6. a) Discuss about lossless and distortionless transmission lines. (8M)
- b) A transmission line operating at 500 MHz has $Z_0 = 80 \Omega$, $\alpha = 0.04$ Np/m and $\beta = 1.5$ rad/m. determine the line parameters R, L, G and C . (8M)
7. a) Explain about Single stub matching. (8M)
- b) Explain load matching using quarter wave transformer. (8M)

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