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B.E. VIIth Semester (CGPA) Examination, 2016

Electronics & Commun. Engg.

Paper - EL-703

Microwave Engineering

Time : 3 Hours] [Maximum Marks : 60

Note :- Attempt all the questions. Each question carries equal marks.

1. (a) What are the advantages of ABCD matrix ?
- (b) What is the Scattering matrix for N port device ?
- (c) Derive the expression for the attenuation of TE₁₀ mode of a rectangular waveguide with finite conductivity.
- (d) Discuss how wave equations are useful in understanding the propagation of EM waves in wave guides.

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- (c) Show that the TEM, TM₀₁ and TM₁₀ modes in a rectangular wave-guide do not exist. 5×2
2. (a) Discuss the merits and demerits of circular wave guide over rectangular waveguide.
- (b) Distinguish between the properties of TEM mode of propagation and that of TE and TM type of propagation. 5×2

OR

- (a) Describe the method of designating the modes of transmission in rectangular waveguides. Why is transmission in the dominant mode most often used in waveguides ?
- (b) What are TE_{nm} and TM_{nm} modes w.r.t a circular wave guide. Sketch the dominant modes. 5×2
3. (a) A cylindrical wave guide has a inner radius of 2 cm. Find the cut off frequency for the guide operating in TE₁₁ mode. Calculate λ_g and ZTE at 10 GHz ($\lambda_0 = 3$ cm.)
- (b) State the factors up on which the attenuation constant of a parallel strip line are dependent. (b) Derive

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an expression for the attenuation factor of a micro strip line. 5×2

OR

- (a) Prove that a cavity resonator is nothing but an LC circuit.
- (b) Derive an expression for Q of a cavity supporting TE₁₀₁ mode. What is the resonant frequency of the cavity if each side of the guide is 3 cm ?
4. (a) With a schematic diagram, explain the construction of a micro strip line (b) Mention the advantages of strip lines over other transmission lines. 5×2
- (b) Discuss the power transmission in circular wave guides.

OR

- (a) An air filled circular wave guide of 2 cm inside radius is operated in the TE₀₁ mode. 5×2
- (i) Compute the cut off frequency (ii) If the guide is to be filled with a dielectric material of $\epsilon_r = 2.25$, to what value must its radius be changed in order to maintain the cut off frequency at its original values.

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5. (a) What is the effect of conductivity on the dielectric loss of a strip line ? (b) Derive the expression for attenuation constant for dielectric loss. 5×2
- (b) What is the impact of skin effect on a micro strip line ?

OR

- (a) Derive an expression for attenuation factor for ohmic skin loss.
- (b) Explain the concepts of propagation delay time for a strip line.
6. (a) Is the effective dielectric constant of a micro strip line a function of relative dielectric constant justify. 5×2
- (b) Write short notes on "Rectangular resonant Cavity".

OR

- (a) Write short notes on "Cavity resonators and its applications".
- (b) What is a cavity resonator ? Discuss the application of cavity resonators.

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