

CBCS SCHEME



15TE63

Sixth Semester B.E. Degree Examination, June/July 2019 Microwave Theory and Antennas

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of Smith chart is permitted.

Module-1

- 1 a. Explain the mechanism of oscillation and mode of oscillation of a reflex Klystron oscillator. (08 Marks)
- b. Define Reflection-co-efficient and Transmission coefficient of transmission line. (03 Marks)
- c. A load impedance of $Z_R = 60 - j80\Omega$ is required to be matched to a 50Ω co-axial line, by using a short circuited stub of length ' l ' located at a distance ' d ' from the load. The wavelength of operation is ' λ ' metre. Using Smith chart find ' d ' and ' l '. (05 Marks)

OR

- 2 a. Write a short note on standing wave and standing wave ratio. (04 Marks)
- b. Derive the Transmission line equations. (08 Marks)
- c. A transmission line has the following parameters $R = 2\Omega/m$, $G = 0.5\text{ m mho/m}$, $f = 1\text{ GHz}$, $L = 8\text{ nH/m}$, $C = 0.23\text{ pF}$. Calculate the characteristic impedance and propagation constant. (04 Marks)

Module-2

- 3 a. State and derive the properties of S-parameters. (10 Marks)
- b. Why are co-axial adaptors used? List six types of co-axial connectors with their frequency ranges. (06 Marks)

OR

- 4 a. What are Waveguide Tees? Explain with the aid of diagram E-plane and H-plane Tee. (10 Marks)
- b. With neat diagram, explain the construction of precision type of variable attenuator. (06 Marks)

Module-3

- 5 a. With neat diagram, explain the operation of parallel strip line. Also write the expression for characteristics impedance and attenuation of the same. (06 Marks)
- b. Explain the basic principle of radiation using basic radiation equation. (04 Marks)
- c. Define the following term with respect to antenna – Beam solid angle, Radiation intensity, Directivity. (06 Marks)

OR

- 6 a. Derive Friis transmission formula. (06 Marks)
- b. Explain different types of aperture and their relationships. (06 Marks)
- c. With neat diagram explain the co-planar and shielded strip lines. (04 Marks)

Module-4

- 7 a. State and explain power theorem. (04 Marks)
- b. Write a short note on pattern multiplication. (04 Marks)
- c. Derive an expression for radiation resistance of $\lambda/2$ antenna (λ by 2). (08 Marks)

OR

- 8 a. Derive an expression for far field intensity for two isotropic sources with equal amplitude and phase. (08 Marks)
b. Derive radiation resistance of a short electric dipole. (08 Marks)

Module-5

- 9 a. Explain the working of a log-periodic antenna. (08 Marks)
b. Derive the far field expression for small loop antenna. (08 Marks)

OR

- 10 a. Explain a yagi-uda antenna structure with a neat diagram. (06 Marks)
b. Explain various types of horn antenna with a neat diagram. (06 Marks)
c. The radius of a circular loop antenna is 0.02λ . How many turns of the antenna will give a radiation resistance of 35Ω ? (04 Marks)

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