CBCS SCHEME

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15TE63

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Microwave Theory and Antennas

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Discuss the mechanism of oscillation and also mode oscillation reflux Klystron oscillator. **(08 Marks)**

b. Derive the transmission line equations and also solution for the same. **(08 Marks)**

OR

2 a. Derive the expressions for reflection coefficient and transmission coefficients. **(08 Marks)**

b. A 50Ω coaxial line operating with wavelength 1 metre is terminated with an impedance of 60-j80Ω. Design a single stub matching system to avoid standing waves using smith chart. **(08 Marks)**

Module-2

3 a. Show how the S-matrix is derived for a multiport network. **(08 Marks)**

b. Discuss the properties of S-parameters in detail. **(08 Marks)**

OR

4 a. With a neat diagram explain the operating principle of two hole directional coupler and also derive its S-matrix. **(08 Marks)**

b. With a neat diagram, explain faraday rotation isolator. **(08 Marks)**

Module-3

5 a. Discuss the different losses occurred in microstrip line. **(08 Marks)**

b. A loss less parallel stripline has a conducting strip width W. The relative dielectric constant ε_{rd} of the substrate is 6 and a thickness d of 4mm.
Calculate:
i) The width W of the conducting strip in order to have characteristic impedance of 50Ω.
ii) Strip line capacitance
iii) Strip line inductance
iv) The phase velocity of the wave in the parallel strip line. **(08 Marks)**

OR

6 a. Explain the following antenna parameters:
i) Beam solid angle
ii) Radiation intensity
iii) Half power beam width
iv) Directivity. **(08 Marks)**

b. Derive FRII's transmission formula for radio communication link. **(08 Marks)**

Module-4

7 a. Derive the resultant radiation pattern for an array of two isotropic point sources placed $\lambda/2$ distance apart and fed with power of equal magnitude and phase. Draw the pattern. **(08 Marks)**

b. State and explain power theorem as applied to a point source. The radiation pattern of a source is given by $u = u_m \sin^2\theta$. Find its directivity for $0 \le \theta \le \pi$, $0 \le \phi \le 2\pi$. **(08 Marks)**

OR

8 a. Obtain an expression for radiation resistance of a short electric dipole. **(08 Marks)**

b. Give a geometry of a short dipole and explain the terms retarded current, retarded scalar potential and retarded vector potential. **(08 Marks)**

Module-5

9 a. Derive an expression for radiation resistance of a small loop antenna. **(08 Marks)**

b. With the help of neat diagrams explain different types of rectangular antennas. **(08 Marks)**

OR

10 a. Discuss practical design considerations for a monofilar axial-mode helical antenna. Draw relevant diagrams wherever necessary. **(08 Marks)**

b. Discuss constructional features of a yagi-uda antenna. Draw a neat diagram of six element yagi-uda antenna with dimensions at 500 MHz. **(08 Marks)**

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