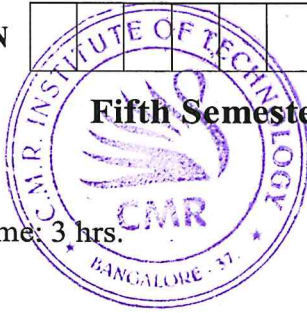


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10EC54



Fifth Semester B.E. Degree Examination, July/August 2021
Microwaves and Radar

Time: 3 hrs.

Max. Marks:100

*Note: 1. Answer any FIVE full questions.
 2. Use of Smith Chart is permitted.*

- 1
 - a. Starting from the fundamentals, derive an expression for the voltage and current at any point on the transmission line. (10 Marks)
 - b. 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 1 meter. Using Smith chart, find "d" and "L". (10 Marks)
- 2
 - a. With a neat diagram, explain the working of a two-hole directional coupler. Also derive the scattering matrix of the same. (10 Marks)
 - b. Explain the construction, working and application of an isolator based faraday rotation with a neat diagram. (10 Marks)
- 3
 - a. With neat sketches, explain the IMPATT diode and draw the negative resistance curve. (10 Marks)
 - b. Explain with a neat diagram, the construction and working of PIN diode and Schottky barrier diode. (10 Marks)
- 4
 - a. Explain S-matrix representation of multi-port network and also explain the properties of S-matrix. (10 Marks)
 - b. Starting from the impedance matrix equation, prove the symmetry property of a reciprocal network. (10 Marks)
- 5
 - a. With a neat diagram, explain the working of E-plane Tee junction. Also derive the scattering matrix. (10 Marks)
 - b. Explain the phase shifter with neat sketches. (10 Marks)
- 6
 - a. Explain the construction of a parallel strip lines with a neat schematic diagram. State equations of distributed parameters of this line. (08 Marks)
 - b. With necessary equations, explain various losses in Microstrip lines. (08 Marks)
 - c. A shielded strip line has the following parameters:
 Strip width $W = 63.5$ mm; strip thickness $t = 35$ mm, shield depth $d = 180$ mm, dielectric constant $\epsilon_r = 2.56$. Calculate: (i) The characteristics impedance of the line
 (ii) The fringe capacitance (04 Marks)
- 7
 - a. Derive the simple form of the radar range equation, starting from the power density of isotropic antenna. (08 Marks)
 - b. With a neat block diagram, explain the conventional pulse radar with a super heterodyne receiver. (08 Marks)
 - c. State and briefly explain the applications of RADAR. (04 Marks)
- 8
 - a. With a neat block diagram, explain the principle and working of an MTI Radar. (08 Marks)
 - b. Explain single delay-line canceller and frequency response of the single delay-line canceller, and also obtain the expression for blind speeds. (08 Marks)
 - c. Briefly explain the advantages offered by digital MTI processing. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

