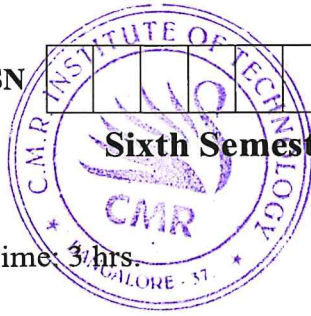


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10TE64



Sixth 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 may be permitted.**

- 1
 - a. Define and derive expression for reflection coefficient and transmission coefficient. (10 Marks)
 - b. What are standing waves and standing wave ratio? (05 Marks)
 - c. A load impedance $Z_L = 60 - j80 \Omega$ is required to be matched to a coaxial line by using a short circuited stub of length 'L' located at a distance 'd' from the load. The wavelength of the operation is 1 meter, using Smith chart find 'd' and 'L'. (05 Marks)
- 2
 - a. With a schematic diagram, explain the directional coupler, and derive an expression with scattering matrix representation of the directional coupler. (10 Marks)
 - b. With a neat diagram, explain the operation of faraday rotation isolator. (05 Marks)
 - c. A rectangular waveguide cavity filled with dielectric constant $\epsilon_r = 4$ has a breadth of 4 cm and height of 2 cm. Find the length of the cavity to produce resonance at 4 GHz. Assume TE_{101} mode. (05 Marks)
- 3
 - a. Explain the principle of operation of GUNN DIODE and explain the different modes of Gunn diode with waveform and graph. (10 Marks)
 - b. Explain the application of PIN diode as a switch. (05 Marks)
 - c. Explain the operation of parametric amplifier. (05 Marks)
- 4
 - a. What are the different properties of scattering parameter? (10 Marks)
 - b. Show that matrix 'Z' and matrix 'Y' are symmetrical for microwave reciprocal network. (05 Marks)
 - c. Express S parameter in terms of impedance when two transmission lines are joined with characteristic impedance Z_1 and Z_2 . (05 Marks)
- 5
 - a. Explain the characteristics of magic tee, with a schematic diagram, also obtain the S-matrix representation of the magic tee. (10 Marks)
 - b. With neat diagram, explain the operation of precision type variable attenuator. (05 Marks)
 - c. Write a note on different types of co-axial connector. (05 Marks)
- 6
 - a. With neat diagram, explain the operation of parallel stripline. And also write the expression for distributed parameters of parallel stripline, characteristic impedance and attenuation of the same. (10 Marks)
 - b. Explain the different losses in the striplines. (05 Marks)
 - c. A microstrip line has the following parameter. Calculate the characteristic impedance Z_0 of the line, $E_r = 5.23$, $h = 7$ mils, $t = 2.8$ mils and $w = 10$ mils. (05 Marks)
- 7
 - a. Derive the radar range equation and discuss the maximum range performance. (10 Marks)
 - b. Explain briefly the application of RADAR. (05 Marks)
 - c. Calculate the maximum range of Radar, which operates at a frequency of 9 GHz peak pulse power of 500 KW. If the antenna effective area is 20 m^2 and the area of target is 5 m^2 , minimum receivable power is 10^{-13} Watt? (05 Marks)
- 8
 - a. With block diagram, explain the operation of moving target indicator. (10 Marks)
 - b. What is blind speed? Calculate first three blind speed of Radar. If MTI radar operating at $\lambda = 10$ cm and PRF of 1 kHz. (05 Marks)
 - c. Explain briefly Doppler affect. (05 Marks)
