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10TE64

# Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
## Microwaves and Radar

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting at least TWO full questions from each part.***



### PART – A

1 a. Derive the expression for voltage and current at any point on the transmission line. **(10 Marks)**

b. A transmission line has the following parameters R = 2Ω/m, G = 0.5m℧/m, f = 1GHz, L = 8nH/m and C = 0.23pF. Calculate: i) The characteristic impedance ii) The propagation constant. **(04 Marks)**

c. What are applications of Smith Chart? Explain briefly. **(06 Marks)**

2 a. With a neat diagram, explain construction of a two hole directional coupler derive S-matrix. **(10 Marks)**

b. With a neat diagram, explain operation of Faraday rotation isolator. **(05 Marks)**

c. An air filled rectangular waveguide of inside dimensions 7cm × 3.5cm operates in the dominant $TE_{10}$ mode:
i) Find the cut off frequency.
ii) Determine the phase velocity of the wave in the guide at a frequency of 3.5GHz.
iii) Determine the guided wavelength at same frequency. **(05 Marks)**

3 a. Explain principle operation of Gunn diode and also explain Gunn diode oscillator. **(10 Marks)**

b. Explain IMPATT diode working. **(05 Marks)**

c. Explain operation of READ diode. **(05 Marks)**

4 a. State and explain properties of S-matrix. **(10 Marks)**

b. With necessary conditions write scattering matrix representation for multiport network. **(10 Marks)**

### PART – B

5 a. With a neat diagram, explain working of precision type variable attenuator. **(06 Marks)**

b. Explain the properties of magic TEE and mention its application. **(10 Marks)**

c. Explain about precision rotary phase shifter. **(04 Marks)**



6 a. What are different losses occurring in microstrip line? Explain. **(10 Marks)**

b. With a neat diagram, explain operation of parallel strip line and write expression for distributed parameter, characteristic impedance and attenuation losses. **(10 Marks)**

7 a. Derive the expression for simple form of the radar equation. **(08 Marks)**

b. Explain with a block diagram of pulse radar with Superheterodyne receiver. **(07 Marks)**

c. Discuss the various applications of the radar. **(05 Marks)**

8 a. With a block diagram, explain working principle of Continuous Wave (CW) radar. **(08 Marks)**

b. Explain with a block diagram of Moving Target Indication (MTI) radar. **(08 Marks)**

c. Write notes on delay line canceller. **(04 Marks)**

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