

[6181]-175

B.E. (E &amp; TC)

## RADIATION AND MICROWAVE THEORY

(2019 Pattern) (Semester - VII) (404181)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right carries full marks.
- 4) Assume suitable data, if necessary.

Q1) a) State the properties of S-matrix and derive S matrix for H plane Tee. [6]

b) Explain the operating principle of two-hole directional coupler with its S-matrix. [6]

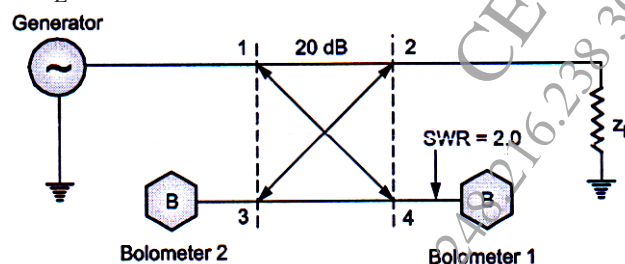
c) An isolator has an insertion loss of 0.5 dB and an isolation of 30 dB. Determine the scattering matrix of the isolator if the isolated ports are perfectly matched to the junction. [6]

OR

Q2) a) Explain how Magic Tee is used for impedance measurement. [6]

b) Explain in brief the working principle of a circulator. [6]

c) A symmetric directional coupler with infinite directivity and a forward attenuation of 20Db is used to monitor the power delivered to a load  $Z_L$  in below Fig. 4.27. Bolometer 1 introduces a VSWR of 2.0 on arm4; bolometer 2 is matched to arm 3. If bolometer 1 reads 8mW and bolometer 2 reads 2 mW, find:(a) the amount of power dissipated in the load  $Z_L$ ; (b) the VSWR on arm 2. [6]



P.T.O.

- Q3)** a) Explain a TWT amplifier. Which type of slow wave structure is used in TWTA and Why? [6]
- b) How bunching is achieved in cavity Magnetron. Explain the phase focusing effect. [6]
- c) Distinguish between TWT and Klystron Tube. [6]

OR

- Q4)** a) With the help of suitable diagram explain the operating principle of single cavity Reflex Klystron. [6]
- b) Explain construction, operation of Two Cavity Klystron amplifier. [6]
- c) Give the limitation of conventional tubes at microwave frequencies? [6]

- Q5)** a) Explain the principle of operation, construction, characteristics of Microwave transistors. [6]
- b) Explain the operation of PIN diode as a) Amplitude Modulator  
b) Switch. [6]
- c) Explain the constructional details and VI characteristics of Schottky barrier diode. [5]

OR

- Q6)** a) Explain the working principle of Varactor diode [6]
- b) Explain the following modes in the Gunn Oscillator : [6]
- i) Transit time domain mode.
- ii) Delayed or Inhibited domain mode.
- iii) Quenched domain mode.
- iv) Limited space charge. Accumulation LSA mode.
- c) Write a short note on IMPATT diode. [5]

- Q7)** a) Differentiate between Satellite and Terrestrial Communication System. [6]
- b) Calculate the maximum range of a radar system which 3 cm with a peak pulse power of 600 kW if its antenna is 5 m<sup>2</sup>, minimum detectable signal is 10<sup>-13</sup> W and the radar cross sectional area of the target is 20 m<sup>2</sup>. [6]
- c) Write a note on radiation hazard levels for personnel. [5]

OR

- Q8)** a) In light on the Industrial applications of microwaves : Microwave Heating. [6]
- b) Explain reflectometer method for measurement of impedance. [6]
- c) How Calorimeter technique is used for measurement of Medium power at Microwave frequency. [5]

