

[6404]-124

B.E. (Electronics and Telecommunication)
RADIATION AND MICROWAVE THEORY
(2019 Pattern) (Semester - VII) (404181)

Time : 2½ Hours]

[Max. Marks : 70

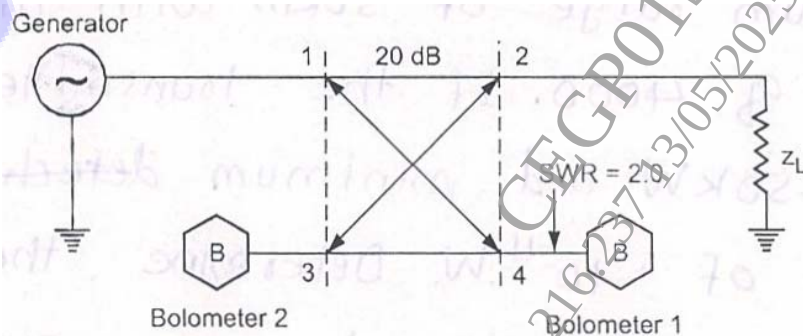
Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Draw neat diagrams wherever necessary.
- 3) Figures to the right indicate full marks.

- Q1)** a) With the help of suitable diagram explain the how Magic Tee is used as a Mixer. [5]
- b) What are the different performance parameters of directional coupler. Explain the operation of two hole directional coupler. [6]
- c) Determine the [S] of a 3-port circulator. Given insertion loss of 0.5 dB, isolation of 20 dB and VSWR of 2. [6]

OR

- Q2)** a) Discuss the roll of Microwave Attenuator. Explain the Card/Fixed type of attenuator. [5]
- b) Enlist the characteristics of Scattering Matrix. Derive the scattering matrix for E-Plane Tee. [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 Figure. 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: i) the amount of power dissipated in the load Z_L ; ii) the VSWR on arm 2. [6]



Figure

P.T.O.

- Q3)** a) Distinguish between the Klystron tube and Travelling wave tube amplifier. [6]
 b) With the help of Constructional Details explain the operating principle of Reflex Klystron. [6]
 c) What is the slow wave structure? Explain how a helical TWT achieves amplification. [5]

OR

- Q4)** a) Explain the working principle of two cavity Klystron Amplifier. [6]
 b) A reflex klystron operates at the peak mode of $n=2$ with $V_0 = 280\text{V}$, $I_0 = 22\text{mA}$ and signal voltage $V_s = 30\text{V}$, Determine (i) the input power, (ii) the output power, and (iii) the efficiency. [6]
 c) Explain the HF limitations of Conventional tube. [5]

- Q5)** a) What is parametric Amplifier? How it is different from a normal amplifier. [6]
 b) Describe the several domain formation modes of a Gunn diode. [6]
 c) With the help of circuit diagram explain the Schottky Barrier Diode. [6]

OR

- Q6)** a) Explain the operation of Varactor diode. Discuss its constructional details, equivalent circuit and figure of merit. Mention its applications. [6]
 b) With the help of Energy band diagram explain how Tunnel diode exhibits negative resistance in the part of its forward characteristics. [6]
 c) Discuss the application of PIN diode as a switch. [6]

- Q7)** a) A slotted line is used to measure the frequency and it was found that the distance between the nulls is 1.85 cm. Given guide dimensions are (3×1.5) cm. Calculate the value of frequency measured between twice minimum power points ≈ 1 mm on a slotted line. [6]
 b) Using suitable block diagram explain the operating principle of RADAR. Enlist the applications of RADAR. [6]
 c) With the help of suitable block diagram explain the measurement of VSWR using double minima method. [6]

OR

- Q8)** a) Write a note on: Medical Application such as Microwave Diathermy. [6]
 b) Write a note on radiation hazard levels for personnel. [6]
 c) A marine radar operating at 10GHz has a maximum range of 50km with an antenna gain of 4000. If the transmitter has a power of 250 kW and minimum detectable signal of 10^{-11}W . Determine the cross section of the target the radar can sight. [6]

