

**M.E. ELECTRONICS AND TELE-COMMUNICATION ENGINEERING
FIRST YEAR FIRST SEMESTER - 2025**

MICROWAVE AND MILLIMETER WAVE CIRCUITS (MW)

Time: 3 hours

Full Marks:100

Answer any Five questions.

1. a) Find the relation between S parameters and Z-parameters. [10]
b) When will a network be lossless? Answer considering its S-parameters. [10]
2. Considering $R = 1 \text{ Ohm}$, calculate ABCD and S-parameters at 2 GHz for the networks shown in Figure 1. [20]

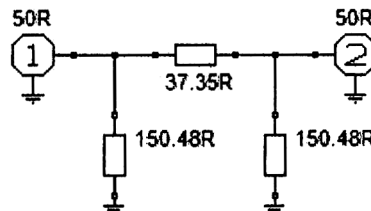


Figure 1

3. a) Design microstrip unequal power divider at 2 GHz with 2:1 power division. Consider microstrip with substrate dielectric constant of 4.3 and height of 1.6 mm (50 Ohm system). [15]
b) For a 50 Ohm system, design a 3 way Power divider/combiner. [5]
4. Design a 4th-order maximally flat low-pass filter for fabrication using microstrip lines. The design parameters are: cut-off frequency = 2 GHz, system impedance = 50 Ohm. Consider microstrip lines with substrate dielectric constant of 4.3 and height of 1.6 mm. [20]
5. Draw a schematic diagram of 180° hybrid ring coupler and find out its S-parameters. [20]
6. a) Design a five-section binomial transformer to match a 50 Ohm load to a 100 Ohm line at 2 GHz. Consider effective dielectric constant 1.2. [15]
b) Can a branch-line coupler be used as a power combiner? Discuss with arguments. [5]
7. Write short notes on [10x2]
a) Kuroda identities
b) Even-odd mode analysis