BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: B.TECH. **SEMESTER : VII**
BRANCH: ECE **SESSION : MO/2024**

SUBJECT: EC401R1 MICROWAVE THEORY AND TECHNIQUES

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Write about the various advantages and applications of microwave.	[2]	I	I
Q.1(b)	Determine the scattering parameters of the 3 dB attenuator circuit shown in Fig. 1(b)	[3]	I	V

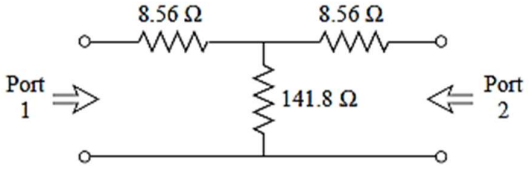

Fig. 1(b)

Q.2(a)	Obtain the relationship between transmission [ABCD]-matrix and [S]-matrix	[2]	I	II
Q.2(b)	Obtain the transmission [ABCD] matrix of the two-port network shown in Fig. 2(b)	[3]	I	III

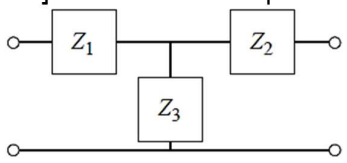

Fig. 2(b)

Q.3(a)	Derive the expression of [S]-parameters to [Z]-parameters conversion formula.	[2]	I	II
Q.3(b)	Using an even and odd mode analysis, determine the [S]-matrix of Wilkinson power divider for equal power division.	[3]	II	V
Q.4(a)	Prove that a three-port network can't be lossless, reciprocal and perfectly matched at all the ports simultaneously.	[2]	II	II
Q.4(b)	In an H-plane Tee junction, 20 mw power is applied to port 3 that is perfectly matched to the junction. Calculate the power delivered to the load $60\ \Omega$ and $75\ \Omega$ connected to port 1 and port 2, respectively.	[3]	II	III
Q.5(a)	Explain the coupled line theory for the design of coupled line coupler.	[2]	II	II
Q.5(b)	A 90-degree symmetric directional coupler has the coupling factor of 8.34 dB. determine the phase and amplitude at ports 2 and 3 relative to port 1.	[3]	II	V

::::::18/09/2024::::::M