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COLLEGE OF ENGINEERING AND TECHNOLOGY

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Question Paper Code: 221EC003 QRN Code: 2210100 Regulations: 2019

B.E./B.Tech. DEGREE EXAMINATION, NOV / DEC 2022

SEVENTH SEMESTER – B.E. ELECTRONICS AND COMMUNICATION
ENGINEERING

19ECCN1701 – RF AND MICROWAVE ENGINEERING

Duration: Three hours Answer ALL questions Maximum: 100 marks

PART – A (10 x 2 = 20 marks)

Q. No.	Question	CO No.	Answer Short's Cognitive Level	Question	CO
1	A transistor has an input impedance of $Z_L = 25 \Omega$ which is to be matched to a 50Ω microstrip line at an operating frequency of 500 MHz. Find the characteristic impedance of the quarter-wave parallel-plate line transformer for which matching is achieved.	CO1	Ap	An	
2	For the given circuit, draw the circuit for S_{11} , S_{21} , S_{22} and S_{12} measurements with the assumptions that it is connected to transmission lines having 50Ω impedance on both sides.	CO1	Ap	An	
3	Define one port network. Give two examples.	CO2	U	Ap	
4	A two watt power source is connected with the input of directional coupler with coupling factor 15 dB. Find the output power in dBm through coupled ports.	CO2	Ap	Ap	

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5.	List the type of circuits used for IMPATT diode.	CO3	R	An
6.	Classify the different modes of operation of Gunn diode.	CO3	R	An
7.	State the purpose of slow wave structures used in TWT amplifiers.	CO4	U	Ap
8.	Compare mode jumping and strapping in a Magnetron.	CO4	U	Ap
9.	Distinguish between conditional and unconditional stability in microwave amplifiers.	CO5	U	Ap
10.	Draw the typical output stability and input stability circles of microwave amplifier.	CO5	U	Ap

PART – B (5 x 16 = 80 marks)

Q. No.	Question	CO No.	Answer Short's Cognitive Level	Question	CO
11 (a)	i. Derive the scattering matrix representation of N-port Network.	10	CO1	An	An
	ii. Analyze the behavior of Resistor, inductor and capacitor at high frequencies.	06	CO1	An	An
Or					
11 (b)	Analyze the properties of S-matrix for two port network.	16	CO1	An	An
12 (a)	i. A 20dB directional coupler gives 3 dBm as output power through coupled port. If the isolation specified as 55 dB, find the power available at the isolated Port.	08	CO2	Ap	Ap
	ii. Derive the S-matrix for E-plane junction.	08	CO2	Ap	Ap
Or					
12 (b)	Compute the S-matrix of a Magic Tee and microwave power dividers with neat sketch.	16	CO2	Ap	Ap

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13(a)	Analyze the materials and fabrication techniques used in monolithic microwave integrated circuits.	16	CO3	An	An
Or					
13(b)	Analyze the characteristics of transit time devices at microwave frequencies.	16	CO3	An	An
Or					
14(a)	From the first principle, derive the condition for velocity modulation of two cavity klystron amplifier.	16	CO4	Ap	Ap
Or					
14(b)	Derive the expressions for hull cutoff voltage and efficiency for magnetron with neat sketch.	16	CO4	Ap	Ap
Or					
15(a)	Analyze the various stability considerations and stabilization techniques used in microwave amplifier design.	16	CO5	Ap	Ap
Or					
15(b)	Derive the equations for power gain, available gain and transducer gain of HF amplifier.	16	CO5	Ap	Ap

Sl No.	Cognitive Level	Code	Order	% in Question Paper
1	Remember	R	Lower Order	68
2	Understand	U		
3	Apply	Ap		
4	Analyze	An	Higher Order	32
5	Evaluate	E		
6	Create	C		