Reg.No.:									

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI].

Question Paper Code: 7012

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – MAY / JUNE 2024
Seventh Semester
Electronics and Communication Engineering
U19EC731 – RF AND MICROWAVE ENGINEERING
(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are the reasons that low frequency parameters cannot be measured in microwaves?	2	K1	CO1
2.	Find VSWR of an amplifier, if the amplifier has reflection coefficient of 0.2533.	2	K2	CO1
3.	List the problems in broadband amplifier.	2	K1	CO2
4.	Name the applications in which RF circuits are used?	2	K1	CO2
5.	List the differences between Isolator and Circulator.	2	K1	CO3
6.	State the high frequency effects in conventional tubes.	2	K1	CO3
7.	Define velocity modulation in Reflex Klystron.	2	K1	CO4
8.	What is the purpose of slow wave structures used in TWT amplifiers?	2	K1	CO4
9.	Define return loss and insertion loss in microwave networks.	2	K1	CO5
10.	How the S parameter of microwave circuit measured?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)		Show how microwave junction can be described by Scattering matrix? Derive the Scattering matrix relation between the input and output of n x n matrix.	13	K2	CO1
			(OR)			
	b)	i.	Show the properties of S-matrix and prove it.	13	K2	CO1
		ii.	Explain the symmetry property in a reciprocal network.			
12.	a)		Make use of the parameters used and derive the expressions for various Power gain of RF amplifier.	13	K2	CO2
			(OR)			
	b)	i.	Explain Single stub impedance matching and Double stub impedance matching	8	K2	CO2
		ii.	Construct T section and Pi section matching network	5		
13.	a)		Explain the construction and working of Directional coupler and Derive the S matrix for the directional coupler and also verifying the properties of it.	13	K2	CO3
			(OR)			
	b)		Illustrate the construction and working of Hybrid junctions. Derive its S matrix and apply the power in each arms individually and find out the outputs for all the cases. Also show how it can be used as a mixer.	13	K2	CO3
14.	a)		Construct two cavity klystron amplifier with neat circuit diagram and relevant equations; explain the velocity modulation process and bunching process.	13	K3	CO4
			(OR)			
	b)		Build the cross sectional view of Magnetron tube and explain the process of bunching. Derive the expression for Hull cut-off voltage.	13	K3	CO4
15.	a)	i.	Illustrate VSWR measurement in detail.	7	K2	CO5
		ii.	Explain the impedance measurement using reflecto meter.	6		
			(OR)			
	b)	i.	Explain the microwave power measurement.	7	K2	CO5
		ii.	Explain the measurement of Q factor in detail.	6		

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Make use of following parameters in two cavity Klystron which has Beam voltage Vo =1000v, DC beam resistance Ro=40 kohms, Beam current I0=25 ma, operating frequency f=3Ghz, gap spacing in either cavity d=1mm, spacing between two cavities L=4 cm, effective shunt impedance excluding beam loading R_{Sh}=30 kohms. Compute i. DC electron velocity, ii. Angular velocity, iii. Gap transit angle, iv. Beam coupling coefficient, v. DC transit angle, vi. input gap voltage to given maximum voltage V_2, vii. voltage gain by neglecting beam loading in output cavity, viii. Efficiency of amplifier by neglecting beam loading, ix. DC beam conductance, x. Beam loading conductance, xi. beam loading resistance.	15	K3	CO4
		(OR)			
	b)	Discuss the following			
		(i) Gunn diode oscillator	5	K2	CO4
		(ii) IMPATT diode oscillator and amplifier	5		
		(iii) YIG Device	5		