Hall Ticket Number :										

R-19

Code: 19A463T

III B.Tech. II Semester Supplementary Examinations May/June 2024

Microwave Engineering

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)

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			Marks	CO
		UNIT–I		
1.	a)	Derive the expressions for Cut-off frequency, Propagation constant and Characteristic Wave Impedance for TE Mode in rectangular waveguide.	7M	1
	b)	What inner radius do you need for an air-filled cylindrical pipe to propagate TE11 wave at 6 GHz with operating frequency 20% above fc. What is guide wavelength?	7M	1
		OR		
2.	a)	Derive the expressions for Power Transmission for Dominant Mode in rectangular waveguide.	7M	1
	b)	For FR4 substrate (ε_r = 4.4) of height h=1.6mm, find the value of microstrip width W, Effective dielectric constant and characteristic impedance.	7M	1
		UNIT–II		
3.	a)	What are TE_{mn} and TM_{nm} modes w.r.t a circular waveguide. Sketch the dominant modes.	7M	2
	b)	A cylindrical wave guide has an inner radius of 2 cm. find the cutoff frequency for the guide operating in TE11 mode. Calculate λ_g and Z_{TE} at 10 GHz (λ_0 =3cm)	7M	2
		OR		
4.		Derive the Q for TM_{111} mode of rectangular cavity assuming lossy conducting walls and lossless dielectric.	14M	2
		UNIT–III		
5.	a)	What is a scattering matrix? What are various properties of S matrix?	7M	3
	b)	Explain why H-Plane Tee Junction is called Current Junction along with power flow directions.	7M	3
		OR		
6.	a)	What are the Properties of Ferrites and explain how different phase shift of left and right circularly polarized waves (LCPW and RCPW) occurs due Faraday rotation.	7M	3
	b)	With a neat schematic diagram explain why 180° phase shift occurs in forward direction and zero in the backward direction only in two-port Gyrator.	7M	3
		UNIT–IV		
7.	a)	How the oscillations are generated in reflex klystron and explain bunching process with apple gate diagram.	7M	4
	b)	Derive the equation of efficiency for a reflex klystron oscillator	7M	4
		OR		
8.	a)	What are the different modes of operation of TWT and explain them?	7M	4
	b)	How cross-field is used to generate oscillations in Magnetron and derive the Hull cut-off condition?	7M	4
		UNIT–V		
9.	a)	Explain Two Valley Theory (RWH Theory) and modes of operation of GUNN diode.	7M	5
	b)	Describe the operation of IMPATT diode	7M	5
		OR		
10.	a)	Using microwave test bench setup ,Explain the measurement of i) Power ii) Q-factor	7M	5
	b)	In Gunn diode's transit domain mode, the domain velocity is equal to the carrier drift velocity and is about 10^7 cm/sec. Determine the drift length of a diode at a frequency of 8 GHz	7M	5

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