CBCS SCHEME

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BEC701

Seventh Semester B.E/B.Tech. Degree Examination, Dec.2025/Jan.2026

Microwave Engineering and Antenna Theory

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
1	a.	Explain clearly how GUNN diode is being a negative resistance device.	6	L2	CO1
	b.	A certain transmission line has the characteristics impedance of (75 + j0.01) Ω and is terminated in load impedance of (70 + j50)Ω. Compute : i. The reflection coefficient ii. Transmission coefficient.	6	L3	CO1
	c.	Derive the equation of transmission line to find voltage and current on the line.	8	L3	CO1
		OR			
2	a.	A transmission line is terminated in a resistive load of 1000 Ω and has L = 9μH/m and C = 100 pF/m. Calculate reflection co-efficient and standing wave ratio.	6	L3	CO1
	b.	Define reflection coefficient. Derive an expression for reflection co-efficient at load in terms of characteristic impedance and load impedance.	8	L3	CO1
	c.	Explain Microwave System with relevant diagram.	6	L2	CO1
		Module – 2			
3	a.	Deduce the relation between incident and reflected waves in terms of S-parameters for a two port network.	6	L3	CO2
	b.	Derive an expression for input reflection co-efficient for two port network with mismatched load.	10	L3	CO2
	c.	Write a note on different losses in microwave network.	4	L4	CO2
		OR			
4	a.	Explain the following with necessary sketches : i. Flexible co-axial cable ii. Movable vane attenuator.	10	L2	CO2
	b.	Explain magic tee and write its S-Matrix representation.	10	L2	CO2

		Module – 3			
5	a.	Explain parallel strip line with relevant diagram.	6	L2	CO3
	b.	A lossless parallel strip line has a conducting strip of width 'W'. The substrate dielectric separating the 2 conducting strips has a relative dielectric constant ε_{rd} of 6 and a thickness 'd' of 4mm. Calculate : i. Value of W so that $Z_0 = 50\Omega$ ii. Strip line capacitance iii. Strip line inductance iv. Phase velocity.	10	L3	CO3
	c.	Explain the following terms related to antenna systems : i. Directivity ii. Power Density.	4	L2	CO4
		OR			
6	a.	Explain antenna radiation pattern. Prove that maximum effective aperture of short electric dipole is $0.119\lambda^2$.	10	L3	CO4
	b.	State and prove Frii's Transmission formula.	6	L2	CO4
	c.	Explain the construction and field pattern of micro strip line.	4	L2	CO3
		Module – 4			
7	a.	Derive the expression for radiation resistance of short electric dipole antenna.	10	L3	CO4
	b.	Obtain the expression for total electric field for array of n-point sources consider uniform linear array.	10	L2	CO4
		OR			
8	a.	Explain principle of pattern multiplication.	6	L2	CO4
	b.	Write a note on Thin Linear Antenna.	8	L1	CO4
	c.	A thin dipole antenna is $\lambda/10$ long. If its loss resistance is 2.5Ω. Find the radiation resistance and efficiency.	6	L3	CO4
		Module – 5			
9	a.	Explain different types of horn antenna with relevant diagrams.	10	L2	CO5
	b.	The radius of a circular loop antenna is 0.02λ. How many turns of the antenna will give radiation resistance of 35Ω?	6	L3	CO5
	c.	Compare the far field components of small loop and short dipole antenna.	4	L1	CO5
		OR			
10	a.	Explain Yagi-Uda antenna and list its applications.	10	L2	CO5
	b.	Explain Parabolic dish antenna or microwave dish antenna with relevant diagram.	10	L2	CO5

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