Semester: VII	Department of Electronics and Communication Engineering	AY: 2026-27
Course Code: BEC701	Course Name: Microwave Engineering and Antenna Theory	

Question Bank

Q.	Module-01	M	L	C
1.	Starting from the fundamental, Derive expressions for voltage and current at any point on a microwave transmission line by the method of distributed circuit.	10	L3	CO1
2.	Obtain the expression for the characteristic impedance and propagation constant for the transmission line	8	L2	CO1
3.	Define reflection co-efficient. Derive the equation for reflection co-efficient at the load end at a distance 'd' from the load	8	L3	CO1
4.	Derive expression for Transmission Coefficient.	7	L3	CO1
5.	Define Standing wave and derive the same.	8	L3	CO1
6.	A certain transmission line has a characteristic impedance of (75+j0.01)Ω and is terminated in load impedance of (75+j50)Ω. Compute a) Reflection co-efficient. b) Transmission co-efficient	5	L3	CI1
7.	What is Smith Chart and explain Single Stub Matching?	6	L2	CO1
8.	Mention characteristics of smith chart with the help of necessary equations	7	L2	CO1
9.	A transmission line has the following parameters: • R=2 Ω/m • G=0.5 m mho/m • f=1 GHz • L=8 nH/m • C=0.23 pF/m **Calculate:** i) Characteristic impedance ii) Propagation constant (γ)	5	L3	CO1
10.	Describe the construction and working principle of a Gunn diode as a microwave source.	9	L2	CO1
	Module-02			
11.	What is S-parameter? What is the need for S-parameter	6	L2	CO2
12.	State and explain the properties of S-parameters	8	L2	CO2
13.	Explain H-Plane Tee junction & derive the S-matrix	8	L3	CO2

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14.	Explain E-Plane Tee junction & derive the S-matrix	8	L 3	CO2
15.	Explain the working of a precision rotary phase shifter with the help of diagram	7	L 2	CO2
16.	What are the characteristics of magic Tee. Also obtain the S matrix representation of the Magic Tee	9	L 3	CO2
17.	Derive the following losses in a microwave network in terms of S parameters i)insertion loss ii)transmission loss iii)reflection loss iv) return loss	8	L 3	CO2
18.	Discuss different types of coaxial connectors.	6	L 2	CO2
19.	Explain the working of a precision type variable attenuator with the help of diagram.	7	L 2	CO2
20.	Explain Faraday rotation isolator.	7	L 2	CO2
	Module-03			
21.	With the help of Maxwell's equation, explain how radiation and reception of EM takes place?	7	L 2	CO3
22.	Explain the following terms as related to antenna system: (1) Directivity (2) HPBW (3) Effective length (4) Beam efficiency (5) Gain (6) Isotropic radiator (7) Beam area/Beam solid angle (8) Radiation resistance	8	L 2	CO3
23.	Show that the directivity for unidirectional operation is 2(n+1) for an intensity variation of u=um cosn θ.	8	L 2	CO3
24.	Prove that maximum effective aperture for a λ/2 antenna is 0.13 λ2.	8	L 3	CO3
25.	The effective aperture of transmitting and receiving antennas in a communication system are 8 λ2 and 12 λ2 respectively with a separation of 1.5 km between them. The E.M wave is travelling with a frequency of 6MHz and the total input power is 25KW. Find the power received by the receiving antenna.	5	L 3	CO3
26.	Define the following with respect to antenna: (1) Radiation pattern (power and field pattern) (2) field zones (3) Aperture	6	L 2	CO3
27.	Explain the construction and field pattern for Micro strip lines.	9	L 2	CO3
28.	Derive the characteristic impedance of the Micro strip lines and different types of losses in a micro strip line.	8	L 3	CO3
29.	Prove that maximum effective aperture for a short dipole antenna is 0.119λ2.	8	L 3	CO3
30.	Derive an expressions for characteristic impedance and attenuation loss in parallel strip line	8	L 3	CO3
	Module -04			
31.	State and prove power theorem and its application.	6	L	CO4

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32.	Derive an expression for the power radiated from an isotropic point source with sine squared power pattern.	8	L 3	CO4
33.	Eight point sources are spaced apart. They have a phase difference of π/3 between adjacent elements. Obtain the field pattern. Also find BWFN and HPBW.	8	L 3	CO4
34.	Derive the expression for total field in case of two isotropic point sources with the same amplitude and equal phase. Plot the field pattern for two isotropic sources spaced apart.	8	L 3	CO4
35.	Explain the principle of pattern multiplication.	7	L 2	CO4
36.	Derive an expression and draw the field pattern for isotropic point sources of same amplitude and opposite phase. Also determine its maxima, minima and HPBW	9	L 3	CO4
37.	4 isotropic point sources are placed apart. The power applied is with equal amplitude and a phase difference of π/3 between adjacent elements. Determine BWFN.	5	L 3	CO4
38.	Derive the field equation for a linear array of n isotropic point sources of equal amplitude and spacing. Explain its operation as (a) broadside array (b) end fire array	8	L 3	CO4
39.	Explain Pattern multiplication principle with example	7	L 2	CO4
40.	Derive the radiation pattern of two isotropic point sources with equal amplitudes.	8	L 3	CO4
	Module-05			
41.	With a neat figure explain the working of Yagi-Uda antenna. Write the design formulae for different components used in Yagi-Uda antenna. Also mention the applications of YagiUda antenna.	7	L 2	CO5
42.	Explain different types of rectangular horn Antennas with diagrams	6	L 2	CO5
43.	Derive an expression for the fields of small loop antenna	8	L 3	CO5
44.	Derive expression for radiation resistance of small loop antenna.	8	L 3	CO5
45.	Explain parabolic reflectors? Also mention characteristics, advantages and disadvantages of parabolic reflectors.	7	L 2	CO5
46.	Explain the construction, operation, and applications of horn antennas.	7	L 2	CO5
47.	An antenna has a power gain of 100. Calculate its gain in dBi using G(dBi) = 10 log10(G).	5	L 3	CO5
48.	Compare Yagi–Uda, parabolic reflector, horn, and microstrip antennas for suitable applications.	6	L 2	CO5

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49.	Describe the construction and radiation characteristics of a small loop antenna.	7	L 2	CO5
50.	Compare the far-field characteristics of a small loop antenna and a short dipole.	7	L 2	CO2

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