QP Code: RA22BTECH408 | Reg. No | | | | | | | | | | | AR 21/22

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Sixth Semester) Examinations, April 2025

21BECPC36002 – Microwave Engineering
(ECE)

Time: 3 hrs | Maximum: 70 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	An antenna has a loss resistance 10 ohms, power gain of 20 and directivity 22. Calculate its radiation resistance.	CO4	K1
b.	A loss less transmission line has L = 110 nH/m, C = 20 pF/m. Find Z_0.	CO1	K1
c.	Define isolator and write its S parameter.	CO2	K2
d.	Write down the Directivity value of the Hertzian and Halfwave dipole Antennas.	CO3	K2
e.	Define velocity modulation.	CO4	K2

PART – B **(15 x 4 = 60 Marks)**

		Marks	CO #	Blooms Level
	Answer ***All*** the questions			
2. a.	Explain circuit model and derive the general equation of transmission line. Also write about lossless and Distortion less transmission line.	12	CO1	K3
b.	For a terminated transmission line Z_L = 200 Ω, and Z_0 = 100 Ω, Find out VSWR.	3	CO1	K2
	(OR)			
c.	Define and write Key features of a stub. Explain in detail with proper derivation about single stub matching.	10	CO1	K3
d.	Define transmission loss. In a lossless Transmission line, Z_L = 100 Ω, Z_0 =50 Ω, Find out transmission loss.	5	CO1	K2
3.a.	A rectangular waveguide is having dimension a = 2.5 cm and b = 1cm and operates at 15 GHz. Find out the cutoff frequency for T_{10}, T_{21}, T_{11} mode.	5	CO2	K1
b.	Define TEM waves and write its various characteristics. A rectangular waveguide with dimension 5 cm x 3 cm operates at 25 GHz frequency. Find out cutoff frequency, cut off wavelength, guided wavelength and phase velocity for TM_{11} mode.	10	CO2	K2
	(OR)			
c.	Explain about the S-parameters of directional coupler, its types and performance parameters along with its applications.	10	CO2	K2
d.	Write a short note on Attenuators. A 5 dB attenuator is having VSWR 1.2, assuming the attenuator is reciprocal find its S-matrix.	5	CO2	K2
4.a.	Explain in detail construction, operation and application of reflex klystron. Draw the Applegate diagram.	12	CO3	K2
b.	Write the formula for electron Trajectory in Magnetron. And write its applications	3	CO3	K2
	(OR)			

c.	A normal magnetron has the following parameters b = 0.45 m. Magnetic flux density is 1.2 mwb/m^2. Determine hall cut-off voltage.	5	CO3	K1
d.	Write key features of Schottky diode and PIN diode with their applications. Compare VI characteristics of Schottky with PN junction diode.	10	CO3	K2
5.a.	Write short note on Radiation Pattern and MASER.	8	CO4	K2
b.	Explain the operation of Gunn diode with two valley diagrams. Also write its applications.	7	CO4	K2
	(OR)			
c.	Write about construction, design considerations, application with pros and cons of microstrip patch antenna.	12	CO4	K2
d.	Calculate the power being radiated by an antenna having a radiation resistance of 50 ohm and is drawing a rms current of 8A.	3	CO4	K2

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