GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– VII (NEW) EXAMINATION – WINTER 2021

Subject Code:2171001   **Date:23/11/2021**
Subject Name:Microwave Engineering
Time:02:30 PM TO 05:00 PM   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Discuss the characteristics of TEM, TE and TM Mode.	**02**
	(b)	TEM mode can't propagate through rectangular wave guide. Justify this statement.	**02**
	(c)	Define terms: (1) Characteristics impedance (2) VSWR and (3) Group velocity.	**03**
	(d)	Define terms Coupling Factor, Directivity & Isolation Factor with respect to directional coupler.	**03**
	(e)	Draw equivalent circuits for following cases. **Case-1**: Transmission line with short ended load and length (1) =λ/4 (2) > λ/4 and (3) < λ/4 **Case -2**: Transmission line with open ended load and length (1) =λ/4 (2) > λ/4 and (3) < λ/4	**04**
Q.2	**(a)**	Smith chart is a transmission line calculator. Give your comments on this statement.	**03**
	(b)	A dielectric-filled rectangular waveguide operates at dominant mode TE_{10}. Dielectric constant = Er = 9: a * b = 7 cm * 3.5 cm. Calculate f_c, V_p and λ_g at 2 GHz.	**04**
	(c)	Mention the significance of impedance matching in the microwave networks. With suitable data, list out procedure wise steps to do single stub matching.	**07**

OR

	(c)	Explain about Micro strip line with its merits and demerits. Also briefly explain about parallel strip line.	**07**
Q.3	**(a)**	A strip line has distance between the two ground planes of 0.32 cm. If the diameter of the conductor equivalent to the flat core of the strip line is 0.054 cm, find the characteristic impedance (Z_0) and velocity of propagation (v) if the dielectric constant of the dielectric in between is 2.3.	**03**
	(b)	Describe about microwave Circulator and microwave Isolator with their S matrixes.	**04**
	(c)	Describe about Gunn diode with required details.	**07**

OR

Q.3	**(a)**	If a rectangular guide with dimensions a:b = 2:1 has waveguide wavelength of 5 cm for operating frequency of 10 GHz, then calculate the values of a, b, V_p, and V_g.	**03**
	(b)	Describe about Magic Tee and also mention its applications.	**04**
	(c)	Describe about Tunnel diode in detail.	**07**
Q.4	**(a)**	Describe any one Power measurement method at microwave frequency.	**03**
	(b)	Explain in detail about Spectrum Analyzer device.	**04**
	(c)	Describe about IMPATT diode in detail.	**07**

OR

Q.4	**(a)**	Describe Impedance measurement technique at microwave operating frequency.	**03**
	(b)	Describe two cavity klystron with all required details.	**04**
	(c)	Describe about TRAPATT diode in detail.	**07**
Q.5	**(a)**	Describe about Electromagnetic Interference / Electromagnetic Compatibility (EMI / EMC).	**03**
	(b)	Write short note on Microwave Antennas.	**04**
	(c)	Describe Monolithic Microwave IC fabrication process and only list out properties of S - parameter matrix.	**07**

OR

Q.5	**(a)**	Enlist various effects of microwaves on human body.	**03**
	(b)	Write short note on Radiometer Systems.	**04**
	(c)	Describe about Radar Systems and Power divider circuits.	**07**

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