K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Subject Code: EXC701   Subject Name: Microwave Engineering
Date: 1 Dec. 2022

Nov – Dec 2022-23			
(B. Tech) Program: Electronics and Telecommunication Engineering			
Examination: LY Semester: VII			
Course Code: EXC701 and Course Name: Microwave Engineering			
Duration: 2.5 Hours		Max. Marks: 60	

Instructions:
(1). All questions are compulsory.
(2). Draw neat diagrams wherever applicable.
(3). Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	Define scattering matrix.	02	CO1	U
ii)	What do you mean by TEE junction and hybrid junction?	02	CO2	R
iii)	List the method of impedance matching? What is the use of the stub matching?	02	CO1	R
iv)	Explain the working principle of TRAPATT diode?	02	CO3	R
v)	Explain isolator.	02	CO2	U
vi)	Explain velocity modulation in two cavity klystron w.r.t. apple gate diagram.	02	CO4	U
vii)	Define antenna gain. List the various measurement of antenna gain.	02	CO5	R
viii)	Explain the RADAR system.	02	CO6	R
Q.2	Solve any four questions out of six.	16		
i)	Explain the operation of Two holes directional coupler with S-matrix.	04	CO2	R
ii)	Explain operation of Gunn diode using two valley model.	04	CO3	R
iii)	Microstrip line is also called open strip line. Comment on this.	04	CO1	U
iv)	Explain travelling wave tube as an amplifier.	04	CO4	R

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v)	Explain the procedure of measurement of dielectric constant at microwave frequency.	04	CO5	R
vi)	Derive radar range equation.	04	CO6	A
Q.3	Solve any two questions out of three.	16		
i)	The terminating impedance $Z_L = 100+j100\ \Omega$ and the characteristics impedance Z_0 of the line and stub is 50 Ω. The fist stub is placed at 0.40 λ away from the load. The spacing between the two stubs is $3\lambda/8$. Determine the length of the short-circuited stub when the match is achieved.	08	CO1	A
ii)	Derive the wave equation for TM wave and obtain all the field components in a circular waveguide.	08	CO2	A
iii)	What is the importance of beam coupling coefficient? Derive the equation of velocity modulation in klystron.	08	CO4	R
Q.4	Solve any two questions out of three.	16		
i)	Explain the working principle of BARITT diode and derive the power output and efficiency.	08	CO3	U
ii)	Explain the measurement of frequency using microwave bench.	08	CO5	R
iii)	Draw and explain the block diagram of the MTI radar system and list out its limitations	08	CO6	R

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