EXTC

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

Nov – Dec 2023

(B. Tech) Program: Electronics and Telecommunication Engineering Scheme: ~~HB~~ II

Examination: LY Semester: VII

Course Code: EXC701 and Course Name: Microwave Engineering

Date of Exam: 4th Dec. 2023 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.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight:**	**12**		
i)	Define S-parameters. Why S-Parameters are required for the characterization of network at microwave frequency?	02	1	U
ii)	What are ferrites and give its properties?	02	3	R
iii)	Summarize the drawbacks of klystron amplifiers. Explain the concept of velocity modulation using Applegate diagram.	02	4	U
iv)	What is TWT? What do you mean by SWS? List the different types of SWS? Explain the amplification process in TWT in short.	02	4	U
v)	What are the applications of TRAPATT devices?	02	3	R
vi)	Explain what do you meant by RADAR range?	02	6	U
vii)	Compare the rectangular and circular waveguide?	02	2	U
viii)	Explain the design of circulator using two magic tee and phase shifter.	02	2	U
Q.2	**Solve any four questions out of six.**	**16**		
i)	What is mode jumping and how it is avoided in magnetron. Also, explain the frequency pushing and pulling.	04	4	U
ii)	Construct a microstrip line on a 0.5 mm alumina substrate (ε_r= 9.9, tanδ=0.001) for a 50 Ω characteristic impedance. Select the length of this line required to produce a phase delay of 270° at 10 GHz.	04	1	Ap
iii)	Explain the characteristics and applications of microwaves.	04	1,6	U
iv)	Explain working of Tunnel diode and TRAPATT diode.	04	3	U
v)	Explain the measurement of frequency using microwave bench set up.	04	5	U
vi)	Construct the S-matrix of Magic tee.	04	2	Ap

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

Nov – Dec 2023
(B. Tech) Program: Electronics and Telecommunication Engineering Scheme: ~~HB~~ IT
Examination: LY Semester: VII
Course Code: EXC701 and Course Name: Microwave Engineering
Date of Exam: 4th Dec. 2023 Duration: 2.5 Hours Max. Marks: 60

Q.3	**Solve any two questions out of three.**	**16**		
i)	Solve a matching network using single shunt short-circuited stub as a tuning element to match a load impedance of Z_L = 73- j80 Ω to a 50 Ω Ohm transmission line. (Use smith chart)	08	1	Ap
ii)	List various modes of Gunn diode. Give classifications for these modes and explain the working of all modes.	08	3	U
iii)	Explain various methods of the measurement of antenna gain.	08	5	U
Q.4	**Solve any two questions out of three.**	**16**		
i)	Derive the wave equation for a TE wave and obtain all the field components in a circular waveguide. An air-filled circular waveguide having an inner radius of 1 cm is excited in the dominant mode at 10 GHz. Solve: (a) The cut off frequency of the dominant mode. (b) Guide wavelength (c) Wave impedance. Find the bandwidth for operation in dominant mode only.	08	2	Ap
ii)	Construct the equation of velocity modulation in klystron. Identify the importance of beam coupling coefficient? Also explain the concept of velocity modulation.	08	4	Ap
iii)	List the medical application of Microwaves and explain any one in brief.	08	6	U

****