

Q1. (20 Marks)	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks. each	2 marks
1.	X-band frequencies are in which of the following ranges?	
Option A:	8.0 to 12.0 GHz	
Option B:	5.5 to 8.0 GHz	
Option C:	3.5 to 5.5 GHz	
Option D:	12.4 to 16.4 GHz	
2.	Isolator offers _____ in the reverse order	
Option A:	low attenuation	
Option B:	high attenuation	
Option C:	high gain	
Option D:	low gain	
3.	The substrate material in MMIC fabrication should have	
Option A:	low dielectric constant	
Option B:	high resistivity and good dielectric strength	
Option C:	high loss tangent	
Option D:	low thermal conductivity	
4.	For a reciprocal network	
Option A:	$S_{ij} \neq S_{ji}$	
Option B:	$S_{ij} = 0$	
Option C:	$S_{ij} \neq 0$	
Option D:	$S_{ij} = S_{ji}$	
5.	The cavity magnetron uses strapping to	
Option A:	prevent mode jumping	
Option B:	prevent cathode back heating	
Option C:	ensure bunching	
Option D:	improve the phase-focusing effect	
6.	The dominant mode for a rectangular waveguide is	
Option A:	TE_{10}	
Option B:	TE_{11}	
Option C:	TM_{11}	
Option D:	TE_{20}	
7.	The microwave source used in a microwave bench setup is the	
Option A:	IMPATT diode	
Option B:	Schottky barrier diode	
Option C:	Gunn diode	
Option D:	PIN diode	
8.	The wave impedance of TEM wave is	
Option A:	$\sqrt{120\pi}$	

Option B:	$1/120\pi$
Option C:	120π
Option D:	$1/\sqrt{120\pi}$
9.	Beam-coupling coefficient in klystron is a function of
Option A:	beam voltage
Option B:	transit angle
Option C:	Input voltage
Option D:	depth of velocity modulation
10.	Which of the following device has the 'negative resistance' characteristics?
Option A:	Reflex klystron
Option B:	Gunn diode
Option C:	p-n-p transistor
Option D:	Magnetron

Q2. (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	Where do microwaves lie in the electromagnetic spectrum in terms of frequency? List the characteristics and applications of microwaves.	
B	A lossless line of characteristic impedance $R_0 = 50\Omega$ is to be matched to a load $Z_L = \frac{50}{[2+(2+\sqrt{3})]}\Omega$ by means of a lossless short-circuited stub. The characteristics impedance of the stub is 100Ω . Find the stub position (closest to the load) and length so that a match is obtained.	
C	What are Microwave Integrated Circuits (MIC's)? Distinguish between HMIC and MMIC.	

Q3. (20 Marks)	Solve any Two Questions out of Three.	10 marks each
A	With the help of a neat labelled diagram, explain the method to measure the microwave frequency.	
B	Explain the significance of RWH model and two valley model in Gunn diode	
C	Explain the working of a parametric amplifier and explain its application.	

Q4. (20 Marks)	Solve any Two Questions out of Three.	10 marks each
A	Describe the mechanism of velocity modulation in two-cavity klystron. Also find the condition for maximum power output.	
B	With a neat functional diagram, explain the working principle of cavity magnetron.	
C	What are slow wave structures? With the help of a neat labelled diagram explain the amplification process in a helix-type travelling-wave tube.	