

University of Mumbai
Examination 2020 under cluster 7 (Lead College: SSJCOE)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: ECC701 and Course Name: Microwave Engineering

Time: 2 hour

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The modes of propagation supported by a rectangular wave guide is:
Option A:	TM, TEM, TE modes
Option B:	TM, TE
Option C:	TM, TEM
Option D:	TE, TEM
2.	The fundamental or dominant mode in a rectangular waveguide is
Option A:	TE ₀₁
Option B:	TE ₁₀
Option C:	TE ₁₁
Option D:	TE ₂₁
3.	The intrinsic impedance of the waveguide at $f=1.5f_c$ in TM and TE modes is, respectively
Option A:	140 Ω , 253 Ω
Option B:	218 Ω , 652 Ω
Option C:	281 Ω , 506 Ω
Option D:	109 Ω , 326 Ω
4.	The isolators constructed using ferrite materials must operate at:
Option A:	Gyro magnetic resonance
Option B:	Magnetic resonance
Option C:	Isolator resonance
Option D:	None of the mentioned
5.	_____ is a device that produces a phase shift of a required amount of the input wave.
Option A:	Phase shifter
Option B:	Attenuator
Option C:	Resonator
Option D:	None of the mentioned
6.	The two adjustable parameters in single stub matching are distance 'd' from the load to the stub position, and _____
Option A:	Susceptance or reactance provided by the stub
Option B:	Length of the stub
Option C:	Distance of the stub from the generator

Option D:	Changing the characteristic impedance
7.	If a load of 10Ω has to be matched to a transmission line of characteristic impedance of 50Ω , then the characteristic impedance of the matching section of the transmission line is:
Option A:	50Ω
Option B:	10Ω
Option C:	22.36Ω
Option D:	100Ω
8.	Shunt stubs are preferred for:
Option A:	Strip and microstrip lines
Option B:	Coplanar waveguides
Option C:	Circular waveguide
Option D:	Circulators
9.	For co-axial lines and waveguides, _____ is more preferred.
Option A:	Open circuited stub
Option B:	Short circuited stub
Option C:	Slotted section
Option D:	Co-axial lines cannot be impedance matched
10.	If the instantaneous RF potentials on the two sides of a magnetron cavity are opposite polarity, the operation is in the
Option A:	Π mode
Option B:	2Π mode
Option C:	$\Pi/2$ mode
Option D:	$\Pi/4$ mode
11.	The purpose of the magnet, which surrounds a travelling-wave tube, is to
Option A:	Accelerate the electron beam
Option B:	Modulate the velocity of the electron beam
Option C:	Hold the electron beam from spreading out
Option D:	Slow down the electromagnetic wave on the helix
12.	In a two-cavity klystron, velocity modulation of the electron beam is produced by
Option A:	Collector
Option B:	Catcher cavity
Option C:	Buncher cavity
Option D:	Cathode
13.	The klystron tube used in a klystron amplifier is a _____ type beam amplifier.
Option A:	Linear beam
Option B:	Crossed field
Option C:	Parallel field
Option D:	None of the mentioned
14.	Under ideal conditions, when a PIN diode is used as a switch, in the ON state, the switch must have an insertion loss which is

Option A:	Maximum
Option B:	Average
Option C:	Insertion loss cannot be defined for a switch
Option D:	Zero
15.	The width of depletion region of a varactor diode _____ with increase in reverse bias voltage.
Option A:	Increases
Option B:	Decreases
Option C:	Remains constant
Option D:	None of the mentioned
16.	When a reverse bias voltage exceeding the breakdown, voltage is applied to an IMPATT diode, it results in
Option A:	avalanche multiplication
Option B:	break down of depletion region
Option C:	high reverse saturation current
Option D:	none of the mentioned
17.	A VSWR meter has the following properties except
Option A:	High gain
Option B:	High selectivity
Option C:	Low noise
Option D:	Low Q
18.	Progress in _____ and other related semiconductors material processing led to the feasibility of monolithic microwave integrated circuits
Option A:	GaAs
Option B:	Si
Option C:	Ge
Option D:	GaAlAs
19.	The substrate of an MMIC must be a _____ to accommodate the fabrication of all the type of devices.
Option A:	Semiconductor
Option B:	Insulator
Option C:	Partial conductors
Option D:	Metals operable at high frequencies
20.	For the capacitors used in MMICs, the insulating dielectric films used are:
Option A:	Air
Option B:	SiO
Option C:	Titanium
Option D:	GaAs

Q2	Solve any Two Questions out of Three	10 marks each
A	Design an <i>L</i> -section matching network to match a series <i>RC</i> load with an impedance $Z_L = 200 - j100$ ohms to a 100 ohms line at a frequency of 500 MHz	
B	Derive an expression for the phase velocity, cut-off frequency and cut-off wavelength of a rectangular waveguide	
C	With the help of suitable diagram explain mechanism of operation of Magnetron. What is mode jumping in Magnetron? How are various modes separated?	

Q3	Solve any Two Questions out of Three	10 marks each
A	Explain the significance of RWH theory and explain two valley models in GUNN diode	
B	Explain how VSWR is measured at microwave frequencies.	
C	Write a short note on types of MIC.	