

Program: BE Electronics & Telecommunication Engineering

Curriculum Scheme: Revised 2012

Examination: Fourth Year Semester VII

Course Code: ETC704 and Course Name: Microwave and Radar Engineering

Time: 1 hour

Max. Marks: 50

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Note to the students:- All the Questions are compulsory and carry equal marks .

Q1.	The cut off frequency of rectangular waveguide with the dimension $a = 5.842$ cm, operating in dominant mode is
Option A:	2.57 GHz
Option B:	1.28 GHz
Option C:	257GHz
Option D:	128GHz
Q2.	The major advantage of single stub tuning over other impedance matching techniques is:
Option A:	Lumped elements are avoided
Option B:	It can be fabricated as a part of transmission line media
Option C:	It involves two adjustable parameters
Option D:	All of the mentioned
Q3.	An air filled rectangular waveguide of internal dimensions a cm X b cm ($a > b$) has cut off frequency of TE ₀₁ mode which is 2 times the cut off frequency of TE ₁₀ mode. If the cut off frequency of TE ₁₁ mode for this waveguide is 9 GHz, then the values of a & b (in cm) are
Option A:	$a = 1.865$ & $b = 3.73$
Option B:	$a = 5.29$ & $b = 3.73$
Option C:	$a = 3.73$ & $b = 1.865$
Option D:	$a = 3.73$ & $b = 5.29$
Q4.	In a circular waveguide, the conduction loss is
Option A:	dependent on frequency only
Option B:	dependent on the radius of the waveguide only
Option C:	inversely proportional to the square root of the conductivity of the inner walls
Option D:	inversely proportional to the square root of the conductivity of the inner as well as outer walls
Q5.	The scattering matrix for an idea 4-port circulator can be written as

Option A:	$\begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$
Option B:	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$
Option C:	$\begin{bmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$
Option D:	$\begin{bmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$
Q6.	If the normalized admittance at a point on a transmission line to be matched is $1+j1.47$. Then the normalized susceptance of the stub used for shunt stub matching is:
Option A:	1Ω
Option B:	1.47Ω
Option C:	-1.47Ω
Option D:	-1Ω
Q7.	$S_{12} = 0.85 - 45^\circ$ and $S_{21} = 0.85 + 45^\circ$ for a two port network. Then the two port network is:
Option A:	Non-reciprocal
Option B:	Lossless
Option C:	Reciprocal
Option D:	Lossy
Q8.	The junction represented by [S] given by $[S] = \begin{bmatrix} 0 & -0.4 & -j0.2 \\ -0.4 & 0 & 0.5 \\ -j0.2 & 0.5 & 0.1 \end{bmatrix}$ is
Option A:	Lossless, reciprocal and matched at all ports
Option B:	Lossless and matched at all three ports but not reciprocal
Option C:	Lossless, reciprocal but not matched at all three ports
Option D:	Lossy, reciprocal and not matched at all three ports
Q9.	In a shunt stub matching design, a short circuited stub of length l_s has been used to cancel out a susceptance $B=Y_0$ (Y_0 is the characteristic admittance of the

	transmission line). If the frequency is 1 GHz, the length of the stub in cm is
Option A:	2
Option B:	3.75
Option C:	5
Option D:	6
Q10.	MST radar is use for
Option A:	Remote sensing
Option B:	Weather forecasting
Option C:	Fire controlling
Option D:	Speed trapping
Q11.	_____ is a device used to measure the intensity of radiant energy.
Option A:	Radiometer
Option B:	Gravometer
Option C:	Gyroscope
Option D:	Dilatometers
Q12.	Which of the following systems use a collection of radio transmitting stations to guide an aircraft to a particular runway?
Option A:	ILS
Option B:	GPS
Option C:	VOR
Option D:	RADAR
Q13.	How many ILS systems does an airport require?
Option A:	0
Option B:	1
Option C:	Depends upon aircraft size
Option D:	Depends upon density of traffic on the airspace
Q14.	If the ratio of the antenna diameter to the wavelength in a radar system is high this will result in (indicate the false statement)
Option A:	large maximum range
Option B:	good target discrimination
Option C:	difficult target acquisition
Option D:	increased capture area
Q15.	The IF bandwidth of a radar receiver is inversely proportional to the
Option A:	pulse width
Option B:	pulse repetition frequency
Option C:	pulse interval
Option D:	square root of the peak transmitted power

Q16.	After a target has been acquired, the best scanning system for tracking is
Option A:	Nodding
Option B:	Spiral
Option C:	Conical
Option D:	Helical
Q17.	The A scope displays
Option A:	the target position and range
Option B:	the target range, but not position
Option C:	the target position, but not range
Option D:	neither range nor position, but not only velocity
Q18.	The slow wave structure is used in
Option A:	TWTA
Option B:	Multicavity klystron
Option C:	Single cavity klystron
Option D:	Magnetron
Q19.	The device commonly used in microwave ovens is the:
Option A:	TWT
Option B:	. klystron
Option C:	magnetron
Option D:	YIG
Q20.	One of the reasons why vacuum tubes eventually fail at microwave frequencies is that their
Option A:	noise figure increases
Option B:	transit time becomes too short
Option C:	shunt capacitive reactances become too large
Option D:	series inductive reactances become too small
Q21.	A reflex klystron is to be operated at a frequency of 10 GHz with dc plate voltage of 300V and plate current of 20 mA. Find the maximum RF power for 1+3/4 mode
Option A:	2.5 W
Option B:	0.5 W
Option C:	2.03 W
Option D:	1.36 W
Q22.	Which of the following diode is most suitable to be used in oscillator ?
Option A:	PIN diode
Option B:	Varactor diode
Option C:	GUNN diode
Option D:	Schottky diode

Q23.	A PIN diode used as a shunt switch has $L_i = 0.5 \text{ nH}$, $R_f = 1.5 \text{ Ohm}$, $R_r = 2 \text{ Ohm}$, and $C_j = 0.5 \text{ pF}$. Given $Z_0 = 50 \text{ Ohm}$ and the operating frequency is 2 GHz. The insertion loss of the switch in the OFF state is
Option A:	37 dB
Option B:	25dB
Option C:	12.5dB
Option D:	8dB
Q24.	For best low-level noise performance in the X-band, an amplifier should use
Option A:	Bipolar transistor
Option B:	GUNN diode
Option C:	Step recovery
Option D:	IMPATT diode
Q25.	The tunnel diode
Option A:	has a tiny hole through its center to facilitate tunneling
Option B:	is a point-contact diode with a very high reverse resistance
Option C:	uses a high doping level to provide a narrow junction
Option D:	works by quantum tunneling exhibited by gallium arsenide only