IES E & T Topic wise Questions

Microwave Engineering

YEAR 1999

MCQ 1

Assertion (A) : In a small flare angle pyramidal horn excited by a TE_{10} rectangular waveguide, the operative field distribution is also very nearly that of TE_{10} mode.

Reason (R) : In a small flare angle horn, the throat acts as a mode filter.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false but R is true

MCQ 2

Assertion (A) : MASER is a low noise microwave source.

Reason (R) : MASER operation is carried out at cryogenic temperatures

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT correct explanation of A

(C) A is true but A is false

(D) A is false but R is true

MCQ 3

Assertion (A) : Fading in microwave transmission in homogeneous

atmosphere is more severe at higher frequencies.

Reason (R) : The effect of changes in path length of the microwave signal through the atmosphere increases with frequency.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT correct explanation of A

(C) A is true but A is false

(D) A is false but R is true

MCQ 4

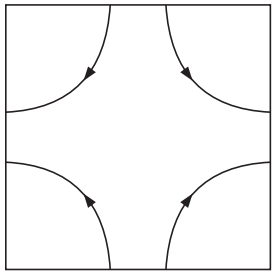
HEMT used in the microwave circuit is a

(A) source (B) high power amplifier

(C) low noise amplifier (D) detector

MCQ 5

Given fig. shows the electrical field pattern of TE_{11} mode in a square waveguide



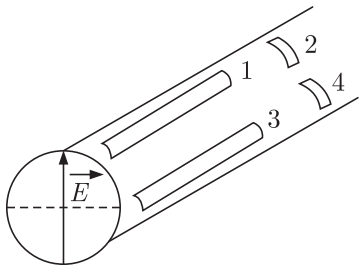
If the waveguide cross-section is gradually deformed into a circle, the circular deformed into a circle, the circular waveguide mode will be

(A) TE_{11} (B) TE_{10}

(C) TE_{21} (D) TE_{12}

MCQ 6

In the circular waveguide, the slots labelled 1,2, 3 and 4 carry TE_{11} mode as shown in the given fig.



Which one of the following is the correct set of radiating and non-radiating slots respectively ?

(A) (1, 3) and (2, 4)
(B) (2, 3) and (1, 4)
(C) (2, 4) and (1, 3)
(D) (1,4) and (2, 3)

MCQ 7

On terminating a waveguide. If a one-port cavity resonator produces a reflection coefficient of $0.5\underline{/0^\circ}$, the coupling characteristics (over/under/critically) and coupling coefficients will be respectively

(A) overcoupled and 2
(B) undercoupled and 0.5
(C) overcoupled and 3
(D) critically coupled and 1

MCQ 8

For an aperture antenna of aperture dimension D and wavelength of radiation from the antenna λ, the far-field is at a distance greater than

(A) $D^2/2\lambda$
(B) $2D^2/\lambda$
(C) D^2/λ
(D) $(2D)^2/\lambda$

MCQ 9

Consider the following statements about advantages and disadvantages of offset parabolic reflector antenna :

1. It reduces aperture blocking but degrades sidelobe level.
2. It can be used as a multibeam or dual polarised antenna.
3. A linearly polarised illumination causes no cross-polarised components in the radiation pattern.
4. It improves isolation between reflector and primary feed.

Which of these statements are correct ?

(A) 1 and 2
(B) 3 and 4

(C) 1 and 3 (D) 2 and 4

MCQ 10

Consider the following components in a two-port transmission loss measurement setup :

1. Sweep oscillator
2. Variable attenuator
3. Device under test (DUT)
4. Power meter

The correct sequence of connection of these components is

(A) 1, 2, 3, 4 (B) 1, 2, 4, 3
(C) 1, 2, 4, 3 (D) 2, 1, 4, 3

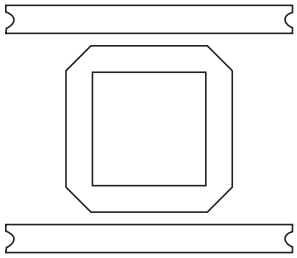
MCQ 11

On a microstrip line, the wavelength measures is 12 mm for a 19 GHz signal. The dielectric constant of the equivalent homogenous line is

(A) 3.5 (B) 5.5
(C) 6.25 (D) 7

MCQ 12

The microstrip conductor pattern shown in the given fig.



is that of

(A) a loss-pass filter (B) a high-pass filter
(C) a channel dropping filter (D) an evanescent mode filter

MCQ 13

In microwave communication links, the rain-drop attenuation experienced is mainly due to

(A) absorption of microwave energy by water vapour
(B) resonance absorption of atomic vibration in water molecules
(C) scattering of microwaves by collection of water-drops
(D) refraction of microwave through liquid-drops lenses formed by rain

MCQ 14

A 100 V source and detector sensitivity of 1 mV are connected to a long-haul transmission link of attenuation of 1 dB per 100 m. The maximum link length is

(A) 10 km (B) 12 km
(C) 15 km (D) 20 km

MCQ 15

Consider the following statements :

Ferrite is

1. a non-conductor with magnetic properties
2. a non-conductor with non-magnetic properties
3. a microwave semi-conductor invented by Faraday.
4. an insulator with gyro-magnetic properties

Which of these statements are correct ?

(A) 1 and 2 (B) 2 and 3
(C) 3 and 4 (D) 1 and 4

MCQ 16

In an LOS communication system, the ground below the direct path is the first Fresnel zone and is smooth reflecting. The phase difference between the direct and reflected waves at the receiving antenna will be

(A) 180° (B) 360°
(C) 270° (D) 450°

MCQ 17

A cavity resonator can be represented by

(A) an LC circuit (B) an LCR circuit

(C) a lossy inductor (D) a lossy capacitor

YEAR 2000

MCQ 18

A cylindrical cavity operating in TE_{111} mode has a 3 dB bandwidth of 2.4 MHz and its quality factor is 4000. Its resonant frequency would be

(A) 9.6 GHz (B) $9.6/\sqrt{2}$ GHz

(C) $9.6/\sqrt{3}$ GHz (D) $9.6/\sqrt{6}$ GHz

MCQ 19

Match **List I** with **List II** and select the correct answer using the codes given below the lists :

	List I		List II
a.	Ferrite circulator	**1.**	Adjustable transmission line stub
b.	E-plane Tee	**2.**	Transit time effect
c.	Velocity modulation	**3.**	Pump oscillator for parametric amplifier
d.	Reflex klystron	**4.**	Microwave resonator

Codes :

	a	b	c	d
(A)	4	1	2	3
(B)	3	2	4	1
(C)	4	1	3	2
(D)	3	2	1	4

MCQ 20

For a Gunn diode oscillator, the drift velocity of the electron is 10^7 cm/s and the active region length is 10×10^{-4} cm. The natural frequency of oscillation would be

(A) 1 MHz (B) 10 MHz

(C) 1 GHz (D) 10 GHz

MCQ 21

At microwave frequencies, a varactor diode may NOT be useful

(A) for electronic tuning (B) for frequency multiplication

(C) as an oscillator (D) as a parametric amplifier

MCQ 22

The correct sequence of the assembled parts in a klystron amplifier from any end is

(A) anode, catcher cavity, cathode and buncher cavity

(B) cathode, buncher cavity, catcher cavity and anode

(C) anode, buncher cavity, catcher cavity and cathode

(D) cathode, catcher cavity, anode and buncher cavity

MCQ 23

An amplifier network is unconditionally stable if

(A) real part of Z_{in} and Z_{out} are greater than zero for some positive the source and load.

(B) real part of Z_{in} and Z_{out} complex conjugates of each other for some positive real impedances of the sources and load

(C) Z_{in} and Z_{out} are complex conjugates of each other for some positive real impedances of the source and load

(D) Z_{in} and Z_{out} are complex conjugates of each other for all positive real impedances of the source and load

MCQ 24

Consider the following statements :

If the narrow dimension of a standard rectangular waveguide carrying the dominant mode is reduced, then the

1. wave impedance will increase
2. attenuation will increase
3. guide wavelength will decrease
4. power handling capability will correct ?

Which of these statements are correct ?

(A) 1 and 2 (B) 2 and 4

(C) 3 and 4 (D) 1 and 3

MCQ 25

A quarter-wave transformer matching a $75\,\Omega$ source with a $300\,\Omega$ load should have a characteristic impedance of

(A) $50\,\Omega$ (B) $100\,\Omega$

(C) $150\,\Omega$ (D) $200\,\Omega$

MCQ 26

Match **List I** with **List II** and select the correct answer using the codes given below the lists :

	List I		**List II**
a.	Ratio of maximum energy stored to energy dissipated per cycle	**1.**	Propagation constant
b.	TEM mode in a lossless medium	**2.**	Cut-off frequency is zero
c.	Ratio of frequency in radian to phase velocity of EM wave	**3.**	Quality factor of a cavity
d.	TE_{11} is the mode of lowest cut-off frequency	**4.**	Cylindrical waveguide

Codes :

	a	**b**	**c**	**d**
(A)	3	2	4	1
(B)	2	3	1	4
(C)	3	2	1	4
(D)	2	3	4	1

MCQ 27

An antenna has $40\,\Omega$ antenna resistance and $60\,\Omega$ radiation resistance. The efficiency of the antenna is

(A) 30% (B) 40%

(C) 50% (D) 60%

MCQ 28

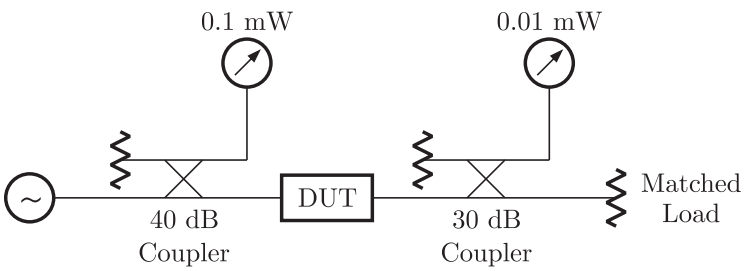
For a microstrip with a substrate dielectric constant ε, the value of effective dielectric constant ε_e will be such that

(A) $\frac{\varepsilon}{2} < \varepsilon_e < \varepsilon$ (B) $\frac{(\varepsilon+1)}{2} < \varepsilon_e < \varepsilon$

(C) $1 < \varepsilon_e < \frac{(\varepsilon+1)}{2}$ (D) $\frac{(\varepsilon-1)}{2} < \varepsilon_e < \frac{(\varepsilon+1)}{2}$

MCQ 29

The insertion loss of the Device Under Test (DUT) shown in the given fig. is



(A) 10 dB (B) 20 dB
(C) 30 dB (D) 40 dB

MCQ 30

In the standing wave detector method for measuring a slightly mismatched load impedance, the distance from the load position to the nearest voltage minimum towards the generator is one-eight the guide wavelength. The load is

(A) a capacitive impedance (B) an inductive impedance
(C) a pure capacitance (D) a pure inductance

MCQ 31

If the peak power of pulsed microwave system is 10^4 W and the average power is 800 W, then the duty cycle will be

(A) 80% (B) 8%
(C) 0.8% (D) 0.08%

MCQ 32

A 8 kHz communication channel has an SNR of 30 dB. If the channel bandwidth is doubled, keeping the signal power constant, the SNR for the modified channel will be

(A) 27 dB (B) 30 dB
(C) 33 dB (D) 60 dB

MCQ 33

Consider the following parameters :

1. Loss is the media
2. Permeability of the media
3. Frequency of the wave
4. Velocity of the wave

Which of these parameters are responsible for the change of phase of a propagating electromagnetic wave ?

(A) 1, 2 and 3 (B) 2, 3 and 4
(C) 1, 2 and 4 (D) 1 and 4

MCQ 34

As a result of reflections from a plane conducting wall, electromagnetic waves acquire an apparent velocity greater than the velocity of light in space. This is called the

(A) velocity of propagation (B) normal velocity
(C) group velocity (D) phase velocity

YEAR 2001

MCQ 35

While determining antenna height for terrestrial microwave links, the effect of refraction from the atmosphere is taken care of by considering the effective curvature of the earth to be

(A) 2/3 times the radius of the earth
(B) 3/4 times the radius of the earth
(C) 4/3 times the radius of the earth
(D) 3.2 times the radius of the earth

MCQ 36

Match **List I** (Microwave band) with **List II** (Frequency used in satellite communication) and select the correct answer using the codes given below the lists :

List I **List II**

a.	C-band	**1.**	12 GHz to 14 GHz
b.	Ku-band	**2.**	24 GHz to 26 GHz
c.	Ka-band	**3.**	20 GHz to 30 GHz
		4.	4 GH to 6 GHz

Codes :

	a	**b**	**c**
(A)	4	2	1
(B)	2	1	3
(C)	4	1	3
(D)	3	4	2

MCQ 37

For a parabolic reflector antenna with diameter of 3 m, the far field pattern measurement at 10 GHz should be carrier out at a distance of a least

(A) 30 m (B) 200 m
(C) 400 m (D) 600 m

MCQ 38

In Gunn oscillator where the diode is operated in a tunable resonant circuit, most of the sample length of the Gunn device is maintained in the negative conductance state during most of the R.F. cycle for

(A) delayed domain mode (B) quenched domain mode
(C) LSA mode (D) hybrid mode

MCQ 39

Match **List I** (Names of the devices) with **List II** (Applications) and select the correct answer using the codes below the lists :

	List I		**List II**
a.	Step-recovery Diodes	**1.**	Switching circuit
b.	MESFET	**2.**	To produce multiple harmonics in comb generator
c.	Pin Diode	**3.**	Microwave amplifier

Codes :

	a	b	c
(A)	2	1	3
(B)	2	3	1
(C)	3	2	1
(D)	1	3	2

MCQ 40

Consider the following statements :

Cross field amplifier (CFA) is a microwave power amplifier which

1. is a cross between the TWT and the magnetron in its operation
2. uses a magnetron structure to provide on interaction between crossed d c electric and magnetic field on one hand and RF fields on the other hand.
3. uses interaction between electron beam and stationary RF fields.

Select the correct answer using the codes given below :

(A) 1 and 2 (B) 1 and 3

(C) 3 alone (D) 2 and 3

MCQ 41

Broad banding a microwave transistor RF amplifier is difficult because

(A) of shunt capacitance loading effect

(B) of series capacitance loading effect

(C) changes in inductive loading

(D) changes in output loading affect input impedance

MCQ 42

The propagation of TE_{10} mode in a rectangular waveguide is used to excite a circular waveguide as shown in fig. I and Fig. II. The mode excited in the circular waveguide of Fig. I and Fig. II will, respectively, be

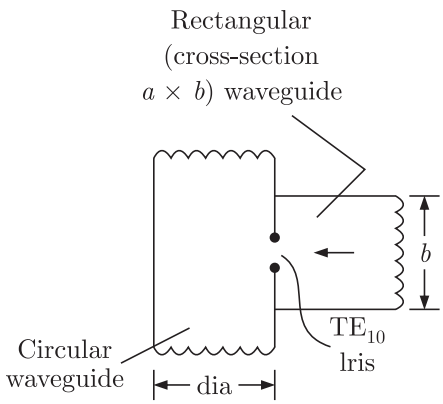


Figure I

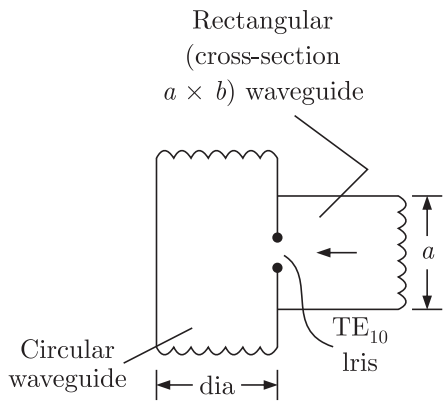


Figure II

(A) TE_{11} and TM_{01}
(B) TM_{01} and TE_{11}
(C) TE_{01} and TM_{01}
(D) TM_{01} and TE_{01}

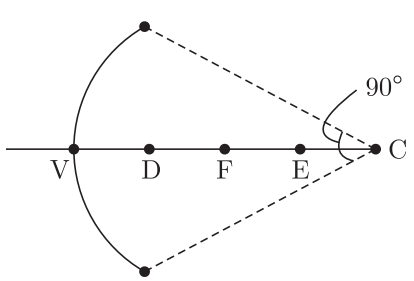
MCQ 43

For producing circularly polarized beams in microwave communication field, the type of antenna ideally suited is

(A) helical antenna
(B) parabolic disc with circular aperture
(C) pyramidal horn with symmetrical beam shapes in E and H plane
(D) circular loop antenna

MCQ 44

Given fig. shows a 90° sector of spherical reflector with vertex 'V', centre of curvature 'C' and equal distance VD, DF, FE and EC. When a beam of electromagnetic wave is incident parallel to the axis, all the energy will pass through the region



(A) VD
(B) DF
(C) FE
(D) EC

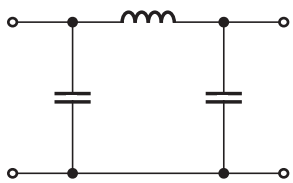
MCQ 45

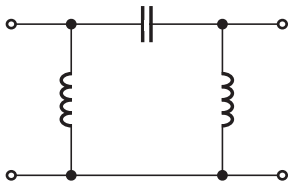
A cylindrical cavity resonator has diameter of 24 mm and length 20 mm. The dominant mode and the lowest frequency band are operated as

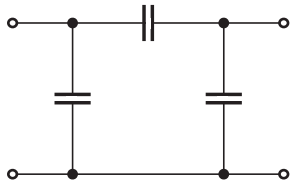
(A) TE_{111} and X-band
(B) TM_{111} and C-band
(C) TM_{011} and Ku-band
(D) TM_{110} and X-band

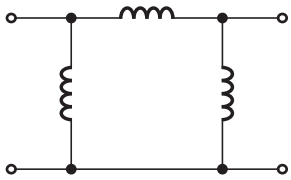
MCQ 46

The equivalent circuit of a gap in the strip conductor of a microstrip is

(A)


(B)


(C)


(D)


MCQ 47

In parametric amplifier used in microwave communication systems, the gain is mainly restricted by

(A) ambient temperature
(B) pump frequency
(C) pump bandwidth
(D) pump energy

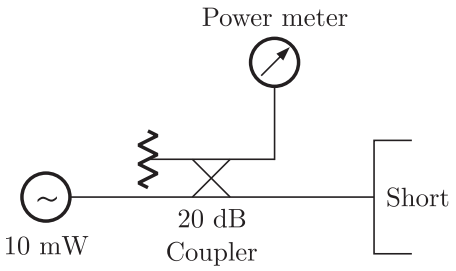
MCQ 48

Two identical antennas 1 km apart and operating at $\lambda = 10\,\text{cm}$ in an LOS link, have an obstacle 10 m high midway between them. The height of the antennas such that the first Fresnel zone is free of any obstacle, should be

(A) 15 m
(B) 18 m
(C) 20 m
(D) 25 m

MCQ 49

In the measurement of microwave signal as shown in the given fig. the power meter reads 0.01 μW . The coupler directivity is



(A) 20 dB
(B) 30 dB
(C) 40 dB
(D) 50 dB

MCQ 50

Assertion (A) : One problem with microstrip circuits (or other planar circuits) is that of inevitable discontinuities at bends, stop changes in width, and junctions which can cause a degradation of circuit performance.

Reason (R) : Bends, step changes in width and junction discontinuities introduces parasitic reactance that can lead to phase and amplitude errors, input and output mismatch, and spurious coupling.

(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is NOT the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

YEAR 2002

MCQ 51

The correct sequence of subsystems of Klystron amplifier as they appear in the direction of low of the electron beam is

(A) Buncher cavity, Cathode, Collector, Catcher cavity
(B) Buncher cavity, Cathode, Catcher cavity, Collector
(C) Cathode, Buncher cavity, Catcher cavity, Collector

(D) Cathode, Buncher cavity, Collector, Catcher cavity

MCQ 52

Assertion (A) : GaAs is preferred to silicon for fabrication of Gunn diode.

Reason (R) : GaAs has better frequency stability than silicon.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false but R is true

MCQ 53

Assertion (A) : TE_{10} mode is the dominant mode in a rectangular wave guide.

Reason (R) : TE_{10} mode has the lowest cut-off frequency for which the wavelength is double the broadwall dimension.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false but R is true

MCQ 54

An IMPATT diode has a drift length of 4 μm. The drift velocity of Si is 10^5 m/s. The operating frequency of the IMPATT diode is

(A) 25 GHz (B) 20 GHz

(C) 12.5 GHz (D) 125 GHz

MCQ 55

Match **List I** (Microwave device) with **List II** (Interaction process involved) and select the correct answer using the codes given below the lists :

List I **List II**

a. Reflex Klystron	**1.** Spiralling beam
b. Gyrotron modulation	**2.** Velocity with travelling wave structure
c. Backward wave	**3.** Velocity modulation oscillator with resonant cavities
d. Fixed-frequency	**4.** Crossed field magnetron

Codes :

	a	b	c	d
(A)	4	2	1	3
(B)	3	1	2	4
(C)	4	1	2	3
(D)	3	2	1	4

MCQ 56

For using as a local oscillator for frequency measurements, the most suitable microwave source will be

(A) Travelling wave tube
(B) Double cavity klystron
(C) Reflex klystron
(D) Magnetron

MCQ 57

Electromagnetic oscillations are sustained in a two-cavity klystron due to

(A) feedback of output power to the input cavity in proper phase
(B) feedback of output power from to the input cavity with phase difference of 180°
(C) feedback of power from external load to input cavity in proper phase
(D) Feedback of power from thermal noise of load circuit with phase lag of 90°

MCQ 58

Match **List I** (Circuit name) with **List II** (S-parameter) and select the correct answer using the codes given below the lists :

List I

a. Circular (3-port)

b. Directional Coupler

c. Magic Tee

d. Rate Race Junction

List II

1. $\begin{bmatrix} 0 & S_{12} & 0 & S_{14} \\ S_{12} & 0 & S_{23} & 0 \\ 0 & S_{23} & 0 & S_{34} \\ S_{14} & 0 & S_{34} & 0 \end{bmatrix}$

2. $\begin{bmatrix} 0 & S_{12} & S_{13} & S_{14} \\ S_{12} & 0 & S_{23} & S_{24} \\ S_{31} & S_{32} & 0 & S_{34} \\ S_{41} & S_{42} & S_{43} & 0 \end{bmatrix}$

3. $\begin{bmatrix} 0 & S_{12} & S_{13} \\ S_{12} & 0 & S_{23} \\ S_{13} & S_{23} & S_{33} \end{bmatrix}$

4. $\begin{bmatrix} 0 & 0 & 1/\sqrt{2} & 1/\sqrt{2} \\ 0 & 0 & 1/\sqrt{2} & -1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} & 0 & 0 \\ 1/\sqrt{2} & -1/\sqrt{2} & 0 & 0 \end{bmatrix}$

Codes :

	a	b	c	d
(A)	1	2	4	3
(B)	3	4	2	1
(C)	1	4	2	3
(D)	3	2	4	1

MCQ 59

A rectangular wave guide measure 3×4.5 cm internally and has a 9 GHz signal propagated in it. The cut off wavelength for TE_{10} mode is

(A) 5 cm (B) 10 cm

(C) 15 cm (D) 9 cm

MCQ 60

Which of the following is not possible in a circular wave guide ?

(A) TE_{10} (B) TE_{01}

(C) TE_{11} (D) TE_{12}

MCQ 61

In general, the reflection coefficient on a transmission line depends

(A) only upon the distance from the source and attenuation of the line

(B) only upon the level of voltage impressed upon the line, and load impedance

(C) only upon the level of power flowing in the line and attenuation in the line

(D) upon the distance from the source, attenuation in the line and also upon the load impedance

MCQ 62

Consider the following features :

1. Wider bandwidth due to higher frequencies.
2. Smaller component size leading to smaller systems.
3. Existence of low signal losses.
4. Lower interference due to lower signal crowding.

Use of RF/microwaves in system application results in which of these advantages ?

(A) 1, 2 and 4 (B) 1, 3 and 4

(C) 2, 3 and 4 (D) 1, 2 and 3

MCQ 63

In a VSWR measurement, a square law detector is used to detect the signal level. The voltmeter reads maximum and minimum as 64 mV and 16 mV respectively. The VSWR of the system will be

(A) 4 (B) 2

(C) 8 (D) 16

MCQ 64

Resistive films in MIC's are needed to fabricate resistors and attenuators. The features desirable in resistive film are

(A) low temperature coefficient of resistance (TCR)

(B) lower loss

(C) good adhesion to the substrate

(D) good etchability and solderability

MCQ 65

The type of antenna to be used for producing circularly polarized beams is

(A) pyramidal horn (B) log-periodic array

(C) paraboloid (D) helical antenna

MCQ 66

In a material characterized by a complex permittivity, the imaginary part is a measure of

(A) dielectric strength of the material

(B) energy stored in the electric field

(C) losses in the material

(D) energy stores in the magnetic field

YEAR 2003

MCQ 67

In a reflex klystron, the velocity modulation

(A) Occurs near the reflector

(B) Occurs in the resonator gap

(C) Occurs near the accelerating grid

(D) Does not occur at all

MCQ 68

For a Gunn diode, the drift velocity of electron through active drift region is 10^7 cm/s and the active region is 10×10^{-4} cm. The critical voltage of the diode (critical field $= 3.2\,\text{kV/cm}$) is

(A) 0.032 V (B) 0.32 V

(C) 3.2 V (D) 32 V

MCQ 69

As an, ideal oscillator for microwave frequency measurements, the most suitable microwave source is a

(A) Multicavity magnetron (B) Reflex klystron

(C) Double cavity klystron (D) Travelling wave tube

MCQ 70

The maximum theoretical output circuit efficiency of a double resonator klystron amplifier is

(A) 25% (B) 50%

(C) 58% (D) 85%

MCQ 71

Which one of the following can be used for amplification of microwave signals ?

(A) Gunn diode (B) Strapped magnetron

(C) Reflex klystron (D) Double cavity klystron

MCQ 72

If the height of the waveguide is halved, its cut-off wavelength will

(A) Be halved

(B) Be doubled

(C) Remain unchanged

(D) Be one-fourth of the previous value

MCQ 73

In a rectangular waveguide with broader dimension a and narrow dimension b, the dominant mode of microwave propagation would be

(A) TE_{10} (B) TM_{10}

(C) TE_{01} (D) TM_{01}

MCQ 74

A cavity wave-meter is connected parallel to a waveguide transmission line which terminates in a resistive load. The microwave power reaching the load-end is monitored by a power meter. As the cavity wave-meter is tuned of the resonant frequency of the input signal through the waveguide assembly the power indicated by the power meter will show

(A) A sudden dip (B) A sudden rise

(C) Rapid fluctuations (D) A steady level

MCQ 75

A two-port non-reciprocal device which produces a minimum attenuation to e.m. wave propagation in one direction and a very high attenuation in opposite direction is generally known as

(A) Phase shifter (B) Isolator

(C) Polariser (D) Circulator

MCQ 76

A metal probe inserted into a rectangular waveguide through the broader wall of the guide will provide a property across the guide. This property is

(A) Shunt (B) Reactance

(C) Reverberation (D) Resonance

MCQ 77

Typical f/D ratio in practice for a paraboloid reflector (where f is the focal length and D is aperture diameter is in the range of

(A) 0.2 to 0.3 (B) 2 to 3

(C) 0.02 to 0.03 (D) 0.5 to 1

MCQ 78

A parabolic dish antenna has a diameter of 1 m. The maximum possible (ideal) gain of the antenna at a wavelength of 3.14 cm is

(A) 20 dB (B) 30 dB

(C) 40 dB (D) 50 dB

MCQ 79

A slotted line is used for the measurement of VSWR. The slot is cut at the centre, because

(A) The field a good impedance matching

(B) To get a good impedance matching

(C) Maximum field will be induced to the penetrating probe

(D) No field will be coupled to the probe

MCQ 80

In a microwave measurement set-up, the power reaching to the load is found to be 50 mW. If a 3 dB coupler is placed before the load, the power to the load will be

(A) 50 mW (B) 25 mW

(C) 12.5 mW (B) 6.25 mW

MCQ 81

The variation of resistance of an element with absorption of microwave power is the underlying principle of operation of a/an

(A) Attenuator (B) Wave filter

(C) Phase shifter (D) Bolometer

MCQ 82

In microwave communication links, path-diversity and frequency-diversity are adopted to overcome fading in the path due to

(A) Polarization shifting (B) Phase lagging

(C) Rain attenuation (D) Fog accumulation

MCQ 83

In microwave communication systems using circularly polarized beams, the receiving antenna should be

(A) Helical antenna (B) Horn antenna

(C) Crossed rhombic antenna (D) Biconical loop antenna

MCQ 84

The extended range propagation occurs due to

(A) High conductivity of the ground

(B) Low conductivity of the ground

(C) Blobs of different dielectric constants randomly distributed in the volume of the upper atmosphere

(D) High conductivity of the upper atmosphere

MCQ 85

In LOS-line of sight propagation system, to take account of normal

refraction, an effective earth radius factor k is used whose value is

(A) 4/3 (B) 4

(C) 3/4 (D) 1/2

MCQ 86

Which one of the following frequency bands is allocated by ITU (International Telecommunication Union) for DBS-Direct Broadcast Service (also referred as DTH-Direct to Home service) ?

(A) 14/12 GHz (B) 6/4 GHz

(C) 2/1 GHz (D) 42/40 GHz

YEAR 2004

MCQ 87

Match **List-I** (Designation of Radar Frequencies) with **List-II** (Frequency Range) and select the correct answer using the codes given below the lists :

	List I		**List II**
a.	S	**1.**	18 - 26.5 GHz
b.	X	**2.**	2 - 4 GHz
c.	Ku	**3.**	8 - 12.4 GHz
d.	K	**4.**	12.4 - 18 GHz

Codes :

	a	**b**	**c**	**d**
(A)	1	3	2	4
(B)	1	4	2	3
(C)	2	3	1	4
(D)	2	4	1	3

MCQ 88

Microwave link repeaters are typically 50 km apart

(A) because of atmosphere attenuation

(B) because of output tube power limitations

(C) because of earth's curvature

(D) to ensure that the applied d.c. voltage is not excessive

MCQ 89

In parameter amplifiers used in microwave communication systems, the pump energy mainly restricted which one of the following ?

(A) Bandwidth (B) Gain

(C) Noise level (D) Operating frequency

MCQ 90

Consider the following statements :

A travelling wave tube is a

1. broad-band amplifier
2. linear beam amplifier
3. crossed field amplifier
4. solid-state amplifier

Which of the statements given above are correct ?

(A) 1 and 2 (B) 2 and 4

(C) 2 and 3 (D) 1, 2 and 4

MCQ 91

In a Ga As gunn diode the drift velocity is 10^7 cm/s and active region length is 10^{-3}cm. What is the natural frequency of oscillation ?

(A) 8 GHz (B) 9 GHz

(C) 10 GHz (D) 11 GHz

MCQ 92

Consider the following pairs :

1. Travelling wavetude : Linear electron beam
2. Cavity Magnetron : Stapping
3. Amplitron : CFA

Which of the pairs given above are correctly matched ?

(A) 1, 2 and 3 (B) 1 and 2

(C) 2 and 3 (D) 1 and 3

MCQ 93

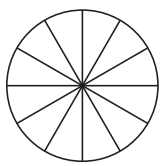
A rectangular waveguide operating in the dominant mode is gradually deformed into circular cross-section in the direction of propagation. What is the mode at the output ?

(A) TM_{11} (B) TE_{11}

(C) TE_{01} (D) TM_{01}

MCQ 94

A "mode filter" has the structure of this radial wires in a circular waveguide as shown in the diagram given below :



Which one of the following modes is filtered out by the above mode filter ?

(A) TE_{01} (B) TM_{01}

(C) TE_{11} (D) TM_{11}

MCQ 95

A 4-port microwave passive device has scattering matrix of the form

$$\begin{bmatrix} 0 & p & 0 & jq \\ p & 0 & jq & 0 \\ 0 & jq & 0 & p \\ jq & 0 & p & 0 \end{bmatrix}$$

Which one of the following statements is correct ?

The device is a

(A) Hybrid Tee (B) Hybrid ring

(C) H-port circular (D) Directional coupler

MCQ 96

It is given that the first root of $J_1(x) = 0$ and $J_1'(x) = 0$ are 3.83 and 1.84 respectively. Which one of the following give the cut off wavelength of TM_{11} mode in a circular waveguide of diameter D ?

(A) $\lambda_C \cong 0.64\,D$ (B) $\lambda_C \cong 0.82\,D$

(C) $\lambda_C = D$ (D) $\lambda_C \cong 1.2\,D$

MCQ 97

A 50 ohm coaxial line is connected to a 72 ohm load through a 60 ohm coaxial section of length 7.5 mm. What is the input VSWR on the line if it is fed by a 20 GHz source ?

(A) 1.0 (B) 1.25

(C) 1.33 (D) 1.44

MCQ 98

Match **List I** with **List II** and select the correct answer using the given below the lists :

	List I		**List II**
a.	Helical antennas	**1.**	Isotropic radiator
b.	Dipoles	**2.**	Circularly polarized radiation
c.	Parabolic dish	**3.**	Shaped beams
d.	Array antennas	**4.**	Satellite communication systems

Codes :

	a	**b**	**c**	**d**
(A)	1	2	4	3
(B)	1	2	3	4
(C)	2	1	4	3
(D)	2	1	3	4

MCQ 99

Match **List I** with **List II** and select the correct answer using the codes given below the lists :

	List I		**List II**
a.	Cavity wave meter	**1.**	Microwave component
b.	Magic Tee	**2.**	Microwave power measurement
c.	VSWR	**3.**	Microwave frequency measurement

d. Bolometer

4. Reflection coefficient measurement

Codes :

	a	b	c	d
(A)	1	2	4	3
(B)	1	2	3	4
(C)	2	1	4	3
(D)	2	1	3	4

MCQ 100

Two one-port cavity resonators having coupling coefficients K_1 and K_2 and identical resonant frequency ω_0 produce identical VSWR when used as terminating loads of a waveguide. Which one of the following relations is satisfied by K_1 and K_2 ?

(A) $K_1 - K_2 = 0$
(B) $K_1 K_2 = 0$
(C) $K_1 K_2 = 1/2$
(D) $K_1 + K_2 = 1$

MCQ 101

Which is the most common antenna to obtain a predetermined radiation pattern ?

(A) Array antenna
(B) Corner reflector
(C) Sectoral horn
(D) Helical antenna

MCQ 102

Assertion (A) : For a slow wave structure, helix is a broadband low-power device while coupled-cavity chain is a narrow band high-power device.

Reason (R) : A Helix is a good dissipator of power, while a coupled cavity structure is poor for high power dissipation.

(A) Both A and R are true and R is the correct explanation of A
(C) Both A and R are true but R is NOT the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

YEAR 2005

MCQ 103

Assertion (A) : Microstrip lines are preferred for antenna application

Reason (R) They have higher 'Q' and higher 'Gain'.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is the false

(D) A is false but R is true

MCQ 104

A four port ideal directional coupler with infinite directivity is characteristic by a S-matrix given as :

(A) $\begin{bmatrix} 0 & S_{12} & S_{13} & S_{14} \\ S_{21} & 0 & S_{23} & S_{24} \\ S_{31} & S_{32} & 0 & S_{34} \\ S_{41} & S_{42} & S_{42} & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & S_{12} & 0 & S_{14} \\ S_{21} & 0 & S_{23} & 0 \\ 0 & S_{32} & 0 & S_{34} \\ S_{41} & 0 & S_{43} & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 0 & 0 & S_{13} & S_{14} \\ 0 & 0 & S_{23} & S_{24} \\ S_{31} & S_{32} & 0 & 0 \\ S_{41} & S_{42} & 0 & 0 \end{bmatrix}$

(D) $\begin{bmatrix} S_{11} & S_{12} & 0 & 0 \\ S_{21} & S_{22} & 0 & 0 \\ 0 & 0 & S_{33} & S_{34} \\ 0 & 0 & S_{43} & S_{44} \end{bmatrix}$

(assuming that port 1, 2 are on one line, and port 3, 4 are on the auxiliary line)

MCQ 105

Match **List I** with **List II** and select the correct answer using the codes given below

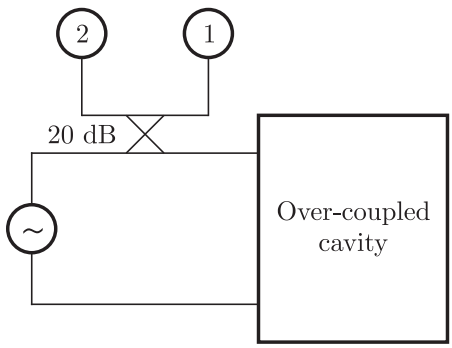
	List I		**List II**
a.	VSWR meter	**1.**	Antenna measurements
b.	T-R tube	**2.**	Microwave power measurements
c.	Reciprocity Theorem	**3.**	Duplexers
d.	Bolometer	**4.**	Reflection Coefficient measurements

Codes :

	a	b	c	d
(A)	4	1	3	2
(B)	2	3	1	4
(C)	4	3	1	2
(D)	2	1	3	4

MCQ 106

In the system above, the input VSWR is 1.5 at resonance. If the power-meter 1 reads 1 mW, what is the reading on the power-meter 2 ?



(A) 0.1 mW
(B) 0.06 mW
(C) 0.4 mW
(D) 0.02 mW

MCQ 107

Match **List I** (Antenna) with **List II** (Property) and select the correct answer using the codes given below the lists :

List I	**List II**
a. Log periodic antenna	**1.** Circular polarization
b. Helical antenna	**2.** Wide bandwidth
c. Microstrip antenna	**3.** Omni directional pattern
d. Dipole antenna	**4.** Compact and light weight

Codes :

	a	b	c	d
(A)	3	1	4	2
(B)	2	4	1	3

(C)	3	4	1	2
(D)	2	1	4	3

MCQ 108

Match **List I** with **List II** and select the correct answer using the codes given below the lists :

	List I		**List II**
a.	Helical antenna	**1.**	Fan-shaped beam, high power handling
b.	Pyramidal horn	**2.**	Low bandwidth, low antenna power handling
c.	Microstrip patch	**3.**	Narrow beam, high antenna power handling
d.	Sectoral horn	**4.**	Circularly polarised antenna beam, moderate power handling

Codes :

	a	**b**	**c**	**d**
(A)	4	3	2	1
(B)	2	1	4	3
(C)	4	1	2	3
(D)	2	3	4	1

MCQ 109

For a parabolic reflector of 5 meter diameter, the far field pattern measurement at 6 GHz should be carried out a distance of at least

(A) 0.5 km (B) 1.0 km

(C) 1.5 km (D) 2.0 km

MCQ 110

A microstrip line of 50 ohm is terminated in $Z_L = 40 + j30\,\Omega$. What is the VSWR of the load ?

(A) 2.0 (B) 1.8

(C) 1.5 (D) 1.3

MCQ 111

In an air-filled waveguide of dimensions a cm $\times$ b cm, at a given frequency, the longitudinal component of electric field of TM_{32} mode is of the form $E_Z = 20\sin(60\pi x)\sin(10xy)$.

Which form would E_Z have for the lowest order TM mode ?

(A) $E_Z = 20\sin(20\pi x)$ (B) $E_Z = 20\sin(20\pi y)$

(C) $E_Z = 20\sin(20\pi x)\sin(50\pi y)$ (D) $E_Z = 20\sin(20\pi x)\sin(100\pi y)$

MCQ 112

For a rectangular waveguide of dimensions : a $\sqrt{3}$ cm $\times$ a cm, the cut off frequency for the TE_{10} mode is 2GHz.

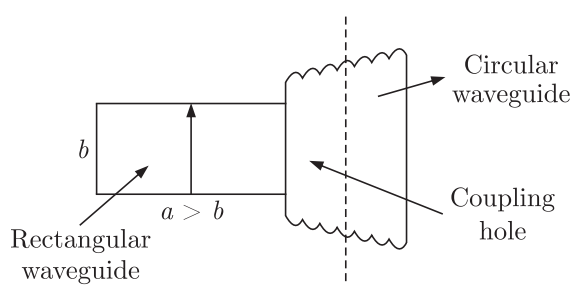
What is the cut off frequency for TM_{11} mode in the waveguide ?

(A) 1 GHz (B) 3.46 GHz

(C) 4 GHz (D) 6 GHz

MCQ 113

If TE_{10} mode propagates in the rectangular waveguide, which is the lowest mode excited in the circular waveguide ?



(A) TE_{11} (B) TM_{11}

(C) TE_{01} (D) TM_{01}

MCQ 114

The Magic-T (or Tee) is commonly used in mixing, duplexing and impedance measurement at microwave frequency. It is characterized by a S-matrix given as

(A) $\begin{bmatrix} 0 & S_{12} & S_{13} & S_{14} \\ S_{21} & 0 & S_{23} & S_{24} \\ S_{31} & S_{32} & 0 & S_{34} \\ S_{41} & S_{42} & S_{43} & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & S_{12} & 0 & S_{14} \\ S_{21} & 0 & S_{23} & 0 \\ 0 & S_{32} & 0 & S_{34} \\ S_{41} & 0 & S_{43} & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 0 & 0 & S_{13} & S_{14} \\ 0 & 0 & S_{23} & S_{24} \\ S_{31} & S_{32} & 0 & 0 \\ S_{41} & S_{42} & 0 & 0 \end{bmatrix}$

(D) $\begin{bmatrix} S_{11} & S_{12} & 0 & 0 \\ S_{21} & S_{22} & 0 & 0 \\ 0 & 0 & S_{33} & S_{34} \\ 0 & 0 & S_{43} & S_{44} \end{bmatrix}$

MCQ 115

N represents the number of electron transit cycles in the drift space of a two cavity klystron amplifier. What is the phase difference between the input signal voltage and the output current of the amplifier ?

(A) $(\pi/2 - 2\pi N)$
(B) $(\pi/2 + 2\pi N)$
(C) $(\pi - 2\pi N)$
(D) $(\pi + 2\pi N)$

MCQ 116

Why is an attenuator used in a TWT ?

(A) To help bunching
(B) To prevent oscillations
(C) To prevent saturation
(D) To increase gain

MCQ 117

Match **List I** with **List II** and select the correct answer using the codes given below the lists :

	List I		**List II**
a.	Reflex klystron	**1.**	Amplification
b.	Double cavity	**2.**	Mode-jumping klystron
c.	Gunn diode	**3.**	Electron bunching
d.	Magnetron	**4.**	Negative resistance

Codes :

	a	**b**	**c**	**d**
(A)	4	3	1	2
(B)	3	1	4	2
(C)	4	3	2	1

(D) 3 2 4 1

MCQ 118

In the Gunn diode, out of its various modes of operation, one mode is independent of domain transit time and hence can be used at high frequency and for very high output powers. Which is this mode ?

(A) Transit time mode

(B) Quenched domain mode

(C) Delay domain mode

(D) Limited space charge accumulation mode

MCQ 119

Consider the following statements :

The analysis of oscillators based on typical semiconductor device cannot be extended at high frequency because :

1. is does not show negative mobility.
2. it does not show negative resistance.
3. the transit time between junctions become high.
4. the junction capacitance becomes very large.

Which of the statements given above are correct ?

(A) 1 and 2 (B) 3 and 4

(C) 1, 2 and 4 (D) 1, 2, 3 and 4

YEAR 2006

MCQ 120

In terrestrial microwave links, the number of 'fades' per unit time increases as

(A) Both the transmission frequency and the distance between the antennas are increased

(B) The transmission frequency is increased but the distance between the antennas is decreased

(C) The transmission frequency is decreased but the distance between the antennas is increased

(D) Both the transmission frequency and the distance between the

antennas are decreased

MCQ 121

In parametric amplifiers used in microwave communication systems, the 'pump energy' is the deciding factor for which one of the following ?

(A) Frequency stability
(B) Maximum output
(C) Amplification factor
(D) Thermal noise level

MCQ 122

By using a travelling wave structure in a maser, we may

(A) Increase the bandwidth of operation
(B) Increase the power output
(C) Stabilize the frequency of operation
(D) Minimize the noise level and distortion

MCQ 123

Match **List I** (Meter/Theorem) with **List II** (Measurement) and select the correct answer using the codes given below the lists :

	List I		**List II**
a.	Bolometer	**1.**	Antenna measurements
b.	Reciprocity Theorem	**2.**	Microwave power measurements
c.	VSWR meter	**3.**	Reflection coefficient measurements
d.	Cavity wavemeter	**4.**	Microwave frequency measurements

Codes :

	a	**b**	**c**	**d**
(A)	3	1	2	4
(B)	2	4	3	1
(C)	3	4	2	1
(D)	2	1	3	4

MCQ 124

Assertion (A) : In microwave communication links, rain causes fading and this is a great concern in communication systems.

Reason (R) : Water droplets in the path of an electromagnetic wave will scatter the energy in the waves and this collective scattering will weaken the incident wave in the forward direction.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is the NOT the correct explanation of A

(C) A is true but R is false

(D) A is false but R is true

MCQ 125

The two-valley model of the Ridley Watkins Hilsum theory is best suited to explain the working of which one of the following ?

(A) Quartz crystal oscillator (B) Gunn Diode oscillator

(C) Klystron oscillator (D) R-C oscillator

MCQ 126

The working of a travelling wave tube is based on the interaction between

(A) Moving electrons and the transverse component of a progressive e.m. wave

(B) Moving electrons and the axial component of a progressive e.m. wave

(C) Moving electrons and the transverse component of a rotating magnetic field.

(D) Moving electrons and the axial component of a steady magnetic field.

MCQ 127

Which of the following are microwave sources ?

(A) Klystron (B) Magnetron

(C) IMPATT (D) TWTA

MCQ 128

To prevent oscillations in the TWT which one of the following is resorted to ?

(A) Bunching defocusing mechanism is used

(B) Attenuator is used

(C) External magnetic field is provided

(D) Helix is used

MCQ 129

Which of the following microwave components has got the combined characteristics of dielectric, ohmic and radiation losses ?

(A) Waveguide (B) Microstrip line

(C) Co-axial line (D) Parallel twin line

MCQ 130

By measuring the VSWR values in the main and ancillary waveguides of a directional coupler, we can determine its

(A) Phase co-relation and efficiency

(B) Frequency shift and phase variations

(C) Attenuation and radiation efficiency

(D) Directivity and coupling factor

MCQ 131

Which one of the following express the phase velocity in microstrip lines ?

(A) C/ε_e (B) $C/\sqrt{\varepsilon_e}$

(C) $C \cdot \varepsilon_e$ (D) $\sqrt{\varepsilon_e} \cdot C$

MCQ 132

Consider the following statements about microstrips :

1. Microstrips are operated under the condition where the substrate thickness $>> \lambda_0$
2. When the substrate thickness $>> \lambda_0$ the line is dispersive.
3. As the frequency of operation increases, the phase velocity on the line decreases and approaches the velocity in free space.

Which of the statements given above is/are correct ?

(A) 1, 2 and 3 (B) Only 1 and 3

(C) Only 2 (D) Only 1 and 2

YEAR 2007

MCQ 133

Match **List I** (Component) with **List II** (Filtering Characteristic) and select the correct answer using the code below the lists :

	List I		**List II**
a.	Coaxial line	**1.**	Band pass filter
b.	Rectangular waveguide	**2.**	Band reject filter
c.	Cavity resonator	**3.**	Low pass filter
d.	Common wavemeter	**4.**	High pass filter

Codes :

	a	**b**	**c**	**d**
(A)	1	2	3	4
(B)	1	2	4	3
(C)	3	4	2	1
(D)	3	4	1	2

MCQ 134

Assertion (A) : Substrates chosen for fabrication of microstrip lines are usually thin and having high value of dielectric constant.

Reason (R) : To minimize radiation loss from microstrip lines, fringing of fields must be reduced as much as practicable.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false but R is true

MCQ 135

X-band frequencies are in which one of the following ranges ?

(A) 3.5 to 5.5 GHz (B) 5.5 to 8.0 GHz

(C) 8.0 to 12.0 GHz (D) 12.4 to 16.4 GHz

MCQ 136

Match **List I** (Medium) with **List II** (Type of Radio Waves) and select the correct answer using the code given below the lists :

	List I		**List II**
a.	Microstrip line	**1.**	Surface wave
b.	Earth crust	**2.**	Guided wave
c.	Troposphere	**3.**	Sky wave
d.	Ionosphere	**4.**	Space wave

Codes :

	a	**b**	**c**	**d**
(A)	1	2	3	4
(B)	1	2	4	3
(C)	2	1	3	4
(D)	2	1	4	3

MCQ 137

Match **List I** (Device) with **List II** (Associated Term) and the select the correct answer using the codes below the lists :

	List I		**List II**
a.	Gunn diode	**1.**	Bunching
b.	IMPATT	**2.**	Avalanche breakdown
c.	Klystron	**3.**	LSA mode
d.	Parametric amplifier	**4.**	Up-converter

Codes :

	a	**b**	**c**	**d**
(A)	3	2	4	1
(B)	3	2	1	4

(C)	2	3	4	1
(D)	2	3	1	4

MCQ 138

In travelling wave tube microwave amplifier, the velocity modulation and bunching of electrons are achieved by the electromagnetic wave supported in the slow wave structure.

Which one of the following field components is responsible for the above ?

(A) The electric field component transverse to the electron beam propagation

(B) The electric field component in the direction of the electron beam propagation

(C) The magnetic field component transverse to the electron beam propagation

(D) The magnetic field component in the direction of the electron beam propagation

MCQ 139

In a klystron amplifier, the interaction between the electron beam and the radio frequency wave in the re-entrant cavity depends upon the average gap transit angle θ_g. What is this transit angle ?

(A) The angle at which the electron beam leaves the central gap of the re-entrant cavity

(B) The angle at which the electron beam enters the central gap of the re-entrant cavity

(C) The angle at which the electron beam different from the central gap of the re-entrant cavity

(D) The phase change due to finite time, the electron beam takes to cross the central gap of the re-entrant cavity

MCQ 140

Why is a reflex klystron oscillator preferred as an ideal source in microwave measurements ?

(A) It provides high power output with wide frequency range

(B) It provides high power output with single frequency

(C) It provides low power output with highly stable single frequency

(D) It provides low power output with multiple frequency components

MCQ 141

To avoid difficulties with strapping at high frequency, what type of cavity structure is used in the magnetron ?

(A) Hole and slot (B) Slot

(C) Vane (D) Rising sun

MCQ 142

A duplexer is used for which one of the following ?

(A) To couple two antennas to a transmitter without interference

(B) To isolate the antenna from local oscillator

(C) To prevent interference between two antennas connected to a receiver

(D) To use same antenna for reception or transmission without interference

MCQ 143

Which one of the following has the combined characteristic of dielectric, ohmic and radiation losses ?

(A) Coaxial line (B) Twin parallel line

(C) Microstrip line (D) Wave guide

MCQ 144

In a microwave circuit with waveguides, what is a 'waveguide twist' used for ?

(A) Impedance matching (B) Phase shifting

(C) Rotating Poynting vector (D) Rotating plane of polarization

MCQ 145

The waveguide ($a = 1.5\,\text{cm}, b = 1\,\text{cm}$) is loaded with dielectric ($\varepsilon_r = 4$) . Which one of the following is correct ?

The 8 GHz signal will

(A) pass through the waveguide

(B) not pass through the waveguide

(C) be absorbed in the guide

(D) none of the above

MCQ 146

Two microwave signals, travelling in the free space have a path length difference os 3 cm when operating at 10 GHz. What is the relative phase difference of the signals ?

(A) 2π (B) π

(C) 3π (D) 4π

MCQ 147

In a dielectric medium of ε_r (given $n = \sqrt{\varepsilon_r}$), what is the expression for the wavelength (λ) of a microwave signal ?

(A) $c/n^2 f$ (B) nc/f

(C) c/nf (D) None of the these

MCQ 148

In the terrestrial paths of a microwave communication system, which technique is usually adopted to overcome signal loss due of earth's curvature ?

(A) Link repeaters are arranged with 50 km apart

(B) Link repeaters are arranged with 500 km apart

(C) Signal amplifier are arranged in every 5 km apart

(D) Phase correctors are located in every 2 km apart

MCQ 149

An amplifier has a power gain of 200. What is its gain in dB ?

($\log_{10} 2 = 0.30$)

(A) 14 dB (B) 17 dB

(C) 20 dB (D) 23 dB

MCQ 150

Bandwidth of the order of 12 MHz can be realized using carriers in

which range ?

(A) VHF

(B) UHF

(C) Microwaves only

(D) Optical frequency and microwaves

YEAR 2008

MCQ 151

In a reflex klystrons, the adjustment of volume of the node cavity will result in change of

(A) output power (B) output pulse-width

(C) output frequency of operation (D) output signal to noise ratio

MCQ 152

The main purpose of inserting a microwave isolator in a microwave circuit is for

(A) offering minimum forward impedance

(B) offering maximum power output from the source

(C) maintaining frequency stability of the source

(D) maintaining amplitude stability of output power

MCQ 153

The underlying principle of working of a cavity wave meter, used to measure frequency of microwave in a system, is

(A) selective absorption of microwave energy in solids

(B) selective scattering of microwave energy of a cavity

(C) selective diffraction of microwaves around a cavity

(D) resonance of a cavity with incoming microwave energy

MCQ 154

In microwave communication links, what causes intense fading in the 18 GHz band ?

(A) Snow (B) Rain

(C) Fog (D) Dust

MCQ 155

In measuring pulsed microwave power, the pulse duration is 1.5 μs with PRF of 1 kHz. If the CW power sensor reads 15 mW, what is the average signal power during the pulse ?

(A) 5 W (B) 10 W
(C) 15 W (D) 20 W

MCQ 156

For obtaining a beam of electromagnetic waves with circular polarization, what is the ideal antenna ?

(A) A double conical reflector (B) A helical antenna
(C) A pyramidal horn antenna (D) A hog-horn antenna

MCQ 157

A microwave antenna characteristics are described as, low weight, low power-handling capacity and low bandwidth. What shall this be ?

(A) Helical antenna (B) Sectoral horn antenna
(C) Micro-strip patch antenna (D) Microwave dipole antenna

MCQ 158

What is a waveguide device which is designed with steps in either the magnetic or electric plane known as ?

(A) Conductance converter (B) Impedance transformer
(C) Impedance canceller (D) Reactance follower

MCQ 159

Which principle of operation of cavity wave-meters is used in microwave networks ?

(A) Phase shift (B) Resonance
(C) Polarization shift (D) Gyration

MCQ 160

In a waveguide network, there is a component which consists of an E-plane Tee combined with an H-plane Tee. What is this component generally known as ?

(A) Directional Tee (B) Phased array Tee
(C) Coupler Tee (D) Magic Tee

MCQ 161

Phase focussing, which leads to bunching of electrons takes plane in which one of the following ?

(A) Double resonator klystron (B) Reflex klystron
(C) TWT (D) Magnetron

MCQ 162

In a magnetron oscillator, the improvement of stability and efficiency is achieved by which technique ?

(A) Strapping (B) Cross coupling
(C) Bunching (D) Bouncing

MCQ 163

A Gunn diode is a negative resistance device, which is used as source of micro-wave. What is the number of p-n junctions ?

(A) 1 (B) 2
(C) 3 (D) 0

MCQ 164

In a TWT the helix is used as which one of the following ?

(A) Slow wave structure (B) Fast wave structure
(C) Amplifying element (D) Attenuating element

YEAR 2009

MCQ 165

Consider the following statements :

In a microstrip line

(A) Wavelength $\wedge = \lambda/\varepsilon_{ff}$, where ε_{ff} is the effective dielectric constant and λ is the effective electric constant and λ is the free space wavelength.

2. Electromagnetic field exist partly in the air above the dielectric

substrate and partly within the substrate itself.

3. The effective dielectric constant is greater than the dielectric constant of the air.
4. Conductor losses increase with decreasing characteristic impedance.

Which of the above statements is/are correct ?

(A) 1, 2, and 3 (B) 1 and 2 and only
(C) 2, 3 and 4 (D) 4 only

MCQ 166

Match **List I** (Types of transmission structure) with **List II** (Modes of propagation) and select the correct answer using the code given below the lists :

	List I		**List II**
a.	Strip line	**1.**	Quasi TEM
b.	Hollow rectangular waveguide	**2.**	Pure TEM
c.	Microstrip	**3.**	TE/TM
d.	Corrugated waveguide	**4.**	Hybrid

Codes :

	a	**b**	**c**	**d**
(A)	2	1	3	4
(B)	4	1	3	2
(C)	2	3	1	4
(D)	4	3	1	2

MCQ 167

A standard waveguide WR90 has inside wall dimensions of

$a = 2.286\,\text{cm}$ and $b = 1.016\,\text{cm}$. What is the cut-off wavelength for TE_{01} mode ?

(A) 4.572 cm (B) 2.286 cm

(C) 2.032 cm (D) 1.857 cm

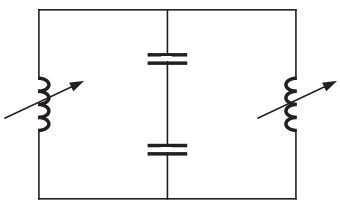
MCQ 168

When a particular mode is exited in a waveguide, there appears an extra electric component, in the direction of propagation. In what mode is the wave propagating ?

(A) Transverse electric (B) Transverse magnetic

(C) Transverse electromagnetic (D) Longitudinal

MCQ 169



The above shown circuit is the equivalent circuit of which one of the following microwave resonator types ?

(A) Butterfly resonator (B) Parallel-wire resonator

(C) Cavity resonator (D) Coaxial line resonator

MCQ 170

Which is the dominant mode in rectangular waveguide ?

(A) TE_{10} (B) TE_{11}

(C) TM_{01} (D) TM_{11}

MCQ 171

Consider the following statements :

For a square waveguide of cross-section $3\,\text{m} \times 3\,\text{m}$ it has been found

1. At 6 GHz dominant mode will propagate.
2. At 4 GHz all the modes are evanescent.
3. At 11 GHz only dominant modes and no higher order mode will

propagates.

4. At 7 GHz degenerate modes will propagate.

Which of the above statements are correct ?

(A) 1 and 2 only (B) 1, 2 and 4

(C) 2 and 3 only (D) 2, 3 and 4

MCQ 172

Match **List I** (Modes) with **List II** (Characteristic) and select the correct answer using the code given below the lists :

	List I		**List II**
a.	Evanescent mode	**1.**	Rectangular waveguide does not support
b.	Dominant mode	**2.**	No wave propagation
c.	TM_{10} and TM_{01}	**3.**	Lowest cut-off frequency

Codes :

	a	**b**	**c**
(A)	1	2	3
(B)	2	3	1
(C)	1	3	2
(D)	2	1	3

MCQ 173

Which one of the following is a transferred electron device ?

(A) BARIT diode (B) IMPATT diode

(C) TRAPAIT diode (D) Gunn diode

MCQ 174

Consider the transmission line of length 37.5 cm, which is terminated into zero resistance. This line is being existed by a source of 1 GHz which has an internal impedance of 50 Ω. What is the input impedance of the line as seen by the source ?

(A) 50 Ω (B) Zero Ω

(C) 100 Ω (D) Infinite Ω

MCQ 175

Which of the following is a microwave source with a 'cross-field' structure ?

(A) Double cavity
(B) Reflex Klystron
(C) Magnetron
(D) Travelling wave tube

MCQ 176

Which of the following devices has the 'negative resistance' characteristic ?

(A) Reflex klystron
(B) Gunn diode
(C) P-N-P transistor
(D) Magnetron

MCQ 177

Which of the following devices is a 'hot electron' diode ?

(A) Thermionic tube diode
(B) Schottky-Barrier diode
(C) Thomson-Deletion diode
(D) Thermal electron diode

MCQ 178

Which of the following uses 'transferred electron effect' for production of microwaves ?

(A) Silicon
(B) Germanium
(C) Metal-semiconductor Junction
(D) Gallium Arsenide

MCQ 179

Which of the following is a microwave power amplifier ?

(A) Gunn diode
(B) Reflex klystron
(C) Magnetron
(D) Travelling wave tube

MCQ 180

Consider the following statements :

The Klystron and travelling wave tube differ from each other.

1. In TWT the microwave circuit is non resonant.

2. In klystron the microwave circuit is resonant.
3. TWT uses attenuator.
4. The wave in TWT is a non-propagating wave.

Which of the above statements are correct ?

(A) 1 and 2 only (B) 3 and 4 only
(C) 1, 2 and 3 (D) 2, 3 and 4

MCQ 181

Which device can detect the presence of both forward and backward waves in a waveguide ?

(A) Filter (B) Detector
(C) Directional coupler (D) Magic T

MCQ 182

Which of the following modes can exist in a rectangular wave guide ?

(A) TM_{10} (B) TE_{10}
(C) TM_{00} (D) TM_{01}

MCQ 183

Which of the following does not apply to Yagi-Uda antenna

(A) High gain (B) Reasonably good bandwidth
(C) Folded dipole (D) Parasitic elements

MCQ 184

Which of the following is obtained by modifying a wave guide ?

(A) Microstrip Antenna (B) Helical Antenna
(C) Horn antenna (D) Dipole Antenna

MCQ 185

Which of the following antennas uses a number of varying length parallel elements ?

(A) Helical antenna (B) Pyramidal Horn
(C) Corner reflection antenna (D) Yagi-Uda antenna

MCQ 186

Which of the following antennas uses a number of varying length parallel elements ?

(A) Helical antenna (B) Pyramidal Horn

(C) Corner reflection antenna (D) Yagi-Uda antenna

MCQ 187

The following components are used to measure power output of a 2 kW TWT amplifier :

1. TWTA
2. Low pass/ high pass filter
3. 20 dB attenuator
4. 40 dB directional complex with matched load
5. Power meter

What is the correct sequence of connection of these components ?

(A) 2 - 4 - 1 -3 - 5 (B) 1 - 3 - 4 - 2 - 5

(C) 1 - 2 - 4 - 3 - 5 (D) 2 - 4 - 1 - 5 - 3

MCQ 188

Match **List I** (Microwave Measuring Instruments) with **List II** (Measuring effected) and select the correct answer using the code given below the lists :

	List I		**List II**
a.	Bolometer	**1.**	Reflection coefficients
b.	VSWR meter	**2.**	Half power beam widths
c.	Cavity wave meter	**3.**	Microwave power
d.	Pattern recorder	**4.**	Microwave frequency

Codes :

	a	b	c	d
(A)	2	1	4	3
(B)	3	1	4	2
(C)	2	4	1	3
(D)	3	4	1	2