INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

DEFINITIONS AND TERMINOLOGY

Course Name	:	**ELECTROMAGNETIC THEORY AND TRANSMISSION LINES**
Course Code	:	**AEC007**
Program	:	**B.Tech**
Semester	:	**IV**
Branch	:	**Electronics and Communication Engineering**
Section	:	**A,B,C,D**
Academic Year	:	**2018– 2019**
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OBJECTIVES

I	To help students to consider in depth the terminology and nomenclature used in the syllabus.
II	To focus on the meaning of new words / terminology/nomenclature

DEFINITIONS AND TERMINOLOGYQUESTION BANK

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
UNIT - I					
1	Define Coulomb's law	The force between two very small objects separated in a vacuum or free space by a distance, which is large compared to their size, is proportional to the charge on each and inversely proportional to the square of the distance between them	Remember	CLO 2	AEC007.02
2	What is orthogonal system?	It is one in which the coordinates are mutually perpendicular.	Understand	CLO 1	AEC007.01
3	What is a point charge?	Point charge is one whose maximum dimension is very small in comparison with any other length.	Remember	CLO 2	AEC007.02
4	What is dot product?	It is defined geometrically as the product of the magnitudes of two vectors and the cosine of the angle between them.	Understand	CLO 1	AEC007.01
4	What is the effect of permittivity on the force between two charges?	Increase in permittivity of the medium tends to decrease the force between two charges and decrease in permittivity of the medium tends to increase the force between two charges.	Understand	CLO 2	AEC007.02
5	Define Gauss's law.	It states that the total electric flux through any closed surface is equal to the total charge enclosed by that surface.	Understand	CLO 2	AEC007.02
6	State applications of Gauss law in electrostatics?	Gauss law is applied to find the electric field intensity from a closed surface. Ex: Electric field can be determined for shell, two concentric shell or cylinders etc	Understand	CLO 2	AEC007.02
7	What is electric flux line?	It is an imaginary path or line drawn in such a way that its direction at any point is the direction of the electric field at that point.	Remember	CLO 2	AEC007.02
8	Define divergence theorem?	The integral of the normal component of any vector field over a closed surface is equal to the integral of the divergence of this vector field throughout the volume enclosed by the closed surface	Remember	CLO 2	AEC007.02
9	What are the significant physical differences between Poisson‘s and laplace’s equations.	When the region of interest contains charges poissons equation can be used to find the potential. When the region is free from charge laplace equation is used to find the potential.	Remember	CLO 3	AEC007.03
10	Define current density.	The current density at a given point is the current through a unit normal area at that Point.	Understand	CLO 2	AEC007.02

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12	Define current.	The current (in amperes) through a given area is the electric charge passing through the area per unit time	Understand	CLO 2	AEC007.02
13	Define linear, isotropic, and homogeneous dielectrics material	A material is said to be linear, electric flux density varies linearly with electric field strength. Materials for which permittivity does not vary in the region being considered and is therefore the same at all points are said to be homogeneous. Materials for which electric flux density and electric field strength are in the same direction are said to be isotropic.	Remember	CLO 2	AEC007.02
14	Explain Electromagnetics?	Electromagnetics is a branch of physics or electrical engineering in which electric and magnetic phenomena are studied.	Understand	CLO 2	AEC007.02
15	What is Field?	Field is a function that specifies a particular quantity everywhere in a region.	Understand	CLO 2	AEC007.02
16	Define scalar and vector field	A scalar field is quantity which has only magnitude. A vector filed is quantity which has both magnitude and dirction.	Understand	CLO 1	AEC007.01
17	Define unit vector.	By definition unit vector having unit magnitude, parallel to the coordinate axes, and they point in the direction of increasing coordinate values	Understand	CLO 1	AEC007.01
18	Define potential difference	Potential difference is defined as the work done in moving a unit positive charge from one point to another point in an electric field.	Remember	CLO 2	AEC007.02
19	Define the conservative property of electric field	The work done in moving a point charge around a closed path in a electric field is zero. Such a field is said to be conservative.	Remember	CLO 2	AEC007.02
20	Define permittivity.	It is a universal electric constant which is a generalized, or large-scale, description of electric behavior that does not specify detailed features on the atomic dimension. It is a measure of the relative effectiveness of that substance as an electrical insulator or the extent of reduction of electric fields and consequently reduced strength of electrostatic interactions in a medium.	Remember	CLO 2	AEC007.02
21	Define Stokes's theorem.	It states that the circulation of a vector field around a closed path is equal to the surface integral of the curl of vector over the open surface.	Remember	CLO 2	AEC007.02
22	What is relaxation time?	It is the lime it takes u charge placed in the interior of a material to drop to 36.8 percent of its initial value	Remember	CLO 2	AEC007.02
23	Define electric flux line	electric flux line is an imaginary path or line drawn in such a way that its direction at any point is the direction of the electric field at that point	Remember	CLO 2	AEC007.02
24	Define capacitance	The capacitance of this two-conductor system as the ratio of the magnitude of the total charge on either conductor to the magnitude of the potential difference between conductors	Remember	CLO 2	AEC007.02

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25	What meaning would you give to the capacitance of a single conductor?	A single conductor also possesses capacitance. It is a capacitor whose one plate is at infinity.	Understand	CLO 2	AEC007.02
26	What is distance vector?	Distance vector is the displacement from one point to another	Understand	CLO 1	AEC007.01
27	What is electrostatic force?	The force between any two particles due to existing charges is known as electrostatic force, repulsive for like and attractive for unlike.	Remember	CLO 2	AEC007.02
28	Define electric field intensity.	It is force per unit charge when placed in the electric field	Understand	CLO 2	AEC007.02
29	Define electrical potential.	It is the amount of work needed to move a unit charge from a reference point to a specific point against an electric field.	Understand	CLO 2	AEC007.02
30	Define equipotential surface.	Equipotential surface as a surface composed of all those points having the same value of potential	Understand	CLO 2	AEC007.02
31	Define conservative electric field.	Any electric field that satisfies the closed line integral of the field is zero is said to be a conservative electric field	Understand	CLO 2	AEC007.02
32	What is the physical significance of divergence of electric flux density?	The divergence of a vector flux density is electric flux per unit volume leaving a small volume. This is equal to the volume charge density.	Understand	CLO 2	AEC007.02
33	What is dielectric strength?	It is the maximum electric field that a dielectric can tolerate or withstand without breakdown.	Understand	CLO 2	AEC007.02
34	Define electric flux density.	One line of electric flux emanates from +1 C and terminates on - 1 C. Therefore, the electric flux is measured in coulombs. Hence, the vector field D is called the electric flux density and is measured in coulombs per square meter.	Remember	CLO 2	AEC007.02
35	What is electric dipole?	An electric dipole is formed when two point charges of equal magnitude but opposite sign are separated by a small distance.	Understand	CLO 2	AEC007.02
36	How is electric energy stored in a capacitor?	In a capacitor, the work done in charging a capacitor is stored in the form of electric energy.	Understand	CLO 3	AEC007.03
37	Define metal and insulator.	A material with high conductivity is referred to as a metal whereas one with low conductivity is referred to as an insulator.	Understand	CLO 2	AEC007.02
38	Define relative permittivity.	It is the ratio of the permittivity of the dielectric to that of free space	Understand	CLO 2	AEC007.02
39	State point form of ohms law	Point form of ohms law states that the field strength within a conductor is proportional to the current density.	Remember	CLO 2	AEC007.02

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UNIT – II					
1	Define Biot-Savart's law	Biot-Savart's law states that the magnetic field intensity dH produced at a point P, by the differential current element idl is proportional to the product idl and the sine of the angle θ between the element and the line joining P to the element and is inversely proportional to the square of the distance K between P and the element.	Remember	CLO 4	AEC007.04
2	Define Ampere's circuit law.	Ampere's circuit law states that the line integral of the tangential component of H around a closed path is the same as the net current enclosed by the path.	Remember	CLO 4	AEC007.04
3	Define magnetic flux density	The magnetic field (B) is defined as the force per unit current element	Remember	CLO 4	AEC007.04
4	What is the magnetic dipole moment?	The magnetic dipole moment is the product of current and area of the loop; its direction is normal to the loop.	Understand	CLO 4	AEC007.04
5	Define magnetic vector potential.	It is defined as that quantity whose curl gives the magnetic flux density	Understand	CLO 4	AEC007.04
6	What is magnetization and its units?	The magnetization M is the magnetic dipole moment per unit volume. Units are amperes/meter	Remember	CLO 4	AEC007.04
7	What is lorentz force?	Lorentz force is the force experienced by the test charge .It is maximum if the direction of movement of charge is perpendicular to the orientation of field lines.	Remember	CLO 4	AEC007.04
8	State Lenz's law.	Lenz's law states that the induced emf in a circuit produces a current which opposes the change in magnetic flux producing it.	Remember	CLO 4	AEC007.04
9	Define transformer emf.	The emf induced by the time-varying current (producing the time-varying B field) in a stationary loop is often referred to as transformer emf in power analysis.	Understand	CLO 4	AEC007.04
10	What is time-harmonic field?	A time-harmonic field is one that varies periodically or sinusoidally with time.	Understand	CLO 4	AEC007.04
11	Define the magnetic boundary conditions between two media	1) The normal components of flux density B is continuous across the boundary. 2) The tangential component of field intensity is continuous across the boundary.	Remember	CLO 6	AEC007.06
12	What is conduction current density?	It is the amount of current (charges) flowing on the surface of a conductor (conduction band) in a time t. This surface is always parallel to the current flow.	Understand	CLO 4	AEC007.04

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13	What is displacement current density?	It is defined as the time rate of change of electric flux density.	Understand	CLO 4	AEC007.04
14	What is main cause of eddy current?	The main cause of eddy current is that it produces ohmic power loss and causes local heating.	Remember	CLO 4	AEC007.04
15	Define inductance	It may be defined from the circuit that has the ratio of the magnetic flux linkage to the current.	Remember	CLO 4	AEC007.04
16	Define self inductance	Self inductance is defined as the rate of total magnetic flux linkage to the current through the coil.	Remember	CLO 4	AEC007.04
17	What is Solenoid?	An inductor coil consisting of multiple turns of wire wound in a helical geometry around a cylindrical core is called as solenoid.	Remember	CLO 4	AEC007.04
18	Distinguish between solenoid and toroid.	Solenoid is a cylindrically shaped coil consisting of a large number of closely spaced turns of insulated wire wound usually on a non magnetic frame. If a long slender solenoid is bent into the form of a ring and thereby closed on itself it becomes a toroid.	Remember	CLO 4	AEC007.04
19	Define magnetic flux line	The magnetic flux line is the path to which the magnetic flux density is tangential at every point in a magnetic field	Understand	CLO 4	AEC007.04
20	What is a magnetic dipole?	A bar magnet or a small filamentary current loop is usually referred to as a magnetic dipole.	Understand	CLO 4	AEC007.04
21	What is relative permeability?	It is the ratio of the permeability of a given material to that of free space and is known as the relative permeability of the material. It is the dimensionless quantity.	Understand	CLO 4	AEC007.04
22	What are ferromagnetic materials?	Ferromagnetism occurs in materials whose atoms have relatively large permanent magnetic moment. They are called ferromagnetic materials because the best known member is iron.	Understand	CLO 4	AEC007.04
23	Define Faraday's law?	Faraday's law states that the emf in any closed circuit is equal to the time rate of change of the magnetic flux linkage by the circuit.	Understand	CLO 4	AEC007.04
24	Define motional emf.	In a conducting loop, moving with uniform velocity u as consisting of a large number of free electrons, the emf induced in the loop, such type of emf is called motional emf or flux-cutting emf because it is due to motional action.	Understand	CLO 4	AEC007.04
25	Define Ampere's force law.	Ampere's Force Law states that the force of attraction or repulsion between two wires carrying currents is proportional to their lengths and the intensities of current passing through them.	Remember	CLO 4	AEC007.04

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26	What is the significance of displacement current?	The concept of displacement current was introduced to justify the production of magnetic field in empty space. It signifies that a changing electric field induces a magnetic field .In empty space the conduction current is zero and the magnetic fields are entirely due to displacement current.	Understand	CLO 4	AEC007.04
UNIT – III					
1	Define a wave.	If a physical phenomenon that occurs at one place at a given time is reproduced at other places at later times , the time delay being proportional to the space separation from the first location then the group of phenomena constitutes a wave.	Understand	CLO 8	AEC007.08
2	What is plane wave?	An EM wave originates from a point in free space, spread out uniformly in all directions and it forms a spherical wave. To an observer at a great distance it appears to him as plane wave.	Remember	CLO 8	AEC007.08
3	Define uniform plane wave.	Uniform plane wave, in which both fields, E and H, lie in the transverse plane—that is, the plane whose normal is the direction of propagation	Understand	CLO 8	AEC007.08
4	Define wave number in free space.	It is the ratio of angular frequency to the free space velocity. The units are rad/m	Remember	CLO 8	AEC007.08
5	How to differentiate good dielectric and good conductor	If the dissipation factor value is >>1 that material is good conductor and if the dissipation factor value is <<1 that material is good dielectric.	Remember	CLO 9	AEC007.09
6	Define skin depth	The skin depth is a measure of the depth to which an EM wave can penetrate the medium.	Remember	CLO 9	AEC007.09
7	Define oblique incidence.	When a uniform plane wave incidences obliquely (with some angle other than 90^0) to the boundary between the two medium, and it is known as oblique incidence.	Understand	CLO 9	AEC007.09
8	What is transmission coefficient of EM wave in a medium	Transmission coefficient is defined as the ratio of the magnitude of the transmitted field to that of incident field.	Remember	CLO 10	AEC007.10
9	What is plane of incidence?	Plane which contains incident ray and normal to the boundary between two media is known as plane of incidence.	Understand	CLO 9	AEC007.09
10	Describe linear polarization	LP is accomplished when the electric field vector possesses, only one component or two orthogonal linear components that are in the time phase or 180^0 out of phase.	Understand	CLO 9	AEC007.09
11	Define wavelength	The wavelength in free space is the distance over which the spatial phase shifts by 2π radians	Remember	CLO 8	AEC007.08

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12	Mention the properties of uniform plane wave.	i) At every point in space, the electric field E and magnetic field H are perpendicular to each other. ii) The fields vary harmonically with time and at the same frequency everywhere in space.	Remember	CLO 8	AEC007.08
13	Define intrinsic impedance or characteristic impedance.	It is the ratio of electric field to magnetic field or It is the ratio of square root of permeability to permittivity of medium.	Remember	CLO 9	AEC007.09
14	Define propagation constant of an EM wave.	Propagation constant is the summation of attenuation constant and phase constant. Propagation constant is a complex number $\gamma = \alpha + j\beta$ where α -is attenuation constant β- is phase constant. In free space $\gamma = j\omega\mu(\sigma + j\omega\varepsilon)$	Understand	CLO 9	AEC007.09
15	What is surface impedance?	It is defined as the ratio of the tangential electric field Et to the linear current density Js which flows due to the electric filed.	Remember	CLO 9	AEC007.09
16	Define pointing vector	The vector product of electric field intensity and magnetic field intensity at a point is a measure of the rate of energy flow per unit area at that point.	Understand	CLO 9	AEC007.09
17	What is pointing theorem?	The vector product of electric field intensity E and magnetic field intensity H at any point is a measure of the rate of energy flow per unit area at that point. The direction of power flow is perpendicular to E and H in the direction of the vector E x H.	Remember	CLO 9	AEC007.09
18	Describe elliptical polarization	Field must have two components are not of same magnitude and time phase difference between the two components must not be 0^0 or multiples of 180^0	Understand	CLO 9	AEC007.09
19	Define critical angle.	It is the incidence angle, defined by Snell's law, where the incident wave is totally reflected at the interface of two different dielectric media.	Understand	CLO 9	AEC007.09
20	Define Snell's Law.	It is the law that gives the angles of reflection and refraction of a plane electromagnetic wave when the wave is incident on a boundary between two media.	Understand	CLO 9	AEC007.09
21	Define index of refraction	a parameter of a medium equal to the ratio of the velocity of propagation in free space to the velocity of propagation in the medium.	Remember	CLO 9	AEC007.09
22	What is characteristic impedance of free space?	It is the square root of ratio of ε_0 and μ_0 and its value is 377 Ω or 120π.	Remember	CLO 9	AEC007.09
23	Define loss tangent.	Loss tangent is the ratio of the magnitude of conduction current density to displacement current density of the medium. Tan $\delta = \sigma / \omega\varepsilon$	Understand	CLO 9	AEC007.09
24	Define lossy dielectric medium	A lossy dielectric is a medium in which an EM wave loses power as it propagates due to poor conduction.	Understand	CLO 9	AEC007.09

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25	Define normal incidence.	When a uniform plane wave incidences normally to the boundary between the two media, then it is called normal incidence.	Remember	CLO 9	AEC007.09
26	What is reflection coefficient of EM wave in a medium	Reflection coefficient is defined as the ratio of the magnitude of the reflected field to that of the incident field.	Remember	CLO 9	AEC007.09
27	Define perpendicular and parallel polarization.	In oblique incidence, if Electric filed component is perpendicular to POI, that is called perpendicular polarization and parallel to POI is called parallel polarization.	Remember	CLO 9	AEC007.09
28	Define brewster angle.	It is the angle of incident wave at which no reflection takes place, i.e entire signal transmitted into material. This angle exit only for parallel or vertical polarization.	Understand	CLO 9	AEC007.09
29	Define polarization.	The polarization of a uniform plane wave defines the shape traced by the tip of the electric field vector as the wave propagates.	Understand	CLO 9	AEC007.09
30	Describe circular polarization	Filed must have two orthogonal components, two components must have the same magnitude and the two components must have a phase difference of odd multiples of 90^0.	Understand	CLO 9	AEC007.09
31	Define depolarization.	It is the change of the polarization state of a wave propagating through an anisotropic medium.	Remember	CLO 9	AEC007.09
32	What is electromagnetic wave	A wave in which the electric and magnetic variables are solutions of the Maxwell–Heaviside equations.	Remember	CLO 9	AEC007.09
UNIT - IV					
1	Define capacitance in a transmission line.	is defined as the loop capacitance per unit length of the wire. Its unit is Farad/Km	Remember	CLO 10	AEC007.10
2	Define conductance in a transmission line.	Conductance (G) is defined as the loop conductance per unit length of the wire. Its unit is mho/Km	Remember	CLO 10	AEC007.10
3	What are primary and secondary constants of a transmission line?	The primary constants of transmission lines are R, L, C, G. These are the distributed parameters of a transmission line. The secondary constants are characteristic impedance and propagation constants	Remember	CLO 10	AEC007.10
4	Define attenuation	Attenuation in electromagnetic systems is due to conductor and dielectric losses.	Remember	CLO 10	AEC007.10
5	Define Delay transmission line.	It is a transmission line of the appropriate length to result in a specific time delay.	Remember	CLO 10	AEC007.10

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6	What is coaxial cable?	A transmission line formed by two concentric conductors separated by a dielectric designed to confine the fields and their energy in the medium between said conductors.	Remember	CLO 10	AEC007.10
7	Define propagation constant.	The transmission line which has attenuation constant (α) and phase constant (β) is called the propagation constant of the transmission line.	Remember	CLO 10	AEC007.10
8	Define phase distortion.	For an applied voice-voltage wave the received waveform may not be identical with the input waveform at the sending end, since some frequency components will be delayed more than those of other frequencies. This phenomenon is known as delay or phase distortion.	Remember	CLO 10	AEC007.10
9	What is distortion less transmission line?	A distortionless line is one in which the attenuation constant is frequency independent while the phase constant is linearly dependent on frequency.	Remember	CLO 10	AEC007.10
10	Define characteristic impedance.	Characteristic impedance is the impedance looking into an infinite length of the line. It is also, the ratio of the voltage applied to the current flowing will give input impedance of an infinite line.	Remember	CLO 10	AEC007.10
11	Define transmission line? What are the different types of transmission lines?	A transmission line is a system of conductors that transfers electrical signals from one place to another. Different types are1.Coaxial line2. Parallel Plate or planar lines 3. Strip lines 4. microstrip Lines.	Remember	CLO 10	AEC007.10
12	Define line parameters of a transmission line.	The performance of transmission line depends on the parameters of the line. The transmission line has mainly four parameters, resistance, inductance, and capacitance and shunt conductance. These parameters are uniformly distributed along the line. Hence, it is also called the distributed parameter of the transmission line.	Remember	CLO 10	AEC007.10
13	Define resistance in a transmission line.	is defined as the loop resistance per unit length of the wire. Its unit is ohm/Km	Remember	CLO 10	AEC007.10
14	Define frequency distortion.	A complex (voice) voltage transmitted on a transmission line will not attenuated equally and the received waveform will not be identical with the input waveform at the transmitting end. This variation is known as frequency distortion.	Remember	CLO 10	AEC007.10
15	What is the condition for a distortion less line?	The condition for a distortion less line is RC=LG.	Remember	CLO 10	AEC007.10
16	What are loaded lines?	It is increase L/C ratio to achieve distortionless condition in a transmission line. This can be done by increasing the inductance of a transmission line. Increasing inductance by inserting inductance in series with transmission line is termed as loading and such lines are called as loaded lines.	Remember	CLO 11	AEC007.11

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
17	Define phase velocity	The phase velocity of a wave is the rate at which the phase of the wave propagates in space. This is the velocity at which the phase of any one frequency component of the wave travels.	Remember	CLO 10	AEC007.10
18	Describe infinite transmission line.	If a line of infinite length is considered, then all the power fed into it will be absorbed. The reason is as we move away from the input terminals towards load, the current and voltages will decrease along the line and becomes zero at an infinite distance.	Remember	CLO 10	AEC007.10
19	What is lumped loading?	In lumped loading, loading is introduced at uniform intervals. It may be noted that hysteresis and eddy current losses are introduced by loading and hence design should be optimal.	Understand	CLO 11	AEC007.11
20	Why line parameters are called distributed paprameters?	Due to transit time effect the whole line inductance or capacitance cannot be assumed to be located at a particular point in space. The inductance and capacitance are distributed throughout the length of the line. These are therefore called the 'Distributed Parameters' of the line	Understand	CLO 10	AEC007.10
21	Define inductance in a transmission line.	is defined as the loop inductance per unit length of the wire. Its unit is Henry/Km	Remember	CLO 10	AEC007.10
22	Define conductance in a transmission line.	Conductance (G) is defined as the loop conductance per unit length of the wire. Its unit is mho/Km	Remember	CLO 10	AEC007.10
23	What are primary and secondary constants of a transmission line?	The primary constants of transmission lines are R, L, C, G. These are the distributed parameters of a transmission line. The secondary constants are characteristic impedance and propagation constants	Remember	CLO 10	AEC007.10
24	Define Wavefront.	For an electromagnetic wave, the wavefront is represented as a surface of identical phase.	Understand	CLO 10	AEC007.10
25	What is coaxial cable?	A transmission line formed by two concentric conductors separated by a dielectric designed to confine the fields and their energy in the medium between said conductors.	Remember	CLO 10	AEC007.10
26	What is dispersion of a transmission line?	Dispersion means the propagation velocity on the line is not constant with frequency.	Understand	CLO 10	AEC007.10
27	What is lossless transmission line?	A transmission line is said to be lossless if the conductors of the line are perfect and the dielectric medium separating them is lossless.	Remember	CLO 10	AEC007.10
28	Define group velocity.	The group velocity of a wave is the velocity with which the overall shape of the wave's amplitudes—known as the modulation or envelope of the wave—propagates through space.	Remember	CLO 10	AEC007.10

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
29	Define characteristics impedance.	Characteristic impedance is the impedance looking into an infinite length of the line. It is also, the ratio of the voltage applied to the current flowing will give input impedance of an infinite line.	Remember	CLO 10	AEC007.10
UNIT - V					
1	What is OC transmission line?	When a transmission line is terminated with infinity load impedance that line is called OC line.	Understand	CLO 12	AEC007.12
2	What is SC transmission line?	When line is terminated with zero load impedance that line is called SC line.	Understand	CLO 12	AEC007.12
3	What is the use of impedance transformer?	It is also called quarter wave transformer. It is impedance inverter, which inverts impedance low to high or high to low. For example, a 120 Ω load is to be matched to a 75Ω line, the quarter wave transformer must have a Z_0 of 95 ohms. This 95Ω quarter wave transformer will match a 75Ω load to a 120 Ω line.	Remember	CLO 12	AEC007.12
4	What are the limits of reflection coefficient and VSWR?	The limits of reflection coefficient are from -1 to 1 and the limits of VSWR are from 1 to infinity.	Remember	CLO 12	AEC007.12
5	What is stub matching?	Stubs can be used to match load impedance to the transmission line characteristic impedance. The stub is positioned a distance from the load. This distance is chosen so that at that point the resistive part of the load impedance is made equal to the resistive part of the characteristic impedance by impedance transformer action of the length of the main line. The length of the stub is chosen so that it exactly cancels the reactive part of the presented impedance.	Understand	CLO 15	AEC007.15
6	Why double stub matching preferred over is single stub?	(a). Single stub matching is useful for a fixed frequency .So as frequency changes the location of single stub will have to be changed. (b). The single stub matching system is based on the measurement of voltage minimum .Hence for coaxial line it is very difficult to get such voltage minimum, without using slotted line section.	Understand	CLO 15	AEC007.15
7	What is reflection	The phenomenon of setting up a reflected wave at the load due to improper termination or due to impedance irregularity in a line is known as reflection	Understand	CLO 12	AEC007.12
8	Define the term insertion loss	It is the ratio of current flowing in the load without insertion of the network to the current flowing in the load with insertion of the network	Remember	CLO 12	AEC007.12

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9	Why OC stubs are preferred over short stub lines?	A short circuited stub is less prone to leakage of electromagnetic radiation and is somewhat easier to realize. On the other hand, an open circuited stub may be more practical for certain types of transmission lines, for example microstrips where one would have to drill the insulating substrate to short circuit the two conductors of the line.	Remember	CLO 15	AEC007.15
10	What are two design parameters of single stub matching	(A) The location of the stub with reference to the load d_{stub}. (B) The length of the stub line L_{stub}	Remember	CLO 15	AEC007.15
11	State the use of half wave line.	To find unknown impedances half wave ($\lambda/2$) transmission line. When unknown load is connected to half wave line, it values is known by input impedance of half wave line	Remember	CLO 15	AEC007.15
12	What is matched transmission line?	When a transmission line is terminated with characteristic impedance that is line is called perfectly matched line.	Understand	CLO 12	AEC007.12
13	Define reflection coefficient.	Reflection coefficient is the ratio of the reflected voltage to the incident voltage.	Remember	CLO 12	AEC007.12
14	What is standing wave? Define VSWR.	If there is impedance mismatch on a line, reflected waves are formed and these are combined with incident waves forms a standing wave. Voltage standing wave ratio is ratio of maximum voltage to minimum voltage in standing wave.	Remember	CLO 12	AEC007.12
15	When a transmission line is considered as series and parallel resonant circuit?	A transmission line of $\lambda/2$ length and it is short circuited at load end, that line act as series resonant. If line open circuited at load end act as parallel resonant circuit.	Understand	CLO 12	AEC007.12
16	What is the smith chart?	It is a polar plot of the complex reflection coefficient. It is the transformation of complex impedance into reflection coefficient plane.	Understand	CLO 15	AEC007.15
17	What are the applications of smith chart?	(a) Measurement of VSWR (b) Measurement of Reflection coefficient (c) Measurement of Input impedance of line (d) Impedance to admittance conversion (e) For designing of stubs.	Remember	CLO 15	AEC007.15

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