



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

CIVIL ENGINEERING

DEFINITIONS AND TERMINOLOGY

Course Name	:	STRENGTH OF MATERIALS - II
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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 TERMINOLOGY QUESTION BANK

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
UNIT - I					
1	How is material strength measured?	Ultimate tensile strength is measured by the maximum stress that a material can withstand while being stretched or pulled before breaking. In the study of strength of materials, tensile strength, compressive strength, and shear strength can be analyzed independently.	Remember	1	CACE004.01
2	What do you mean by tensile strength?	Tensile strength is a measurement of the force required to pull something such as rope, wire, or a structural beam to the point where it breaks. The tensile strength of a material is the maximum amount of tensile stress that it can take before failure, for example breaking.	Understand	2	CACE004.02
3	What is the difference between strength and stress?	Pressure developed on application of loads, on a structure. Material generated due to application of external force. strength is the maximum stress the structure can withstand	Remember	1	CACE004.01
4	Why is strength of materials important to the engineer?	Strength of materials, Engineering discipline concerned with the ability of a material to resist mechanical forces when in use. A material's strength in a given application depends on many factors, including its resistance to deformation and cracking, and it often depends on the shape of the member being designed.	Remember	3	CACE004.03
4	What is stress in strength of materials?	In continuum mechanics, stress is a physical quantity that expresses the internal forces that neighboring particles of a continuous material exert on each other, while strain is the measure of the deformation of the material. Stress is frequently represented by a lowercase Greek letter sigma (σ).	Understand	4	CACE004.04
5	What is the shear strength of steel?	The shear strength of mild steel bar or threaded bar depends on the applications or 0.6 used to change from tensile to shear force could vary from 0.58–0.62.	Understand	1	CACE004.01
6	What is the compressive strength of steel?	The compression strength will then be equal to the yield stress, which is approximately 250 MPa. At around -60 °C, mild steel bar or threaded rebar undergoes a ductile-to-brittle transition.	Remember	2	CACE004.02
7	What material has the highest tensile strength?	Multi walled carbon nanotubes have the highest tensile strength of any material yet measured, with labs producing them at a tensile strength of 63 GPa, still well below their theoretical limit of 300 GPa.	Remember	7	CACE004.07
8	Why is it important to know the mechanical properties of materials?	Some Important Mechanical Properties. Mechanical properties including elasticity, yield strength, ultimate tensile strength and ductility are usually part of material specifications and are obtained by tensile testing.	Understand	5	CACE004.05
9	What is a good tensile strength?	Tensile strength is a measurement of the force required to pull something such as rope, wire, or a structural beam to the point where it breaks. The tensile strength of a	Understand	1	CACE004.01

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
		material is the maximum amount of tensile stress that it can take before failure, for example breaking.			
10	What is difference between tear strength and tensile strength?	strength is the measure of how much tensile stress the material can with stand in a specific case, i.e. when a tear has been introduced in the material, whereas a normal tensile stress test is done for a non-defective piece of material.	Remember	5	CACE004.05
12	What is the difference between strength and stiffness?	Strength is ability of a material to withstand an applied load without getting plastically deformed or rupture, whereas Stiffness is the degree to which an object resists its deformation in applied load.	Understand	1	CACE004.01
13	What is difference between stress and pressure?	Pressure is often used with fluids (gases or liquids), whereas stress is more often used with solids. One major difference is that pressure only acts perpendicular to a surface, whereas stress can also be parallel to a surface as well as perpendicular to it.	Remember	1	CACE004.01
14	Is tension the same as tensile stress?	Tensile stress (or tension) is the stress state leading to expansion; that is, the length of a material tends to increase in the tensile direction. The volume of the material stays constant.	Understand	2	CACE004.02
15	What is permissible tensile stress?	The allowable stress or allowable strength is the maximum stress (tensile, compressive or bending) that is allowed to be applied on a structural material.	Understand	1	CACE004.01
16	Define beam?	A Beam is a horizontal member which spans between one or more supports, and also carries transverse load.	Remember	1	CACE004.01
17	What is deflection of beam?	The deflection at any point on the axis of the beam is the distance between its position before and after loading.	Remember	2	CACE004.02
18	What is slope of beam?	Slope at any section in a deflected beam is defined as the angle in radians which the tangent at the section makes with the original axis of the beam.	Remember	1	CACE004.01
19	What is a cantilever beam?	Cantilever beam can be defined as a beam which is supported on only one end. That means one end is fixed and the other end is exposed beyond the support. The beam transfers the load to the support where it can manage the moment of force and shear stress.	Remember	3	CACE004.03
20	What is a fixed beam?	A fixed beam is supported at both free ends and is restrained against rotation and vertical movement. It is also known as built-in beam.	Understand	4	CACE004.04
21	What is overhanging beam?	It is defined as a beam that has its one or both ends stretching out past its supports. It can have any number of supports. In other words, it is a beam when a cantilever portion is hanging out of a simply supported beam.	Understand	1	CACE004.01
22	Define Conjugate beam?	A conjugate beam is an imaginary beam whose length is same as that of the original beam but load at any point on the conjugate beam is equal to the bending moment at that point divided by EI.	Remember	2	CACE004.02
23	Where is the maximum deflection in a beam?	Maximum deflection occurs at the farthest point from the support. In the case of two support points it will be at the midpoint between them regardless of the location of the	Remember	7	CACE004.07

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
		point loads. Where there are more than two supports then it will be at a midpoint between the section which has the most load.			
24	What is flexural rigidity	Flexural rigidity is the stiffness of a material when subjected to bending. Flexural Rigidity is EI. It gives the relation between bending moment and deflection of any structural member subjected to bending moment.	Understand	5	CACE004.05
25	What is the importance of Young's modulus?	The Young's Modulus of a material is a fundamental property of every material that cannot be changed. It is dependent upon temperature and pressure however. The Young's Modulus (or Elastic Modulus) is in essence the stiffness of a material. In other words, it is how easily it is bended or stretched.	Understand	1	CACE004.01
26	What is moment of inertia?	Moment of inertia is the property of a body to resist the angular acceleration due to external torque.	Remember	5	CACE004.05
27	What is moment of inertia and radius of gyration?	Radius of gyration or gyradius of a body about an axis of rotation is defined as the radial distance of a point from the axis of rotation at which, if whole mass of the body is assumed to be concentrated, its moment of inertia about the given axis would be the same as with its actual distribution of mass.	Understand	1	CACE004.01
28	Why is Macaulay's method superior to Double integration method?	Double integration method is convenient only for single concentrated load or single uniformly distributed load (UDL). Macaulay's method is convenient for any number of concentrated loads as well as uniformly distributed loads (UDL). Therefore Macaulay's method is superior to Double integration method.	Remember	1	CACE004.01
29	On what factors radius of gyration depends?	The radius of gyration depends upon shape and size of the body, position and configuration of the axis of rotation, and also on the distribution of the mass of the body w.r.t the axis of rotation.	Understand	2	CACE004.02
30	What do you mean by slenderness ratio?	Slenderness ratio is the ratio of the length of a column and the least radius of gyration of its cross section.	Understand	1	CACE004.01
UNIT – II					
1	Is tension a stress or strain?	The stress applied to a material is the force per unit area applied to the material. The maximum stress a material can stand before it breaks is called the breaking stress or ultimate tensile stress.	Understand	7	CACE004.07
2	What is the tensile strength of steel?	The tensile strength for structural steel is 400 megapascals (MPa) and for carbon steel is 841 MPa. Tensile strength is different for different densities of steel.	Understand	6	CACE004.06
3	What is toughness of a material?	In materials science and metallurgy, toughness is the ability of a material to absorb energy and plastically deform without fracturing.	Remember	8	CACE004.08
4	What is find in shear test?	A direct shear test is a laboratory or field test used by geotechnical engineers to measure the shear strength properties of soil or rock material, or of discontinuities in soil or rock masses.	Remember	8	CACE004.08

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5	What is hardness of a material?	Material hardness and hardness testing. Material hardness is the property of the material which enables it to resist plastic deformation, usually by penetration or by indentation.	Understand	7	CACE004.07
6	What is E in mechanics of materials?	Strength of materials, also called mechanics of materials, is a subject which deals with the behavior of solid objects subject to stresses and strains .	Understand	8	CACE004.08
7	What is stiffness of a material?	Stiffness is the extent to which it(an object) resists deformation in response to an applied force.	Remember	9	CACE004.09
8	What is Q in shear stress?	τ is the (transverse) shear stress acting at a distance, y , from the neutral axis. V is the value of the shear force at the section. Q is the first moment of the area between the location where the shear stress.	Understand	6	CACE004.06
9	What is the shear strength of steel?	The shear strength of mild steel bar or threaded bar depends on the applications or 0.6 used to change from tensile to shear force could vary from 0.58–0.62. Mild steel has a tensile strength of 400 MPa	Understand	6	CACE004.06
10	What is the compressive strength of steel?	The compression strength will then be equal to the yield stress, which is approximately 250 MPa. At around -60 °C, mild steel bar or threaded rebar undergoes a ductile-to-brittle transition.	Understand	9	CACE004.09
11	What is shear strength of mild steel?	The factor of 0.6 used to change from tensile to shear force could vary from 0.58–0.62 and will depend on application.	Remember	8	CACE004.08
12	What is ultimate shear strength?	In engineering, shear strength is the strength of a material or component against the type of yield or structural failure when the material or component fails in shear	Remember	9	CACE004.09
13	What material has the highest tensile strength?	Multiwalled carbon nanotubes have the highest tensile strength of any material yet measured, with labs producing them at a tensile strength of 63 GPa, still well below their theoretical limit of 300 GPa.	Understand	7	CACE004.07
14	Is steel better in compression or tension?	Steel is equally strong in tension and compression. Steel is weak in fires, and must be protected in most buildings.	Understand	9	CACE004.09
15	What is characteristic strength of material?	Compressive Strength The compressive strength of concrete is given in terms of the characteristic compressive strength of 150 mm size cubes tested at 28 days (f_{ck}).	Remember	8	CACE004.08
16	What is strain energy method?	The concepts of strain, strain-displacement relationships are very useful in computing energy-related quantities such as work and strain energy. These can then be used in the computation of deflections.	Understand	7	CACE004.07
17	What is castigliano's Theorem?	Castigliano's first theorem The first partial derivative of the total internal energy (strain energy) in a structure with respect to any particular deflection component at a point is equal to the force applied at that point and in the direction corresponding to that deflection component.	Understand	6	CACE004.06
18	What do you mean by strain energy?	The external work done on an elastic member in causing it to distort from its unstressed state is transformed into strain energy which is a form of potential energy.	Remember	8	CACE004.08

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		The strain energy in the form of elastic deformation is mostly recoverable in the form of mechanical work.			
19	What is shear strain energy?	Strain Energy of the member is defined as the internal work done in defoming the body by the action of externally applied forces.	Remember	8	CACE004.08
20	What is the principle of virtual work?	The principle of virtual work states that in equilibrium the virtual work of the forces applied to a system is zero. Newton's laws state that at equilibrium the applied forces are equal and opposite to the reaction, or constraint forces. This means the virtual work of the constraint forces must be zero as well.	Understand	7	CACE004.07
21	What is Betti's Law?	Maxwell's Theorem of Reciprocal Displacements; Betti's Law. Maxwell's Theorem. The displacement of a point B on a structure due to a unit load acting at point A is equal to the displacement of point A when the unit load is acting at point B, that is, $f_{BA} = f_{AB}$.	Understand	8	CACE004.08
22	What is difference between strain energy and resilience?	Resilience is the ability to absorb strain energy elastically. In other words it is the amount of strain energy the material can absorb without suffering permanent deformation. On removal of load, this energy is used by the material to go back to its original size. Resilience energy is strain energy until elastic limit.	Remember	9	CACE004.09
23	What is resilience in strength of materials?	Proof resilience is defined as the maximum energy that can be absorbed up to the elastic limit, without creating a permanent distortion. The modulus of resilience is defined as the maximum energy that can be absorbed per unit volume without creating a permanent distortion.	Understand	6	CACE004.06
24	What is simple truss?	A truss is used in architecture and structural engineering as a means of structural support. The most simple type of truss is a triangle truss. Simple triangle trusses consist of a series of triangles arranged so that the weight being supported is distributed evenly for maximum support.	Understand	6	CACE004.06
25	What is a truss and why are they important?	The ends of these members are connected at joints, known as nodes. They are able to carry significant loads, transferring them to supporting structures such as load-bearing beams, walls or the ground. In general, trusses are used to achieve long spans.	Understand	9	CACE004.09
26	What are the 3 types of trusses?	Pratt truss Warren truss. King post truss	Remember	8	CACE004.08
27	What is short and long column?	A column is considered to be short when the ratio of its effective length to its least lateral dimension does not exceed 12. If the ratio of the the effective length to its least lateral dimension exceeds 12 the column is considered to be a long column.	Remember	9	CACE004.09
28	What is buckling or crippling load?	Crippling is just like buckling, but it happens in the web of a beam when it is being compressed. It often occurs at the supports of a beam, where the bottom flange is resting on a support, and the top flange is holding up the load, such as on a bridge abutment.	Understand	7	CACE004.07

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29	What is meant by slenderness ratio?	Slenderness ratio is the ratio of the length of a column and the least radius of gyration of its cross section.	Understand	9	CACE004.09
30	What is buckling in civil engineering?	Buckling of Columns is a form of deformation as a result of axial- compression forces.	Remember	8	CACE004.08
UNIT – III					
1	What is tensile strength of a material?	Tensile strength is a measurement of the force required to pull something such as rope, wire, or a structural beam to the point where it breaks.	Remember	11	CACE004.11
1	What are properties of materials?	A material is any substance or mixture of substances that occupy a volume, and has a mass. A substance usually refers to pure compound. Appearance, behavior, name, structure, color, order, composition and any information about a substance are properties of a material.	Remember	12	CACE004.12
3	What is the difference between stiffness and rigidity?	stiffness is the rigidity of an object to the extent which it resists deformation when force is being applied to it.	Understand	14	CACE004.14
4	How many types of strain are there?	There are three types of stress: compression, tension, and shear. Stress can cause strain, if it is sufficient to overcome the strength of the object that is under stress.	Remember	12	CACE004.12
5	What is radial stress in thick cylinder?	The radial stress for a thick-walled cylinder is equal and opposite to the gauge pressure on the inside surface, and zero on the outside surface. The circumferential stress and longitudinal stresses are usually much larger for pressure vessels, and so for thin-walled instances, radial stress is usually neglected.	Remember	11	CACE004.11
6	What is hoop stress in thin cylinder?	Hoop and longitudinal stress thin-walled tubes or cylinders. Sponsored Links. When a thin-walled tube or cylinder is subjected to internal pressure a hoop and longitudinal stress are produced in the wall.	Remember	15	CACE004.15
7	What is transverse stress?	Transverse Shear Stresses in Beams. SHEAR STRESSES IN BEAMS. In addition to the pure bending case, beams are often subjected to transverse loads which generate both bending moments $M(x)$ and shear forces $V(x)$ along the beam.	Remember	14	CACE004.14
8	What is hoop compression?	The objective of this video is to give an introductory overview on hoop stress- a normal stress on tangential direction. ... Hoop stresses essentially are caused by pressure acting equally outwards.	Understand	11	CACE004.11
9	What is hoop stress definition?	Circumferential stress or hoop stress, a normal stress in the tangential (azimuth) direction; Axial stress, a normal stress parallel to the axis of cylindrical symmetry;	Remember	13	CACE004.13
10	What is longitudinal stress and strain?	It is a dimensionless quantity as it is a ratio between two quantities of same dimension. When a body is under load, it will extend in the direction of the stress(longitudinal strain) and contract in the transverse or lateral direction (lateral strain), in case of longitudinal tensile stress.	Remember	12	CACE004.12
12	What is meant by tangential stress?	a force acting in a generally horizontal direction especially : a force that produces mountain folding and over thrusting.	Remember	12	CACE004.12

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13	What is transverse bending?	Transverse loading is a load applied vertically to the plane of the longitudinal axis of a configuration, such as a wind load. It causes the material to bend and rebound from its original position, with inner tensile and compressive straining associated with the change in curvature of the material.	knowledge	14	CACE004.14
14	What is a transverse load?	Forces applied perpendicular to the longitudinal axis of a member. Transverse loading causes the member to bend and deflect from its original position.	Remember	14	CACE004.11
15	Where does the maximum shear stress occur?	When an section beam is subjected to both Bending and Shear Stresses it is normal to find that the Maximum Principle Stress is at the top of the Web.	Understand	14	CACE004.14
16	What is meant by principal stress?	It is defined as the normal stress calculated at an angle when shear stress is considered as zero. The normal stress can be obtained for maximum and minimum values.	Remember	15	CACE004.15
17	What are thin cylinders?	Thin cylinders are devices which are used in engineering applications. These are also called as pressure vessels, which are used to carry high pressure fluid or gas.	Remember	11	CACE004.11
18	What is thick cylinder?	If the ratio of thickness to internal diameter is more than 1/20, then the cylinder is called as thick cylinder.	Remember	12	CACE004.12
19	What is the hoop stress in thick cylinder?	The hoop stress in case of thick cylinder will not be uniform across the section. The hoop stress will vary from a maximum value at the inner circumference to a minimum value at outer circumference.	Understand	14	CACE004.14
20	What is thin pressure vessel?	Thin-walled Pressure Vessels. A tank or pipe carrying a fluid or gas under a pressure is subjected to tensile forces, which resist bursting, developed across longitudinal and transverse sections.	Remember	12	CACE004.12
21	How is stress distributed in thin cylinder?	In case of thin cylinder the stress distribution is assumed uniform over the thickness of the wall.	Remember	11	CACE004.11
22	What is hoop stress and radial stress?	radial stresses are for thick walled cylinders and hoop stress are related to thin wall cylinders. They are both the result of the internal pressure of the cylinder.	Remember	15	CACE004.15
23	What do you understand by longitudinal strain?	the ratio of change in longitudinal length to that of original length is called as longitudinal strain	Remember	14	CACE004.14
24	What is lateral strain?	The lateral strain is given by change in lateral dimensions i.e. change in diameter to that of original diameter	Understand	11	CACE004.11
25	What is meant by shear stress?	Shearing stress is a force that causes layers or parts to slide upon each other in opposite directions.	Remember	13	CACE004.13
26	What is normal stress?	A normal stress is a stress that occurs when a member is loaded by an axial force. The value of the normal force for any prismatic section is simply the force divided by the cross sectional area. A normal stress will occur when a member is placed in tension or compression.	Remember	12	CACE004.12
27	What is meant by shear strain?	Shear strain is the ratio of deformation to original dimensions. shear strain is defined as the tangent of the angle, and is equal to the length of deformation at its maximum divided by the perpendicular length in the plane of force	Remember	12	CACE004.12

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28	What are the 3 types of strain?	There are three types of stress: compression, tension, and shear.	knowledge	14	CACE004.14
29	What does stiffness mean?	Stiffness is the extent to which an object resists deformation in response to an applied force.	Remember	14	CACE004.11
30	What is stiffness factor?	Stiffness factor is the ratio of moment of inertia of cross section of beam or wire to its length.	Understand	14	CACE004.14
31	What is equivalent stress?	Equivalent stress is part of the maximum equivalent stress failure theory used to predict yielding in a ductile material.	Remember	15	CACE004.15
UNIT - IV					
1	What is hoop stress and radial stress?	In general tangential and radial stresses are for thick walled cylinders [1] and hoop stress are related to thin wall cylinders . They are both the result of the internal pressure of the cylinder.	Knowledge	16	CACE004.16
2	What is Poisson's ratio used for?	The Poisson's ratio of a stable, isotropic, linear elastic material will be greater than -1.0 or less than 0.5 because of the requirement for Young's modulus, the shear modulus and bulk modulus to have positive values.	Remember	17	CACE004.17
3	What is transverse loading of beams?	Transverse loading encourages shear forces that cause shear deformation of a material and increase its slanting deflection. When a transverse load is applied on a beam, it deforms and tensions develop within it.	Remember	16	CACE004.16
4	What is the difference between compressive strength and flexural strength?	Flexural strength is the maximum amount of bending it can withstand. ... Flexural Strength is the capacity of the concrete (usually beams) to resist deformation under bending moment. It is sometimes called Bending Strength. Tensile Strength is the capacity of concrete to resist tension/stretched tight.	Remember	18	CACE004.18
5	What is longitudinal load?	When a beam is flipped up words, it become a column, and the load is at the top as a rule. Longitudinal is length wise. transverse is breadth wise. the third is Verticals. So u have longitudinal or transverse beams and verticals or pillars or columns.	Knowledge	19	CACE004.19
6	What is unsymmetrical bending?	Unsymmetrical beam bending is really just two problems added together using the principle of superposition. Normally, a beam is loaded in the y-direction causing a moment about the z axis.	Understand	17	CACE004.17
7	What is meant by principal stress?	It is defined as the normal stress calculated at an angle when shear stress is considered as zero. The normal stress can be obtained for maximum and minimum values.	Understand	17	CACE004.17
8	What are the principal stresses on a Mohr's circle?	Mohr's circle also tells you the principal angles (orientations) of the principal stresses without your having to plug an angle into stress transformation equations. Starting with a stress or strain element in the XY plane, construct a grid with a normal stress on the horizontal axis and a shear stress on the vertical.	Understand	16	CACE004.16

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9	What is shear Centre and its importance?	To avoid twisting, and cause only bending, it is necessary for the forces to act through the particular point, which may not coincide with the centroid. Shear center is defined as the point on the beam section where load is applied and no twisting is produced.	Remember	17	CACE004.17
10	What is the difference between shear stress and normal stress?	Normal stress is a result of load applied perpendicular to a member. Shear stress however results when a load is applied parallel to an area.	Understand	18	CACE004.18
11	How do you calculate shear stress?	Shear stress is the force, F , acting on a given section divided by the cross sectional area, A , of the section, calculated in the direction of the force. E.G., for a force, F , normal to the surface of a beam having a cross sectional area of A , the shear stress is = F/A .	Remember	19	CACE004.19
12	What is difference between shear force and bending moment?	The force in the beam acting perpendicular to its longitudinal (x) axis. For design purposes, the beam's ability to resist shear force is more important than its ability to resist an axial force.	Remember	18	CACE004.18
13	What is hogging and sagging bending moment?	Hogging and sagging describe the shape of a beam or similar long object when loading is applied. Hogging describes a beam which curves upwards in the middle, and sagging describes a beam which curves downwards.	Remember	16	CACE004.16
14	Where does maximum bending moment occur?	The maximum bending moment occurs in a beam, when the shear force at that section is zero or changes the sign because, at point of contra flexure the bending moment is zero.	Remember	16	CACE004.16
15	Where the bending stress is maximum for I section beam?	As a result of this bending, the top fibers of the beam will be subjected to tension and the bottom to compression it is reasonable to suppose, therefore, that somewhere between the two there are points at which the stress is zero.	Remember	17	CACE004.17
16	What is statically determinate structure?	When the number of unknown reactions in a structure can be determined only by the equation of equilibrium, then the structure is called as statically determinate structure.	Knowledge	16	CACE004.16
17	What is statically indeterminate structure?	When the number of unknown reactions in a structure cannot be determined only by the equation of equilibrium, then the structure is called as statically indeterminate structure.	Remember	17	CACE004.17
18	What is a fixed beam?	In a beam when both the ends are having fixed end support condition then, those beams are called as fixed beam.	Remember	16	CACE004.16
19	What is a propped cantilever beam?	When a cantilever beam is having a support on the free end, then those beams are called as propped cantilever beams.	Remember	18	CACE004.18
20	What is fixed end moment?	The fixed end moments are reaction moments developed in a beam member under certain load conditions with both ends fixed.	Knowledge	19	CACE004.19
21	What is a simply supported beam?	A simply supported beam is a type of a beam that has pinned support at one end and roller support at the other end.	Understand	17	CACE004.17
22	What is over hanging beam?	An overhanging beam is defined as a beam, which is freely supported at two points and having one or both ends extending beyond these supports. Mostly in the	Understand	17	CACE004.17

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		overhanging beam one support is hinge support while is roller support having one end as free like as cantilever.			
23	What do you mean by point of Contraflexure in beam?	In a bending beam, a point is known as a point of contraflexure if it is a location at which no bending occurs.	Understand	16	CACE004.16
24	What do you mean by point of Contraflexure in bending moment?	In a bending moment diagram, it is the point at which the bending moment curve intersects with the zero line.	Remember	17	CACE004.17
25	What is support and its types?	Supports are used in structures to provide it stability and strength. There are basically three types of support and these are roller, pinned and fixed support.	Understand	18	CACE004.18
26	What is a pinned support?	A pinned support can resist both vertical and horizontal forces but not a moment.	Remember	19	CACE004.19
27	What is a fixed support?	Fixed supports can resist vertical and horizontal forces as well as a moment. Since they restrain both rotation and translation, they are also known as rigid supports.	Remember	18	CACE004.18
28	What is a roller support?	A roller support can resist vertical forces but not a horizontal forces and a moment.	Remember	16	CACE004.16
29	What are different types of loads?	Types of loads acting on a structure are: Dead loads. Imposed loads. Wind loads. Snow loads. Earthquake loads. Special loads.	Remember	16	CACE004.16
30	What are imposed loads?	Imposed load is defined as the load that is applied to the structure that is not permanent and can be variable.	Remember	17	CACE004.17
UNIT - V					
1	What is axial load?	An Axial load is a force administered along the lines of an axis. Axial loading occurs when an object is loaded so that the force is normal to the axis that is fixed, as seen in the figure.	Understand	20	CACE004.20
2	What is stiffness of beam?	The bending stiffness () is the resistance of a member against bending deformation. It is a function of elastic modulus, the area moment of inertia of the beam cross-section about the axis of interest, length of the beam and beam boundary condition.	Remember	21	CACE004.21
3	What is EI in beam deflection?	The bending stiffness () is the resistance of a member against bending deformation. It is a function of elastic modulus , the area moment of inertia of the beam cross-section about the axis of interest,	Remember	21	CACE004.21
4	What is continuous beam	A continuous beam is a statically indeterminate multi span beam on hinged support. The end spans may be cantilever, may be freely supported or fixed supported. At least	Understand	23	CACE004.23

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
		one of the supports of a continuous beam must be able to develop a reaction along the beam axis.			
5	What is the difference between a simply supported beam and a continuous beam?	Simply supported: A beam supported on the ends, which are free to rotate and have no moment resistance. Fixed: A beam supported on both ends, which are fixed in place. Overhanging: A simple beam extending beyond its support on one end. ... Continuous: A beam extending over more than two supports.	Remember	22	CACE004.22
6	What is meant by fixed beam?	Structural beams resting at supports which get fixed and cant rotate or free to move are fixed beams. Viz restrained. They will generally designed not to take any Bending Moments. ... A fixed beam is supported at both free ends and is restrained against rotation and vertical movement. It is also known as built-in beam.	Remember	23	CACE004.23
7	What is free end moment?	The fixed end moments are reaction moments developed in a beam member under certain load conditions with both ends fixed.	Understand	23	CACE004.23
8	What is propped cantilever?	Propped cantilever beam is a beam which is supported at its free end. For solving such examples we must have a knowledge of slope & deflection of the beams.	Remember	20	CACE004.20
9	What is the difference between a cantilever and a beam?	A cantilever beam is a beam with one end fixed and other end free. A simple supported beam is a beam with two hinge support at each end. An overhanging beam is a beam when a cantilever portion is hanging out of a simply supported beam. In other words, when simply supported beams is extended over its supports.	Understand	20	CACE004.20
10	What is slope of a beam?	Slope of a beam: slope at any section in a deflected beam is defined as the angle in radians which the tangent at the section makes with the original axis of the beam.	Understand	21	CACE004.21
11	When Macaulay's method is preferred?	Macaulay's method (the double integration method) is a technique used in structural analysis to determine the deflection of Euler-Bernoulli beams.	Understand	22	CACE004.22
12	What is relative stiffness?	When two or more members join at a point and prevent the joint from rotation or displacement, the ratio of stiffness of one member to the sum of the stiffness of all the members put together at the joint is the relative stiffness of the member at the joint.	Understand	23	CACE004.23
13	What is Maxwell's law of reciprocal deflections?	Maxwell's reciprocal theorem state that in a linearly elastic structure, the deflection at any point.	Remember	23	CACE004.23
14	What is double integration method?	The double integration method is a powerful tool in solving deflection and slope of a beam at any point because we will be able to get the equation of the elastic curve.	Remember	23	CACE004.23
15	Where does maximum deflection occur in a beam?	Generally maximum deflection occurs at the middle of the load for uniformly distributed load. However, when there is point load it varies. Depending on the location of the point load, location where the maximum deflection occurs vary.	Remember	22	CACE004.22
16	What is a continuous beam?	A continuous beam is a statically indeterminate multi-span beam on hinged support. The end spans may be cantilever, may be freely supported or fixed supported. At least one of the supports of a continuous beam must be able to develop a reaction along the beam axis.	Understand	20	CACE004.20

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17	What is negative bending moment?	Bending Moments that cause hogging is called negative Bending Moment.	Remember	21	CACE004.21
18	What is positive bending moment?	Bending Moment that causes sagging is called positive bending moment.	Remember	21	CACE004.21
19	Name various methods to determine slope and deflection in beams.	(i) Double Integration Method (ii) Macaulay's Method (iii) Strain Energy Method (iv) Superposition Method (v) Moment Area Method OR Graphical Method	Understand	23	CACE004.23
20	What is the definition of bending?	Bending is a part of a circular deformation. Initially straight member becomes like a bow or an arc.	Remember	22	CACE004.22
21	What is neutral axis?	In bending of beams, the neutral axis is the line where neutral plane intersects the area of cross-section. At this axis there is zero stress and zero strain. Neutral plane is a fiber of zero stress.	Remember	23	CACE004.23
22	What are composite beams?	A beam of two or more materials is called a composite beam.	Understand	23	CACE004.23
23	Explain the difference between Neutral layer and neutral axis.	Neutral Layer is a plane (area) under zero stress and under zero strain. It passes through the neutral axis of the beam. Neutral axis is a line where neutral fiber cuts the cross section of the beam. It does not have any stress or no strain.	Remember	20	CACE004.20
24	What are the various types of stresses?	Various types of stresses are (i) Tensile stress (ii) Compression stress (iii) Shear stress (iv) Thermal stress (v) Bending stress (vi) Torsional shear stress (vii) Buckling stress (viii) Complex stress (ix) Principal Stress	Understand	20	CACE004.20
25	Define Poisson's Ratio?	The ratio of lateral strain to the linear strain is a constant for a given material, when the material is stressed within the elastic limit. This ratio is Poisson's ratio and it is generally denoted by $1/m$ or μ . Poisson's ratio $1/m = \mu = \text{linear strain} / \text{lateral strain}$.	Understand	21	CACE004.21
26	What Is Stability?	The stability may be defined as an ability of a material to withstand high load without deformation.	Understand	22	CACE004.22

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	Define Factor Of Safety?	It is defined as the ratio of ultimate stress to the working stress or permissible stress. Factor of safety = ultimate stress / permissible stress	Understand	23	CACE004.23
	Define Bulk Modulus?	When a body is subjected to an uniform direct stress in all the three mutually perpendicular directions, the ratio of the direct stress to the corresponding volumetric strain is found to be a constant is called as the bulk modulus of the material and is denoted by K	Remember	23	CACE004.23
	What is a strut?	It is a long column which may be horizontal or inclined. It is not vertical.	Remember	23	CACE004.23
	What is the difference between a column and a strut?	Column is a vertical compression member and can be a short or medium or long column on the basis of slenderness ratio. Whereas strut means only a long compression member and which is horizontal or inclined to horizontal.	Remember	22	CACE004.22

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