

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous) Dundigal, Hyderabad - 500 043

MECHANICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	MATERIALS AND MECHANICS OF SOLIDS		
Course Code	:	AMEB11		
Program	:	B. Tech		
Semester	:	IV		
Branch	:	Mechanical Engineering		
Section	•••	A & B		
Academic Year	:	2019-2020		
Course Faculty	:	Dr. K. Viswanath Allamraju, Professor Mr. A Somaiah, Assistant Professor		

OBJECTIVES:

Ι	Understand the nature of stresses developed in simple geometries such as bars, cantilevers, beams, shafts, cylinders and spheres for various types of loads.
II	Calculate the elastic deformation occurring in various simple geometries for different types of loading.

DEFINITIONS AND TERMINOLOGYQUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		MODULE-I				
1	What is the definition of material science?	Definition of materials science. : the scientific study of the properties and applications of materials of construction or manufacture (such as ceramics, metals, polymers, and composites)	Understand	CO1	CL01	AMEB11.01
2	What is material science used for?	Materials Science and Engineering is the study of all materials, from those we see and use everyday such as a glass or a piece of sport equipment to those used in aerospace and medicine.	Understand	CO1	CL01	AMEB11.01
3	Why is material science important?	The rest of the universe which might be in a position to exchange energy and matter with the system is called the surroundings.	Remember	CO1	CLO1	AMEB11.01
4	What are the 4 types of materials?	Materials are generally split into four main groups: metals, polymers, ceramics, and composites. Let's discuss each of them in turn. Metals are materials like iron, steel, nickel, and copper.	Understand	CO1	CLO2	AMEB11.01

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
5	Is water a material?	The final material is water, which is	Understand	CO1	CLO 1	AMEB11.01
		a clear, colorless, odorless, and				
		tasteless liquid, which is comprised				
		of hydrogen and oxygen. The				
		majority of water on Earth is in the				
		form of saltwater and a small				
		amount is freshwater. All				
		along, but together they are even				
		more impressive				
		more impressive.				
6	What is	Crystallographers use the properties	Remember	CO1	CLO 2	AMEB11.02
	crystallography used	and inner structures of crystals to)		
	101 /	and generate knowledge that is used				
		by chemists, physicists, biologists,				
		and others As a				
		science, crystallography has				
		produced 28 Nobel Prizes, more than any other scientific field				
		than any other scientific field.				
7	What is	The law of the constancy of	Understand	CO1	CLO 2	AMEB11.02
	crystallography law?	interfacial angles (or 'first law of				
		crystallography') states that the				
		given species are constant, whatever				
		the lateral extension of these faces				
		and the origin of the crystal, and are				
		characteristic of that species.				
8	What do you mean	Crystallography is the experimental	Remember	CO1	CLO 2	AMEB11.02
Ũ	by crystallography?	science of determining the		001	0101	
		arrangement of atoms in crystalline	_	- T	0	
		solids		1	. ~~	
9	How does a	X-ray Crystallography is a	Remember	CO1	CLO 2	AMEB11.02
	crystallography	scientific method of determining the	Remember	001		7 MVILD11.02
	work?	precise positions/arrangements of			N	
		atoms in a crystal where beams of		20		
		X-ray strikes a crystal and causes		S		
		the beam of light to diffract into				
		many specific directions X-ray	1.1.1			
		beams are shot through a crystal of				
		the atom				
10	What are the 7 types	There are in total 7 groups	Remember	CO1	CLO 3	AMEB11.03
	of crystals?	collectively called Crystal Systems:		201	2200	
	-	Tricinic, Monoclinic,				
		Orthorhombic, Tetragonal,				
		The symmetry of each group is				
		described by the relationship				
		between the lattice sides a, b, and c				
		and angles α , β and γ . Click on				
1		a crystal system to get started.				

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
11	What are the 6 major	In three dimensions,	Understand	CO1	CLO 3	AMEB11.03
	crystal types?	the crystal families and systems are				
		identical, except the hexagonal and				
		trigonal crystal systems, which are				
		combined into one				
		hexagonal crystal family. In total				
		there are six crystal families:				
		triclinic, monoclinic, orthorhombic,				
		tetragonal, hexagonal, and cubic.				
12	What is d in Bragg's	Bragg's Law, When x-rays are	Understand	CO1	CLO 3	AMEB11.03
	law?	scattered from a crystal lattice,				
		peaks of scattered intensity are		_		
		observed which correspond to the				
		following conditions: The angle of incidence – angle of scattering. The				
		pathlength difference is equal to an				
		integer number of wavelengths.				
13	What are laws of	Laws of Crystallography. (i) Law of	Remember	CO1	CLO 3	AMEB11.03
	crystallography?	constancy of interfacial angles:				
		adjacent corresponding faces is inter				
		facial angles of the crystal of a				
		particular substance is always	-			
		constant inspite of different shapes				
		and sizes and mode of growth of		-		
		crystal This law was given by				
		That y.		1		
14	Who discovered	The field of crystallography started	Understand	CO1	CLO1	AMEB11.03
	crystallography?	with the discovery of X-rays by			-	
		Röntgen who was awarded the	_	_	0	
	G	this discovery in 1901 Max yon		1	~	
		Laue followed this by investigating			~	
	S. 1.	the interaction of X-rays with			1	
		crystals producing a diffraction			N	
		pattern and he received the Nobel		2		
		Prize for Physics in 1914.		5		
	What is the study of	The scientific study of	Understand	CO1	CLO 3	AMEB11.03
15	crystals called?	crystals and crystal formation is	1.10			
		known as crystallography. The				
		process of crystal formation via				
		is called crystallization or				
		solidification.				
16	How are crystals	Crystals often form in nature when	Understand	CO1	CLO 4	AMEB11.04
	formed?	liquids cool and start to harden.				
		Certain molecules in the liquid				
		become stable. They do this in a				
		uniform and repeating pattern that				
		forms the crystal. In				
		nature, crystals can form when				
	1	liquid rock, called magma, cools.				

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
17	How is crystallography related to chemistry?	Crystallography, branch of science that deals with discerning the arrangement and bonding of atoms in crystalline solids and with the geometric structure of crystal lattices. Classically, the optical properties of crystals were of value in mineralogy and chemistry for the identification of substances.	Understand	CO1	CLO 4	AMEB11.04
18	Is Diamond A Crystal?	Diamond is a solid form of the element carbon with its atoms arranged in a crystal structure called diamond cubic Under high pressure and temperature, carbon- containing fluids dissolved minerals and replaced them with diamonds.	Understand	CO1	CLO 4	AMEB11.04
19	What are crystals made of?	A crystal is made up of atoms of the same element or atoms of different elements [like silica (Si) or calcium (Ca)], and the atoms have a regular, repeating arrangement. Crystals are very ordered, the arrangement of a certain crystal is always the same	Understand	CO1	CLO 1	AMEB11.01
20	What is unit cell and space lattice?	"A space lattice is an array of points showing how particles (atoms, ions or molecules) are arranged at different sites in three dimensional spaces." The unit cell may be defined as, "the smallest repeating unit in space lattice which, when repeated over again, results in a crystal of the given substance".	Understand	COI	CLO 1	AMEB11.01
21	What is a lattice science?	Lattice. The regular arrangement of atoms, ions, or molecules in a crystalline solid.	Remember	CO1	CLO 1	AMEB11.01
22	What are three ways crystals form?	Crystals grow in one of three major ways: from a vapor, from a solution, or from a melt.	Understand	CO1	CLO 1	AMEB11.01
23	What is a for FCC?	Face-Centered Cubic (FCC) Structure. • Unit cell contains: 6 x $1/2 + 8 \times 1/8 = 4$ atoms/unit cell. • Close packed directions are face.	Understand	CO1	CLO 1	AMEB11.01
24	What is coordination number of FCC?	12	Understand	CO1	CLO 2	AMEB11.02
25	Is FCC stronger than BCC?	The bcc lattice, although cubic, is not closely packed and forms strong metals The fcc lattice is both cubic and closely packed and forms more ductile materials. Gamma-iron, silver, gold, and lead have fcc structures. Finally, HCP lattices are closely packed, but not	Remember	COI	CLO 2	AMEB11.02

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		cubic.				
26	Is chromium FCC or BCC?	The bcc unit cell has a packing factor of 0.68. Some of the materials that have a bcc structure include lithium, sodium, potassium, chromium, barium, vanadium, alpha-iron and tungsten. Metals which have a bcc structure are usually harder and less malleable than close-packed metals such as gold.	Understand	CO1	CLO 2	AMEB11.02
27	What is a bcc structure?	Body-centered cubic (bcc or cB) is a type of crystal structure in metals. This structure can be seen as a gathering of cubes with atoms at the edges and an atom in the center of every cube. The corner or edge atoms are shared among eight unit cells. The metals which have a bcc structure are: Alpha iron.	Remember	CO1	CLO 2	AMEB11.02
28	What is hcp structure?	Hexagonal close packed (hcp) refers to layers of spheres packed so that spheres in alternating layers overlie one another. Hexagonal close packed is a slip system, which is close-packed structure. The hcp structure is very common for elemental metals, including: Beryllium. Cadmium.	Remember	CO1	CLO 2	AMEB11.02
29	Is Zinc FCC or BCC?	For example, FCC metals, Cu, Au, Ag, are usually soft and 'ductile', which means they can be bent and shaped easily. BCC metals are less ductile but stronger, eg iron, while HCP metals are usually brittle. Zinc is HCP and is difficult to bend without breaking, unlike copper.	Remember	COI	CLO 3	AMEB11.03
30	What is BCC unit cell?	Body-centered cubic lattice (bcc or cubic-I), like all lattices, has lattice points at the eight corners of the unit cell plus an additional points at the center of the cell The number of atoms in a unit cell is two $(8 \times 1/8 + 1 = 2)$. There are 23 metals that have the bcc lattice	Understand	CO1	CLO 3	AMEB11.03
MOI	DULE-II		- I			
1	What is an alloy simple definition?	An alloy is a uniform mixture. It is made up of two or more chemical elements, of which at least one is a metal. An alloy has properties different from the metals it is made of.	Understand	CO1	CLO 6	AMEB11.06

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
2	What are alloys give examples?	Examples of common alloys: Steel, a combination of iron (metal) and carbon (non-metal) Bronze, a combination of copper (metal) and tin (metal) and. Brass, a mixture of	Understand	CO1	CLO 6	AMEB11.06
3	What are the 2 types	copper (metal) and zinc (metal)	Understand	CO1	CLO 6	AMEB11.06
	of alloys?	These are called substitution alloys and interstitial alloys. In substitution alloys, the atoms of the original metal are literally replaced with atoms that have roughly the same size from another material. Brass for example of				
		a substitution alloy of copper and zinc				
4	What are the properties of alloy?	In general, alloys have been found to be stronger and harder, less malleable, less ductile, and more corrosion-resistant than the main metal making the alloy. An alloy mixture is stronger because it contains atoms from different elements that are different in sizes.	Understand	COI	CLO 6	AMEB11.06
5	What are alloy wheels made of?	In the automotive industry, alloy wheels are wheels that are made from an alloy of aluminium or magnesium. Alloys are mixtures of a metal and other elements. They generally provide greater strength over pure metals, which are usually much softer and more ductile.	Understand	CO2	CLO 6	AMEB11.06
6	Can alloys rust?	But only iron or alloys that contain iron can rust.	Understand	CO2	CLO 6	AMEB11.06
7	Are Alloy wheels good?	Advantages of alloy wheels Alloy wheels are made of an alloy of light metals, namely aluminium, nickel, magnesium, or a combination of these metals. They offer performance advantages over steel wheels, as they are often several pounds lighter per wheel - less weight means quicker acceleration and faster stopping	Understand	CO2	CLO 6	AMEB11.06
8	What does peritectic mean?	Definition of peritectic. : taking place between the solid phases and the still unsolidified portions of the liquid melt.	Understand	CO2	CLO 6	AMEB11.06
9	What is a Peritectoid	A peritectoid transformation is a	Understand	CO2	CLO 6	AMEB11.06

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
	reaction?	type of isothermal reversible reaction that has two solid phases reacting with each other upon cooling of a binary, ternary,, ary alloy to create a completely different and single solid phase				
10	What is Monotectic reaction?	Phase Diagram Showing Monotectic Reaction: As the temperature rises, their miscibility increases such that above temperature 990°C, both liquid solutions are miscible completely in each other, i.e., form a homogeneous liquid solution Point B is a monotectic point, and 954°C is a monotectic- reaction temperature.	Remember	CO2	CLO 7	AMEB11.07
11	What is a eutectic reaction?	A eutectic reaction is a three- phase reaction, by which, on cooling, a liquid transforms into two solid phases at the same time. It is a phase reaction, but a special one. For example: liquid alloy becomes a solid mixture of alpha and beta at a specific temperature (rather than over a temperature range).	Remember	CO2	CLO 7	AMEB11.07
12	What is peritectic change?	A peritectic reaction is a reaction where a solid phase and liquid phase will together form a second solid phase at a particular temperature and composition	Understand	CO2	CLO 7	AMEB11.07
13	What is peritectic phase diagram?	Peritectic point - The point on a phase diagram where a reaction takes place between a previously precipitated phase and the liquid to produce a new solid phase A peritectic is also an invariant point. Intermediate compound - A phase that has a composition intermediate between two other phases	Remember	CO2	CLO 7	AMEB11.07
14	What is peritectic steel?	Peritectic steels are ultra low carbon steels that fall into the phase change boundary, namely upper phase, that is it is directly influenced by alloying elements which can make this high tensile	Understand	CO2	CLO 8	AMEB11.08
15	What is eutectic composition?	A eutectic system is a homogeneous, solid mixture of two or more substances that form a super-lattice; the mixture either melts or solidifies at a lower temperature than the melting point	Remember	CO2	CLO 8	AMEB11.08

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		of any of the individual substances. A eutectic system only forms when there is a specific ratio between the components				
16	What can be determined from a phase diagram?	Phase Diagrams. Phase diagram is a graphical representation of the physical states of a substance under different conditions of temperature and pressure.	Remember	CO2	CLO 8	AMEB11.08
17	What do you mean by eutectic temperature?	The term Eutectic literally specifies that the behavior is to will melt well Eutectic system means the two chemical compounds, which do not mix well, when at their lowest melting point temperatures mixes well and the mixture fully becomes liquid at that point.	Understand	CO2	CLO 8	AMEB11.08
18	Why is the eutectic temperature lower?	A and B form, somewhere, a eutectic Because the existence of a eutectic point is guaranteed for any A/B binary system, and because the eutectic corresponds to a lower temperature, your liquidus curve decreases with increasing impurity concentration, and the impurity thus lowers the melting point.	Understand	CO2	CLO 8	AMEB11.08
19	How do you find the eutectic point?	This point is called the eutectic. It is the lowest temperature at which a liquid can exist in this system. At the eutectic, both anorthite and titanite crystallize together at a fixed temperature and in a fixed ratio until the remaining liquid is consumed. All intermediate liquid compositions migrate during	Understand	CO2	CLO 5	AMEB11.05
20	What is lever rule in phase diagram?	The lever rule is a rule used to determine the mole fraction (xi) or the mass fraction (wi) of each phase of a binary equilibrium phase diagram. It can be used to determine the fraction of liquid and solid phases for a given binary composition and temperature that is between the liquidus and solidus line.	Understand	CO2	CLO 5	AMEB11.05
21	What's the freezing point?	the temperature at which a liquid freezes: The freezing point of water is 32°F, 0°C.	Understand	CO2	CLO 5	AMEB11.05
22	What is ternary phase diagram?	Phase diagrams are graphical representations of the liquid, vapor, and solid phases that co-exist at various ranges of temperature and	Understand	CO2	CLO 8	AMEB11.05

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		pressure within a reservoir. Ternary phase diagrams represent the phase behavior of mixtures containing three components in a triangular diagram				
23	What is the triple point of a substance?	In thermodynamics, the triple point of a substance is the temperature and pressure at which the three phases (gas, liquid, and solid) of that substance coexist in thermodynamic equilibrium.	Understand	CO2	CLO 8	AMEB11.05
24	What is Eutectoid temperature?	The eutectoid reaction In the Fe-C system, there is a eutectoid point at approximately 0.8wt% C, 723°C. The phase just above the eutectoid temperature for plain carbon steels is known as austenite or gamma	Understand	CO2	CLO 6	AMEB11.06
25	What is a peritectic point?	A eutectic is an invariant point. Peritectic point - The point on a phase diagram where a reaction takes place between a previously precipitated phase and the liquid to produce a new solid phase. When this point is reached, the temperature must remain constant until the reaction has run to completion.	Remember	CO2	CLO 8	AMEB11.08
26	What happens at eutectic point?	Eutectic point - the point on a phase diagram where the maximum number of allowable phases are in equilibrium	Understand	CO2	CLO 8	AMEB11.08
27	What is phase rule equation?	The Phase Rule describes the possible number of degrees of freedom in a (closed) system at equilibrium, in terms of the number of separate phases and the number of chemical constituents in the system The Chemical Constituents are simply the distinct compounds (or elements) involved in the equations of the system.	Understand	CO2	CLO 8	AMEB11.08
28	What is ternary solution?	Ternary solution is the one in which three components are present. Either two solvents and one solute or one solvent and two solute). For e.g. salt, sugar and water solution	Understand	CO2	CLO 5	AMEB11.05
29	Why it is called triple point?	It's called the triple point: In thermodynamics, the triple point of a substance is the temperature and pressure at which the three phases (gas, liquid, and solid) of that substance coexist in thermodynamic	Remember	CO2	CLO 8	AMEB11.08

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		equilibrium				
30	What is peritectic temperature?	peritectic temperature (PTEC) Description: The Peritectic Temperature is the temperature at which the melt of a heterogeneous multicomponent system begins to react with the solid phase to form a new compound.	Understand	CO2	CLO 5	AMEB11.05
MOL	DULE-III		1			
1	What is the unit for stress?	N/sqmm	Understand	CO4	CLO 14	AMEB11.14
2	What is strain?	It is the ratio of change in length to original length	Remember	CO4	CLO 16	AMEB11.16
3	What are the three elastic constants?	Modulus of elasticity or Young's modulus (E), Bulk modulus (K) and. Modulus of rigidity or shear modulus (M, C or G).	Remember	CO3	CLO 13	AMEB11.13
4	What is relation between elastic constants?	Relation Between Elastic Constants. Young's modulus, Bulk modulus, and Rigidity modulus of any elastic solid are together called as Elastic constants. When a deforming force is acting on a solid. It results in the change in its original dimension.	Remember	CO3	CLO 13	AMEB11.13
5	Why steel is more elastic than rubber?	By this definition, steel is more elastic than rubber because steel comes back to its original shape faster than rubber when the deforming forces are removed In physics a substance is labeled more elastic if it offers greater resistance to deformation than other bodies, so that it can be stretched less than others.	Understand	CO3	CLO 13	AMEB11.13
6	How do you calculate Young's modulus?	Young's modulus equation is $E = tensile stress/tensile strain = (FL) / (A * change in L), where F is the applied force, L is the initial length, A is the square area, and E is Young's modulus in Pascals (Pa). Using a graph, you can determine whether a material shows elasticity.$	Remember	CO4	CLO 14	AMEB11.14
7	What is the relationship between Poisson's ratio and Young's modulus?	Poisson's ratio(n) is related to elastic moduli K (also called B), the bulk modulus; G as the shear modulus; and E, Young's modulus, by the following (for isotropic solids, those for which properties	Understand	CO4	CLO 14	AMEB11.14

S.No	QUESTION	ANSWER	Blooms Level	со	CLO	CLO Code
		are independent of direction).				
		The elastic moduli are				
		measures of stiffness. They				
		are ratios of stress to strain				
0	T X7 1 11			004	01.0.14	
8	Is Young's modulus	Is Young's modulus for a material constant in all cases? It's a	Remember	CO4	CLO 14	AMEB11.14
	constant?	material property. It is not always				
		the same in all orientation of a				
		material. For the metals and				
		ceramics that are isotopic, in such				
		cases Young's modulus will				
		have constant value since their				
		mechanical properties are same in				
		all orientations.				
				004	CT 0 14	
9	What is the use of	modulus of elasticity in Mechanical	Remember	CO4	CLO 14	AMEB11.14
	modulus of	By definition a stiffer material has				
	clasticity?	a higher modulus of elasticity				
		The modulus of elasticity of a				
		material is a measure of its stiffness.				
		It is equal to the stress applied to it				
		divided by the				
		resulting elastic strain.				
10	What is the formula	Stress is denoted by σ . It is	Remember	CO4	CLO 15	AMEB11.15
	for stress?	represented as N/m2. Stress				
		formula is made use of to				
		body if force and area on which				
		force is exerted is given in the				
		problem.				lan.
		-				-
11	What is Young's	Young's modulus is the ratio of	Understand	CO4	CLO 15	AMEB11.15
	modulus units?	longitudinal stress and strain. Unit of			1.	
		Stress is N/m ² . Strain is a unit less			A	
		increment in length and original				
		length. Hence the unit of Young's			1	
		Modulus is the unit of stress.				
			-	5		
12	What is Young's		Understand	CO4	CLO 15	AMEB11.15
	modulus?	Young's Modulus. The Young's				
		Modulus of a material is a				
		fundamental property of every				
		The Young's modulus is the slope of				
		the initial section of the curve (i.e.				
		m in $v = mx + b$). When a material				
		reached a certain stress, the material				
		will begin to deform.				
13	What is the formula	The Poisson's Ratio for most of the	Remember	CO4	CLO 14	AMEB11.14
	101 POISSON TALLO?	The Poisson's Datio is between the				
		range f 0 to 0.5 for plastics				
		range i e to e.e for prastices.				
14	What is Poisson's	Poisson's ratio is defined as the	Understand	CO4	CLO 15	AMEB11.15
	ratio used for?	negative of the ratio of the lateral				

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		strain to the axial strain for a uniaxial stress state. If a tensile load is applied to a material, the material will elongate on the axis of the load				
15	How do you measure stiffness?	is the displacement produced by the force along the same degree of freedom (for instance, the change in length of a stretched spring) In the International System of Units, stiffness is typically measured in newtons per meter.	Understand	CO4	CLO 15	AMEB11.15
16	What is principal stress and plane?	Principal Stresses and Principal Planes. A stress is a perpendicular force acting on an object per unit area. In every object, there are three planes which are mutually perpendicular to each other. These will carry the direct stress only no shear stress.	Understand	CO4	CLO 16	AMEB11.16
17	What is principal plane in strength of material?	Principal plane may be defined as. " The plane on which normal stress attains its maximum and minimum value." So these planes are also called as major principal plane and minor principal plane. The shear stress on principal plane is zero.	Understand	CO4	CLO 16	AMEB11.16
18	What is principle stress?	Principal Stresses. 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	CO4	CLO 15	AMEB11.15
19	What is shear stress on principal plane is called?	These planes are called the principal planes. It will also be noted from the figure that the normal stresses acting on the planes of zero shear stress are either a maximum or minimum.	Understand	CO4	CLO 14	AMEB11.14
20	What are the 3 principal stresses?	These three principal stress can be found by solving the following cubic equation, This equation will give three roots, which will be the three principal stresses for the given three normal stresses (σx , σy and σz) and the three shear stresses (τxy , τyz and τzx).	Understand	CO4	CLO 14	AMEB11.14
21	Why are principal stresses important?	The fact that the coordinate transform equation properly reflects the force balance at different orientations is what makes it relevant. The principal stresses are	Remember	CO4	CLO 15	AMEB11.15

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		the corresponding normal stresses at an angle, θP , at which the shear stress, $\tau' xy \tau x y'$, is zero.				
22	Why do we use Mohr's circle?	Mohr's Circle. It is termed as the graphical form where transformation equations of plane stress can be signified. This representation is very useful since it allows you to imagine the normal and shear stress relationships acting on different inclined planes at a point in a stressed body.	Remember	CO4	CLO 15	AMEB11.15
23	Why shear stress is maximum at 45?	Why is the shear stress maximum at 45 degrees to the principal stress axes? At maximum shear stress the normal stress equals the mean stress Maximum Shear stress at 45 degrees only applies in a uniaxial tension	Understand	CO4	CLO 15	AMEB11.15
24	Where is shear stress maximum?	The maximum shear stress is located at the neutral axis. As the point moves further from the neutral axis, the value of the shear stress is reduced until it reaches zero at both extremes	Remember	CO4	CLO 14	AMEB11.14
25	What is a principal strain?	Principal Angle: The angle of orientation at which principal stresses occur for a specific point. Principal Strain: Maximum and minimum normal strain possible for a specific point on a structural element. Shear strain is 0 at the orientation where principal strain occurs	Understand	CO4	CLO 14	AMEB11.14
26	What does principal stress mean?	Principal stress is the maximum normal stress a body can have at its some point. It represents purely normal stress. If at some point principal stress is said to have acted it does not have any shear stress component.	Remember	CO4	CLO 14	AMEB11.14
27	What is angle of obliquity in Mohr's circle?	Any plane is to be under complex stress if it has a normal and shear dtress simultaneously The angle between resultant and normal stress is called angle of obliquity and is represented by alpha. A principal will have zero angle of obliquity	Remember	CO4	CLO 14	AMEB11.14
28	What is torsional stress?	Torsional shear stress or Torsional stress is the shear stress produced in the shaft due to the twisting. This twisting in the shaft is caused by the	Remember	CO4	CLO 15	AMEB11.15

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		couple acting on it.				
29	Can maximum principal stress be negative?	The "maximum shear failure theory" is an arithmetic average of the largest minus the smallest "principal stress" (tension producing principal stresses is positive and compression principal stresses are negative).	Understand	CO4	CLO 15	AMEB11.15
30	How many principal stresses are there?	There are two types of principal stresses; 2-D and 3-D. The equation of 2-D principal stress is calculated by the angle when shear stress is equal to zero. Here, the shear stress of point 2 relative to point 1 is and normal stresses are on x and y direction. There are two values of angle.	Understand	CO4	CLO 15	AMEB11.15
1	What is meant by	Shear force is the force in the beam	Remember	CO4	CLO 17	AMEB1117
1	shear force diagram?	acting perpendicular to its longitudinal (x) axis Shear force diagrams are simply plots of the shear force (on the y-axis) versus the position of various points along the beam (on the x- axis).	Kemember			
2	What is the definition	shear force. A force acting in a	Remember	CO4	CLO 17	AMEB11.17
	of shear force?	direction parallel to a surface or to a planar cross section of a body, as for example the pressure of air along the front of an airplane wing. Shear forces often result in shear strain. Resistance to such forces in a fluid is linked to its viscosity. Also called shearing force.			4710H	
3	What is shear force & bending moment?	Shear force is the internal force on a member when the force is not applied at the axis. Shearing force is the force divided by the cross-sectional area. Bending moment is the force trying to rotate the member. Moment is the perpendicular distance from the force to the axis multiplied by the force.	Remember	CO4	CLO 17	AMEB11.17
4	What is SFD and BMD?	BMD(Bending moment diagram) is a diagram representing the variation of bending moment along the length of member .SFD(shear force diagram) is diagram representing variation of shear force along the length of structural member	Remember	CO4	CLO 17	AMEB11.17

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
5	What is meant by shear force?	Shearing forces are unaligned forces pushing one part of a body in one specific direction, and another part of the body in the opposite direction William A. Nash defines shear force in terms of planes: "If a plane is passed through a body, a force acting along this plane is called a shear force or shearing force.	Remember	CO4	CLO 17	AMEB11.17
6	What are the three types of beams?	Simply Supported Beam, Fixed Beam, Cantilever Beam, Continuously Supported Beam are the different types of beams. In engineering, beams are of several types: Simply supported - a beam supported on the ends which are free to rotate and have no moment resistance.	Remember	CO4	CLO 17	AMEB11.17
7	What is an example of a shear force?	A shear force is a force applied perpendicular to a surface, in opposition to an offset force acting in the opposite direction When a structural member experiences failure by shear, two parts of it are pushed in different directions, for example, when a piece of paper is cut by scissors.	Understand	CO4	CLO 17	AMEB11.17
8	What is meant by shear force diagram?	Shear and bending moment diagrams are analytical tools used in conjunction with structural analysis to help perform structural design by determining the value of shear force and bending moment at a given point of a structural element such as a beam.	Remember	CO4	CLO 16	AMEB11.16
9	What is the use of SFD and BMD?	Shear and bending moment diagrams are analytical tools used in conjunction with structural analysis to help perform structural design by determining the value of shear force and bending moment at a given point of an element.	Remember	CO4	CLO 16	AMEB11.16
10	What is a load diagram?	The loading diagram is perfect for all of those teachers that wanted to see a free body diagram. The loading diagram is a visual representation of the loading on the beam being designed.	Remember	CO4	CLO 16	AMEB11.16
11	How do you test flexural strength?	Three-Point TestFlexuralStrength CalculationFmeansthemaximumforce	Remember	CO4	CLO 17	AMEB11.17

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		applied, L is the length of the sample, w is the width of the sample and d is the depth of the sample. So to calculate the flexural strength (σ), multiply the force by the length of the sample, and then multiply this by three				
12	Is a higher Young's modulus better?	But In engineering, elasticity (Young's Modulus) means how stiff a material is (i.e. how much it can resist plastic deformation). The more the value of young's modulus, more force is required to deform it. Hence a material with higher young's modulus is more elastic than a material with lower young's modulus.	Understand	CO4	CLO 17	AMEB11.17
13	What is UDL and UVL?	For solving the problems, total UDL can be converted into a point load, acting at center of UDL. Uniformly Varying Load (UVL) A UVL is one which is spread over the beam in such a manner that rate of loading varies from each point along the beam, in which load is zero at one end and increase uniformly to the other end.	Understand	CO4	CLO 16	AMEB11.16
14	What is UDL in engineering?	A uniformly distributed load (UDL) is a load that is distributed or spread across the whole region of an element such as a beam or slab. In other words, the magnitude of the load remains uniform throughout the whole element.	Understand	CO4	CLO 16	AMEB11.16
15	What is a simply supported beam?	In engineering, beams are of several types: 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 and restrained from rotation. Over hanging - a simple beam extending beyond its support on one end.	Understand	CO4	CLO 17	AMEB11.17
16	What does UDL stand for in engineering?	uniformly distributed load And, by the way UDL stands for uniformly distributed load, not uniform design load. Concentrated loads or variable loads do not contribute to UDL	Understand	CO4	CLO 17	AMEB11.17
17	What is mean by shear stress?	Shearing stress is a force that causes layers or parts to slide upon each other in opposite directions. An example of shearing stress is the	Understand	CO4	CLO 17	AMEB11.17

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		force of two connecting rocks rubbing in opposite directions.				
18	What is normal stress and shear 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. Looking again at figure one, it can be seen that both bending and shear stresses will develop. Like in bending stress, shear stress will vary across the cross sectional area.	Understand	CO4	CLO 17	AMEB11.17
19	How do you calculate shear stress?	The formula for more accurate shear stress, in this case, looks something like this: Where, S= shear stress, Q= the moment about the neutral axis of the area above the point you want to calculate the shear stress, I = moment of inertia, b = width of the desired section.	Remember	CO4	CLO 17	AMEB11.17
20	What the difference between direct stress and shear stress?	Direct stress is the stress developed due force applied which is parallel or collinear to the axis of the component. Examples for this type of stress are tensile stress, compressive stress, shear stress, thermal stress. If the stress is developed due to moment or torsion then it is called as indirect stress.	Remember	CO4	CLO 17	AMEB11.17
21	What is shear stress in beams?	When a beam is subjected to nonuniform bending, both bending moments, M, and shear forces, V, act on the cross section Shear stresses on one side of an element are accompanied by shear stresses of equal magnitude acting on perpendicular faces of an element.	Understand	CO4	CLO 16	AMEB11.16
22	What is direct stress?	Direct stress is the force per unit area on a body, where the area is perpendicular to the line of action of the force.	Remember	CO4	CLO 16	AMEB11.16
23	What is meant by flexural test?	The most common purpose of a flexure test is to measure flexural strength and flexural modulus. Flex ural strength is defined as the maximum stress at the outermost fiber on either the compression or tension side of the specimen. Flexural modulus is calculated from the slope of the stress vs. strain deflection curve	Remember	CO4	CLO 16	AMEB11.16

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
24	What is flexural failure?	Flexural strength also known as modulus of rupture, bend strength, or fracture strength, is a material property, defined as the stress in a material just before it yields in a flexure test There are many causes of flexural failure. The flexural failure is governed by concrete crushing after yielding of the steel.	Remember	CO4	CLO 17	AMEB11.17
		MODULE - V	1			
1	What do you mean by slope and deflection?	Deflection of a Beam : The deflection at any point on the axis of the beam is the distance between its position before and after loading. 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.	Remember	CO4	CLO 17	AMEB11.17
2	What is slope deflection equation?	Introduction. By forming slope deflection equations and applying joint and shear equilibrium conditions, the rotation angles (or the slope angles) are calculated. Substituting them back into the slope deflection equations, member end moments are readily determined. Deformation of member is due to the bending moment.	Understand	CO4	CLO 17	AMEB11.17
3	What are the causes of deflection?	Deflection is caused by many sources, such as loads, temperature, construction error, and settlements. It is important to include the calculation of deflections into the design procedure to prevent structural damage to secondary structures.	Understand	CO4	CLO 17	AMEB11.17
4	What is carryover moment?	The ratio of the carried- over moment at the other end to the fixed-end moment of the initial end is the carryover factor. While when a joint is released and begins to rotate under the unbalanced moment, resisting forces develop at each member framed together at the joint.	Understand	CO4	CLO 15	AMEB11.15
5	What is Moment analysis?	In statistics, the method of moments is a method of estimation of population parameters. It starts by expressing the population moments (i.e., the	Understand	CO4	CLO 17	AMEB11.17

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		expected values of powers of the random variable under consideration) as functions of the parameters of interest. Those expressions are then set equal to the sample moments.				
6	What is the moment of a function?	In mathematics, a moment is a specific quantitative measure of the shape of a function For a distribution of mass or probability on a bounded interval, the collection of all the moments (of all orders, from 0 to ∞) uniquely determines the distribution (Hausdorff moment problem).	Understand	CO4	CLO 15	AMEB11.15
7	What is second moment?	The 2nd moment of area, also known as the area moment of inertia, or second area moment, is a geometrical property of an area which reflects how its points are distributed with regard to an arbitrary axis.	Remember	CO4	CLO 16	AMEB11.16
8	Why are moments called moments?	Why is a moment called a moment? Archimedes used moment of force (torque) to describe his work with levers. Speculation: moment came to be associated with time from the small movement of the hands, from back when clocks were mechanical devices.	Remember	CO5	CLO 18	AMEB11.18
9	What is the difference between slope and deflection?	Slope is the angle formed by the tangent of the curve to the horizontal axis. Just like the slope of the line. While deflection is the translational movement of the beam from its original position Slope defines the direction in which the curvature of the deflection is heading	Understand	CO5	CLO 18	AMEB11.18
10	What is the deflection of beam?	Deflection of Beams The deformation of a beam is usually expressed in terms of its deflection from its original unloaded position. The deflection is measured from the original neutral surface of the beam to the neutral surface of the deformed beam.	Understand	CO4	CLO 17	AMEB11.17
11	What is slope deflection equation?	By forming slope deflection equations and applying joint and shear equilibrium conditions, the rotation angles (or the slope angles) are calculated. Substituting them back into the slope deflection	Understand	CO5	CLO 18	AMEB11.18

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		equations, member end moments are readily determined. Deformation of member is due to the bending moment.				
12	How do you calculate beam deflection?	Beam Deflection Equations Generally, deflection can be calculated by taking the double integral of the Bending Moment Equation, M(x) divided by EI (Young's Modulus x Moment of Inertia).	Understand	CO5	CLO 18	AMEB11.18
13	What is slope in strength of material?	The slope is defined as at any point on the bent beam is the angle measured in terms of radians to which the tangent at that point makes with the x axis	Understand	CO5	CLO 18	AMEB11.07
14	What is the unit of deflection?	The unit of deflection, or displacement, is a length unit and normally taken as mm (for metric) and in (for imperial). This number defines the distance in which the beam has deflected from the original position.	Understand	CO5	CLO 18	AMEB11.18
15	What is acceptable deflection in a beam?	Allowable deflection is generally expressed as a fraction of the span, in inches. All structural members will deflect or flex under load For example, the allowable deflection of a 12ft span floor joist with plaster (L/360) is 0.4" (12ft divided by 360).	Understand	CO5	CLO 17	AMEB11.17
16	What is shear force definition?	shear force. A force acting in a direction parallel to a surface or to a planar cross section of a body, as for example the pressure of air along the front of an airplane wing. Shear forces often result in shear strain. Resistance to such forces in a fluid is linked to its viscosity. Also called shearing force.	Understand	CO4	CLO 17	AMEB11.17
17	What is excessive deflection?	Serviceability failures of concrete structures involving excessive cracking and/or excessive deflection are relatively common. Numerous cases have been reported, in Australia and elsewhere, of structures that complied with code requirements but still deflected or cracked excessively.	Understand	CO4	CLO 15	AMEB11.15
18	What is the maximum deflection allowed on a beam?	Deflection limits. This means that to calculate the deflection in a beam which spans 6,000 mm,	Understand	CO4	CLO 17	AMEB11.17

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		divide 6,000 by 300. So a span of 6,000 mm has a maximum allowable deflection of 20 mm.				
19	What kind of force is shear?	Shearing forces are unaligned forces pushing one part of a body in one specific direction, and another part of the body in the opposite direction. When the forces are aligned into each other, they are called compression forces.	Understand	CO4	CLO 15	AMEB11.15
20	What is live load and dead load?	Live Loads. Live loads refer to the dynamic forces from occupancy and intended use. They represent the transient forces that can be moved through the building or act on any particular structural element The total dead plus live loads equal the "gravity load" of the structure.	Remember	CO4	CLO 16	AMEB11.16
21	What is shear damage?	Wounds such as pressure ulcers, also called bed sores, are caused by both friction and shear forces. Friction will damage the superficial tissue such as the skin, while shearing forces will damage the underlying tissue such as the fat and muscle.	Remember	CO5	CLO 18	AMEB11.18
22	What does Shear mean in medical terms?	A shear force or shear stress can be defined as, 'Unaligned forces pushing one part of a body in one direction, and another part of the body in the opposite direction'(1) . Shear forces can lead to shear strain, which is the deformation of a cell	Understand	CO5	CLO 19	AMEB11.19
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