



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

CIVIL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	STRUCTURAL ANALYSIS
Course Code	:	ACE008
Program	:	B. Tech
Semester	:	V
Branch	:	Civil Engineering
Section	:	A & B
Academic Year	:	2019 - 2020
Course Faculty	:	Mr. Suraj Baraik, Assistant Professor Mr. S Ashok Kumar, Assistant Professor

COURSE OBJECTIVES:

The course should enable the students to:	
I	Describe the process of analysis of various structures such as beams, trusses, arches and frames.
II	Analyze statically determinate structures using force and displacement methods.
III	Draw the shear force, bending moment and influence diagrams for various structures.
IV	Examine the various structures to calculate critical stresses and deformation.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
MODULE-I						
1	Define trusses	A Truss is a structure composed of slender members (two-force members) joined together at their end points. Joints are modeled by smooth pin connections.	Understand	CO 1	CLO 1	ACE008.01
2	What are the different types of roof trusses?	Different types of roof trusses are <ul style="list-style-type: none">• King Post Truss.• Pratt Truss.• Queen Post Truss.• Howe Truss.• Fan Truss.• Quadrangular Roof Trusses.• Parallel Chord Roof Trusses.	Remember	CO 1	CLO 1	ACE008.01
3	What is the purpose of a truss?	The purpose of a truss is to distribute the load through all the members.	Remember	CO 1	CLO 2	ACE008.02
4	What is a truss chord?	Chords The outer members of a truss that define the envelope or shape.	Remember	CO 1	CLO 1	ACE008.01

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5	What is a truss element?	The truss transmits axial force only and, in general, is a three degree-of-freedom (DOF) element	Remember	CO 1	CLO 1	ACE008.01
6	What is a simple truss?	A Truss is a structure composed of slender members (two-force members) joined together at their end points. Joints are modeled by smooth pin connections.	Remember	CO 1	CLO 1	ACE008.01
7	What is flat truss?	A flat truss is the wood structure that forms a triangular roof: cross beams, collar beams, ceiling posts, posts, etc. Trusses and flat trusses connected by purlins form the roof structure.	Remember	CO 1	CLO 1	ACE008.01
8	What is the difference between a truss and a beam?	Trusses are used only when it is intended to transfer the loads through axially loaded elements (No bending takes place)	Remember	CO 1	CLO 1	ACE008.01
9	What is the bottom chord of a truss?	The bottom chord is the bottom horizontal or inclined member of a truss.	Remember	CO 1	CLO 1	ACE008.01
10	Define scissors truss	The bottom chord is also called a scissors truss. The bottom chord establishes the lower edge of a truss.	Remember	CO 1	CLO 1	ACE008.01
11	What is section method?	The method of sections consists of passing an imaginary line through the truss, cutting it into sections.	Remember	CO 1	CLO 4	ACE008.04
12	What is method of joint?	The method of joints is a way to find unknown forces in a truss structure. The principle behind this method is that all forces acting on a joint must add to zero.	Remember	CO 1	CLO 4	ACE008.04
13	Define is complex truss.	Compound trusses are commonly used to support loads over long spans as in bridges. Complex Truss: A complex truss uses a general layout of members different from that used in simple and compound trusses.	Understand	CO 1	CLO 1	ACE008.01
14	What is a clear span truss?	Clear span metal buildings don't require a truss and cord system, and boast an "A" frame design.	Remember	CO 1	CLO 2	ACE008.02
15	What is a parallel chord truss?	In a parallel chord truss, the top and bottom chords of the truss follow the same slope.	Remember	CO 1	CLO 1	ACE008.01
MODULE-II						
1	Define Arch.	An arch is a vertical curved structure that spans an elevated space and may or may not support the weight above it	Remember	CO 2	CLO 7	ACE008.07

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2	What is a hinged arch?	A Hinged arch can be defined as a humped or curved beam subjected to transverse and other loads as well as the horizontal thrust at the supports.	Remember	CO 2	CLO 7	ACE008.07
3	What is the degree of indeterminacy of a two hinged arch?	The degree of indeterminate to 2 degrees. It consists of two pin supports at both of its ends.	Understand	CO 2	CLO 9	ACE008.09
4	What is normal thrust?	Normal thrust and radial shear in an arch. Total force acting along the normal is called normal thrust and total force acting, along the radial direction is called radial shear.	Understand	CO 2	CLO 9	ACE008.09
5	Define radial Shear	Total force acting along the normal in case of arch is called normal thrust and total force acting, along the radial direction is called radial shear.	Understand	CO 2	CLO 9	ACE008.09
6	What is three hinged arches?	Three-hinged arches are statically determinate; hence, horizontal displacement of the abutments does not produce any additional stresses on the structural system.	Remember	CO 2	CLO 9	ACE008.09
7	What is two hinged arch?	Two-hinged arch is the statically indeterminate structure to degree one.	Remember	CO 2	CLO 7	ACE008.07
8	What is fixed Arch?	Fixed arches restrict the horizontal, vertical or rotational movement at its two ends, so a fixed arch is an indeterminate structure.	Remember	CO 2	CLO 7	ACE008.07
9	Where the fixed arches can be used?	Fixed arches are used as bridge arches or as tunnel roofs, where the span is short.	Remember	CO 2	CLO 7	ACE008.07
10	What is the purpose of Arches?	Its purpose is to support or strengthen a building. Most arches consist of wedge-shaped blocks. The top center stone, called the keystone, is the last block to be inserted.	Remember	CO 2	CLO 7	ACE008.07
11	What material are generally used in making an arch?	An arch is a curved structure that is usually made of stone, brick, concrete, or, more recently, steel.	Remember	CO 2	CLO 7	ACE008.07
12	What is theoretical Arch?	An arch is a vertical curved structure that spans an elevated space and may or may not support the weight above it, or in case of a horizontal arch like an arch dam, the hydrostatic pressure against it.	Remember	CO 2	CLO 7	ACE008.07
13	What is a rolling load?	Rolling loads are those loads which roll over the given structural element from one end to the another.	Remember	CO 2	CLO 7	ACE008.07

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14	Why is an arch stronger?	The natural curve of the arch and its ability to dissipate the force outward greatly reduces the effects of tension on the underside of the arch	Remember	CO 2	CLO 7	ACE008.07
15	What is linear arch?	Eddy's theorem states that the bending moment at any section of an arch is equal to the vertical intercept between the linear arch and the center line of the actual arch.	Remember	CO 2	CLO 7	ACE008.07

MODULE-III

1	What is propped beam?	A cantilever beam for which one end is fixed and other is provided support, in order to resist the deflection of the beam, is called a propped cantilever beam.	Understand	CO 3	CLO 13	ACE008.13
2	What is overhanging 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.	Remember	CO 3	CLO 13	ACE008.13
3	What is meant by fixed beam?	If a beam is inflexible at both ends in order that the slope at the ends becomes zero, it is known as fixed beam.	Remember	CO 3	CLO 13	ACE008.13
4	Define built-in beam?	If a beam is inflexible at both ends in order that the slope at the ends become zero.	Remember	CO 3	CLO 13	ACE008.13
5	What is the advantages of fixed beam?	The advantages are that you reduce the sagging moment in the beam thus also reducing the deflection.	Remember	CO 3	CLO 13	ACE008.13
6	What are the disadvantages of fixed beam?	The disadvantages are that moment are causing at the top over supports thus need some reinforcing in the top of the beam.	Understand	CO 3	CLO 13	ACE008.13
7	What is a continuous beam?	A continuous beam is a statically indeterminate multispan beam on hinged support. The end spans may be cantilever, may be freely supported or fixed supported	Remember	CO 3	CLO 15	ACE008.15
8	What is end span beam?	A span that is a slab or a continuous beam at its interior support.	Understand	CO 3	CLO 13	ACE008.13
9	What is a simple beam?	A simply supported beam is a type of beam that has pinned support at one end and roller support at the other end.	Remember	CO 3	CLO 13	ACE008.13
10	Is cantilever beam statically indeterminate?	A structure is usually externally indeterminate or redundant if the reactions at the supports cannot be determined by using three equations of equilibrium,	Remember	CO 3	CLO 13	ACE008.13

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11	Is fixed beam statically indeterminate?	The fixed end moments are reaction moments developed in a beam member under certain load conditions with both ends fixed. A beam with both ends fixed is statically indeterminate to the 3rd degree, and any structural analysis method applicable on statically indeterminate beams	Understand	CO 3	CLO 13	ACE008.13
12	How many types of beams are there?	The four different types of beams are: Simply Supported Beam. Fixed Beam. Cantilever Beam.	Remember	CO 3	CLO 13	ACE008.13
13	What is meant by sinking of support?	Sinking of support means the support of the beams are at different levels.	Remember	CO 3	CLO 15	ACE008.15
14	What is the advantages of continuous beam?	A continuous beam has lesser maximum positive bending moment than a simply supported beam.	Remember	CO 3	CLO 15	ACE008.15
15	Define effective span for a beam?	The distance between the centers of support, or the clear distance between supports plus the effective depth of the beam or slab, the lesser value being taken.	Remember	CO 3	CLO 13	ACE008.13

MODULE-IV

1	What is statistically determinate beam?	In regards to beams, if the reaction forces can be calculated using equilibrium equations alone, they are statically determinate.	Understand	CO 4	CLO 16	ACE008.17
2	What do you mean by a statically indeterminate system?	Statically indeterminate structures indicate that there's at least one more unknown reaction force than there are equations of equilibrium, meaning that the sum of forces and moments in each direction is equal to zero.	Remember	CO 4	CLO 16	ACE008.18
3	What is a determinate truss?	A truss is considered statically determinate if all of its support reactions and member forces can be calculated using only the equations of static equilibrium.	Understand	CO 4	CLO 16	ACE008.17
4	What is indeterminacy degree?	Degree of static indeterminacy = Total number of unknown (external and internal) forces. - Number of independent equations of equilibrium.	Remember	CO 4	CLO 16	ACE008.17
5	What is static indeterminacy?	In statics, a structure is statically indeterminate (or hyperstatic) when the static equilibrium equations are insufficient for determining the internal forces and reactions on that structure.	Remember	CO 4	CLO 16	ACE008.17

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6	What is moment distribution method?	The moment distribution method is a structural analysis method for statically indeterminate beams and frames developed by Hardy Cross.	Remember	CO 4	CLO 16	ACE008.17
7	What is the use of moment distribution method?	Moment distribution method offers a convenient way to analyse statically indeterminate beams and rigid frames.	Understand	CO 4	CLO 16	ACE008.18
8	Why ever joint has to be analysed in moment distribution method?	In the moment distribution method, every joint of the structure to be analysed is fixed so as to develop the fixed-end moments.	Remember	CO 4	CLO 16	ACE008.18
9	What is carry over in moment distribution method?	Carry over moment is the same nature of the applied moment.	Remember	CO 4	CLO 16	ACE008.18
10	How carry over moment is distributed?	A moment applied at the hinged end B “carries over” to the fixed end A, a moment equal to half the amount of applied moment and of the same rotational sense.	Remember	CO 4	CLO 17	ACE008.17
11	What is beam end release?	An end release will allow either or both ends of a beam element to rotate about or translate along one or more of the local axes of the beam.	Remember	CO 4	CLO 16	ACE008.18
12	Why slope deflection method is called as displacement method?	Slope-deflection equations are obtained by expressing moment at the end of a member as the superposition of end moment due to external loads on the member assuming ends are restrained and end moments caused by the actual end displacements and rotations.	Understand	CO 4	CLO 17	ACE008.17
13	What are the assumption made in slope deflection method?	All the joints of the frame are rigid distortion, due to axial and shear stresses, being very small, are neglected.	Remember	CO 4	CLO 17	ACE008.17
14	What is stiffness factor?	Stiffness factor is the ratio of moment of inertia of cross section of beam or wire to it's length. Stiffness factor is the measure of “resistance to bending”	Remember	CO 4	CLO 16	ACE008.17
15	What is sway correction?	Sway correction is defined as the removal of lateral movement in the beams or frames by correction factor is multiplied by corresponding sway moment.	Remember	CO 4	CLO 17	ACE008.18

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MODULE-V						
1	What is influence line in structural analysis?	An influence line for a given function, such as a reaction, axial force, shear force, or bending moment, is a graph that shows the variation of that function at any given point on a structure due to the application of a unit load at any point on the structure.	Remember	CO 5	CLO 19	ACE008.21
2	What is the significance of influence line diagram?	It shows the variation in the function when unit load is applied at any point on the structure.	Remember	CO 5	CLO20	ACE008.21
3	What is a rolling load?	Rolling loads are those loads which roll over the given structural element from one end to another.	Remember	CO 5	CLO 19	ACE008.23
4	What are the uses of influence line?	Influence lines are very useful in the quick determination of reactions, shear force, bending moment or similar functions at a given section under any given system of moving loads.	Remember	CO 5	CLO20	ACE008.21
5	What is bending moment 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.	Understand	CO 5	CLO 19	ACE008.21
6	What does the influence line for bending moment indicate?	The influence line shows the value of bending moment at a point in a structure as a given point load moves across the structure.	Understand	CO 5	CLO20	ACE008.23
7	What is ILD in structural analysis?	An influence line for any given point or section of structure is a curve whose ordinates represent to scale the variation of a function such as shear force, bending moment, deflection.	Understand	CO 5	CLO20	ACE008.21
8	What is absolute maximum bending moment?	The indeterminacy of a structure that is expressed in terms of its degrees of freedom is known as the kinematic indeterminacy.	Understand	CO 5	CLO 19	ACE008.21
9	What is the difference between static and kinetic energy?	The main difference between static and kinetic friction is that static friction acts while the surfaces are at rest while kinetic friction acts when there is relative motion between the surfaces.	Understand	CO 5	CLO 19	ACE008.21
10	What is compatibility equation?	Compatibility equation is used when solving indeterminate members	Remember	CO 5	CLO 19	ACE008.21

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11	What is Determinacy of a structure?	Statically determinacy is a term used in structural mechanics to describe a structure where force and moment equilibrium conditions alone can be utilized to calculate internal member actions.	Remember	CO 5	CLO 19	ACE008.23
12	What is strain displacement?	Strain is a measure of deformation representing the displacement between particles in the body relative to a reference length.	Remember	CO 5	CLO 19	ACE008.23
13	What is an overhanging beam?	It is a beam when a cantilever portion is hanging out of a simply supported beam.	Remember	CO 5	CLO 19	ACE008.21
14	What is point of Contra-flexure?	In a bending moment diagram, it is the point at which the bending moment curve intersects with the zero line.	Remember	CO 5	CLO 19	ACE008.21
15	What is internal static indeterminacy?	It refers to the geometric stability of the structure.	Remember	CO 5	CLO 19	ACE008.21

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