INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MECHANICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Title	**ENGINEERING MECHANICS**				
Course Code	AMEB03				
Program	B.Tech				
Semester	III	ME			
Course Type	Foundation				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	-	-
Chief Coordinator	Dr. Ch. Sandeep, Associate Professor				
Course Faculty	Dr. Ch. Sandeep, Associate Professor Mrs. V. Prasanna, Assistant Professor				

COURSE OBJECTIVES:

The course should enable the students to:	
I	Students should develop the ability to work comfortably with basic engineering mechanics concepts required for analyzing static structure.
II	Identify an appropriate structural system to studying a given problem and isolate it from its environment, model the problem using good free-body diagram and accurate equilibrium equations.
III	Understand the meaning of centre of gravity (mass)/ centroid and moment of Inertia using integration methods and method of moments.
IV	To solve the problem of equilibrium by using the principle of work and energy, impulse momentum and vibrations for preparing the students for higher level courses such as Mechanics of solids, Mechanics of Fluids, Mechanical Design and Structural Analysis etc.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
MODULE-I						
1	What is mechanics?	It is the branch of physics which deals with the study of effect of force system acting on a particle or a rigid body which may be at rest or in motion.	Understand	CO 1	CLO1	AMEB03.01
2	What is statics?	Statics deals with the forces acting on the stationary bodies that means at equilibrium.	Remember	CO 1	CLO1	AMEB03.01

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
3	What is dynamics?	Dynamics is the study of forces on moving bodies. Application of forces when they are in motion.	Remember	CO 1	CLO2	AMEB03.01
4	Define kinematics?	Kinematics is the study of the geometry of motion. It is used to relate displacement, velocity, acceleration and time, without reference to the cause of the motion.	Remember	CO 1	CLO1	AMEB03.02
5	Define kinetics?	Kinetics is the branch of classical mechanics that is concerned with the relationship between motion and its causes, specifically, forces and torques.	Remember	CO 1	CLO1	AMEB03.01
6	Explain the term rigid body?	A body is said to be rigid, if the relative position of any two particles do not change under the action of force.	Remember	CO 1	CLO1	AMEB03.02
7	State Newton's Ist law.	Newton's First Law states that an object will remain at rest or in uniform motion in a straight line unless acted upon by an external force.	Remember	CO 1	CLO1	AMEB03.02
8	State Newton's IInd law.	The second law states that the rate of change of momentum of a body is directly proportional to the force applied, and this change in momentum takes place in the direction of the applied force.	Remember	CO 1	CLO2	AMEB03.03
9	State Newton's IIInd law.	The third law states that, for every action, there is an equal and opposite reaction.	Remember	CO 1	CLO2	AMEB03.02
10	Explain law of transmissibilit	It states that the state of rest or motion of a rigid body is unaltered if a force acting on the body is replaced by another force of the same magnitude and direction but acting anywhere on the body in the line of action of the replaced force.	Remember	CO 1	CLO3	AMEB03.02
11	Explain Newton's law of gravitation?	Newton's law of universal gravitation states that every particle attracts every other particle in the universe with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers.	Remember	CO 1	CLO2	AMEB03.03
12	What is a force system?	When several forces acts simultaneous on a body they constitutes a system of force system	Remember	CO 1	CLO1	AMEB03.03
13	Define particle?	It is matter having considerable mass but negligible dimension.	Understand	CO 1	CLO1	AMEB03.03
14	Explain the term rigid	A body is said to be rigid, if the relative position of any two	Remember	CO 1	CLO2	AMEB03.03

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	body?	particles do not change under the action of force.				
15	What is composition of forces?	The replacement of two or more forces by a single force having the same effect.	Remember	CO 1	CLO1	AMEB03.03
16	What is resolution of force?	The process of breaking the force into no of component which are equivalent to the given force.	Remember	CO 1	CLO4	AMEB03.04
17	Explain moment of force?	It is a turning effect produced by a force on a body, on which it acts. The moment of force is equal to the product of the force and the perpendicular distance.	Understand	CO 1	CLO4	AMEB03.01
18	Define couple?	The two non collinear parallel forces of equal magnitude and in opposite direction forms a couple.	Remember	CO 1	CLO4	AMEB03.01
19	What is moment of couple?	The magnitude of the rotation is known as moment of couple. It is a product of common magnitude of the two forces and of the perpendicular distance between the lines of action.	Understand	CO 1	CLO1	AMEB03.01
20	Define concurrent force system?	In a concurrent force system, the line of action of all forces in a system passes through a single point.	Remember	CO 1	CLO1	AMEB03.01
21	Define collinear force system?	If the line of action of all the forces lies along a single line then it called collinear force system.	Understand	CO 1	CLO1	AMEB03.01
22	State Varginon's theorem?	Varginon's theorem states that algebraic sum of the moment of all the forces about any point is equal to the moment of their resultant force about the same point.	Remember	CO 1	CLO1	AMEB03.01
23	Define equilibrium?	If the resultant of a number of forces, acting on a body is zero, then that body is said to be in equilibrium.	Understand	CO 1	CLO1	AMEB03.01
24	What is free body diagram?	If a body is isolated from the all the contact surfaces and considering the reaction at contact surface which is perpendicular to the surface.	Remember	CO 1	CLO2	AMEB03.01
25	State Lamis theorem?	Lamis theorem states that, if anybody is in equilibrium under the action of only three coplanar concurrent forces then each force is directly proportional to the sine of the angle between the other two forces.	Remember	CO 1	CLO2	AMEB03.01
MODULE-II						
1	What is friction?	When two bodies are in contact, and an effort to move	Remember	CO 1	CLO 6	AMEB03.06

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		one body over the other is resisted. This resistance to motion is called friction.				
2	Define coefficient of friction?	A coefficient of friction is a value that shows the relationship between the force of friction between two objects and the normal reaction between the objects that are involved.	Remember	CO 1	CLO 6	AMEB03.06
3	What is dry friction?	The friction that exists between perfectly cleaned and dry solid surfaces is called dry friction.	Understand	CO 2	CLO 6	AMEB03.07
4	What is fluid friction?	The Thick layer of oil lubricant is introduced between two surfaces, the friction between surfaces are separated by a film of lubricant is called fluid friction.	Understand	CO 2	CLO 6	AMEB03.06
5	Define Non-viscous friction?	The thin layer of lubricant is allowed to prevent the direct contact between surfaces and reduces the friction. The friction that exists between the surfaces is called non- viscous friction.	Understand	CO 2	CLO 6	AMEB03.06
6	What is limiting friction?	The maximum friction that can be generated between two static surfaces in contact with each other is called limiting friction.	Remember	CO 2	CLO 6	AMEB03.05
7	Define angle of friction?	It is the angle of a plane to the horizontal when a body placed on the plane will just start to slide.	Remember	CO 2	CLO 6	AMEB03.05
8	What is angle of repose?	Angle of repose is defined as the minimum angle of an inclined plane which causes an object to slide down the plane.	Remember	CO 2	CLO 6	AMEB03.05
9	What is a beam?	It is a structural element that primarily resists loads applied transverse to the beam's axis.	Remember	CO 2	CLO 6	AMEB03.06
10	What do you understand static friction?	In static friction the force applied to the body is not sufficient to move the body, and then the friction acting on the body is called static friction.	Remember	CO 2	CLO 7	AMEB03.06
11	Describe kinetic friction?	The friction acting on a body which is actually in motion is called kinetic friction	Remember	CO 2	CLO 7	AMEB03.06
12	What is truss?	A structural that is made of straight slender bars that are joined together at their ends by frictionless pins to form a pattern of triangle is called truss.	Remember	CO 2	CLO 7	AMEB03.07
13	List different types of beams?	Cantilever, simple supported, over hanged, continuous, and fixed.	Remember	CO 2	CLO 7	AMEB03.07
14	What is dry friction?	The friction that exists between perfectly cleaned and dry solid	Remember	CO 2	CLO 7	AMEB03.08

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		surfaces is called dry friction.				
MODULE-III						
1	What is meant by center of gravity?	Centre of gravity is a point where the whole weight of the body is assumed to concentrate.	Understand	CO 3	CLO7	AMEB03.07
2	Define centroid?	It is a point where the whole area of a plane is supposed to concentrate.	Remember	CO 3	CLO7	AMEB03.07
3	State parallel axis theorem?	Parallel axis theorem states that the MI of a plane area with respect to any reference axis in its plane is equal to the sum of MI with respect to a parallel centroid axis and product of the total area and the square of the distance between the two axes.	Remember	CO 3	CLO7	AMEB03.07
4	State perpendicular axis theorem?	Perpendicular axis theorem states that the moment of inertia of an area with respect to an axis perpendicular to that x-y plane and passing through the origin will be equal to the sum of moment of inertia of the same area about x-x, y-y axis.	Remember	CO 3	CLO7	AMEB03.07
5	What is radius of gyration?	Radius of gyration is defined as the distance from the axis of rotation to a point where the total mass of the body is supposed to be concentrated, so that the moment of inertia about the axis may remain the same.	Remember	CO 3	CLO7	AMEB03.07
6	Define the term moment of inertia?	It is the product of area and the square of its moment arm about a reference axis is called moment of inertia.	Understand	CO 3	CLO7	AMEB03.07
7	Define mass moment of inertia?	It is the product of mass and the square of its moment arm about a reference axis is called mass moment of inertia.	Remember	CO 3	CLO7	AMEB03.07
8	State Pappus-Guldinus theorem for area?	The area of surface generated by revolving a plane curve about non-intersecting axis in the plane of the curve is equal to the length of the generating curve times the distance travelled by the centroid of the curve in the revolution and angle of rotation.	Understand	CO 3	CLO7	AMEB03.07
9	State Pappus-Guldinus theorem for volume?	The volume of a solid generated by revolving a plane area about a non-intersecting axis in the plane is equal to the area of the generating plane times the distance travelled by the centroid of the plane area and its rotation.	Remember	CO 3	CLO7	AMEB03.07

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
10	Explain polar moment of inertia?	Moment of inertia about an axis perpendicular to the plane of an area is known as polar moment of inertia.	Remember	CO 3	CLO7	AMEB03.07
11	What is the concept of virtual work?	Virtual work is the total work done by the applied forces and the inertial forces of a mechanical system as it moves through a set of virtual displacements. When considering forces applied to a body in static equilibrium, the principle of least action requires the virtual work of these forces to be zero.	Remember	CO 3	CLO8	AMEB03.08
12	Define degree of freedom?	It is defined as the minimum number of independent variables required to define the position or motion of a system is known as degree of freedom.	Remember	CO 3	CLO8	AMEB03.08
13	Define the term moment of inertia?	It is the product of area and the square of its moment arm about a reference axis is called moment of inertia.	Remember	CO 3	CLO8	AMEB03.08
14	What is meant by work done?	The work done by a force on a moving body is defined as the product of the force and the distance moved in the direction of the force.	Remember	CO 3	CLO8	AMEB03.08
15	Define kinetic energy?	The kinetic energy of an object is the energy that it possesses due to its motion. It is defined as the work needed to accelerate a body of a given mass from rest to its stated velocity.	Remember	CO 3	CLO8	AMEB03.08
MODULE-IV						
1	What is motion?	The continuous change in position of a body with respect to time and relative to the reference point or observer is called motion.	Remember	CO 4	CLO9	AMEB03.09
2	Define kinetics?	Kinetics is the branch of classical mechanics that is concerned with the relationship between motion and its causes, specifically, forces and torques.	Remember	CO 4	CLO9	AMEB03.09
3	Define translation?	If a straight line drawn on the moving body remains parallel to its original then such motion is called translation.	Remember	CO 4	CLO9	AMEB03.09
4	Explain the term rectilinear motion?	If the path followed by a point is a straight line then such motion is called rectilinear motion.	Remember	CO 4	CLO9	AMEB03.09
5	Define curvilinear motion?	If the path followed by appoint is a curve then such motion is called a curvilinear motion.	Remember	CO 4	CLO9	AMEB03.09

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
6	Define term plane motion?	Plain motion is combination of both translation and rotation.	Remember	CO 4	CLO9	AMEB03.09
7	What do you mean by a position?	Position means the location of a particle with respect to origin.	Remember	CO 4	CLO9	AMEB03.09
8	What is projectile motion?	If a particle is freely thrown in air along any direction, other than vertical it will follow a curves path which is parabolic in nature. This motion is a called projectile.	Remember	CO 4	CLO9	AMEB03.09
9	What is meant by speed?	The rate of change of distance with respect to time is called speed.	Remember	CO 4	CLO9	AMEB03.09
10	Define trajectory?	The path traced by a projectile is called trajectory.	Remember	CO 4	CLO9	AMEB03.09
11	Define time of flight?	The time taken by projectile to move from point of projection to point of target is called time of flight.	Remember	CO 4	CLO9	AMEB03.09
12	What is a maximum height?	When projectile reaches to the max height where vertical component of velocity is zero	Remember	CO 4	CLO9	AMEB03.09
13	What is a range?	It is a horizontal distance from point of projection to point of target is called a range.	Remember	CO 4	CLO9	AMEB03.09
14	Explain the term rigid body?	A body is said to be rigid, if the relative position of any two particles do not change under the action of force.	Remember	CO 4	CLO14	AMEB03.14
15	Define the term angular velocity?	It defines the rate of change of angular position with respect to time.	Remember	CO 4	CLO14	AMEB03.14
MODULE-V						
1	Explain the Vibration?	If the body is given a small displacement from the position, a force comes into play which tries to bring the body back to the equilibrium point, giving rise to oscillations or vibrations	Remember	CO 5	CLO15	AMEB03.15
2	What is Simple harmonic motion?	Oscillatory motion under a retarding force proportional to the amount of displacement from an equilibrium position is called simple harmonic motion.	Remember	CO 5	CLO15	AMEB03.15
3	Describe longitudinal waves.	Longitudinal waves are waves in which the displacement of the medium is parallel to the direction of propagation of the wave.	Remember	CO 5	CLO15	AMEB03.15
4	What is Damped Vibration?	The oscillatory motion in which the amplitude decreases continuously with the passage of time is known as damped oscillation.	Remember	CO 5	CLO15	AMEB03.15
5	What are “Forced (or)	All free oscillations eventually die out because of the ever	Understand	CO 5	CLO15	AMEB03.15

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	driven Vibration	present damping forces. However, an external agency can maintain these oscillations. These are called forced or driven oscillations				
6	Define the term degree of freedom?	It is defined as the minimum number of independent variables required to define the position or motion of a system is known as degree of freedom.	Understand	CO 5	CLO15	AMEB03.15
7	Explain term about "Resonance"	When the driving frequency is equal to the natural frequency the oscillations can be large - this is called resonance	Understand	CO 5	CLO16	AMEB03.15
8	Recall wavelength.	A wavelength is a measure of distance between two identical peaks or crests.	Understand	CO 5	CLO15	AMEB03.15
9	Define frequency	Frequency is the number of occurrences of a repeating event per unit time.	Understand	CO 5	CLO15	AMEB03.15
10	Define pendulum?	A pendulum is a weight suspended from a pivot so that it can swing freely. When a pendulum is displaced sideways from its resting, equilibrium position, it is subject to a restoring force due to gravity that will accelerate it back toward the equilibrium position.	Understand	CO 5	CLO16	AMEB03.15
11	Define amplitude.	The maximum extent of a vibration or oscillation, measured from the position of equilibrium.	Remember	CO 5	CLO15	AMEB03.15
12	Define time period for simple pendulum?	It the time needed for one complete cycle of vibration to pass in a given point.	Remember	CO 5	CLO15	AMEB03.15
13	What is meant by torsional pendulum?	A torsion pendulum is a mass suspended on a string that rotates periodically. When the mass of a torsion pendulum is rotated from its equilibrium position, the fiber resists the rotation and provides a restoring force that causes the mass to rotate back to its original equilibrium position.	Remember	CO 5	CLO17	AMEB03.16
14	What is meant by compound pendulum?	Any swinging rigid body free to rotate about a fixed horizontal axis is called a compound pendulum.	Remember	CO 5	CLO16	AMEB03.16
15	Explain about under-damped Systems.	An under-damped system yields an exponentially decreasing sinusoidal output in response to a step input.	Remember	CO 5	CLO18	AMEB03.17

Signature of the Faculty **HOD, ME**