INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

AERONAUTICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	**ENGINEERING MECHANICS**
Course Code	:	**AMEB03**
Program	:	**B.Tech**
Semester	:	**II**
Branch	:	**Aeronautical Engineering**
Section	:	**A & B**
Academic Year	:	**2019 – 2020**
Course Faculty	:	**Mr. G.Venkateswarlu, Assistant Professor, AERO**

OBJECTIVES:

I	Students should develop the ability to work comfortably with basic engineering mechanics concepts required for analyzing static structures.
II	Identify an appropriate structural system to studying a given problem and isolate it from its environment, model the problem using good free-body diagrams 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
	UNIT-I INTRODUCTION TO ENGINEERING MECHANICS					
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.	Remember	CO 1	CLO1	CAAEB01.01
2	What is statics?	Statics deals with the forces acting on the stationary bodies that means at equilibrium.	Remember	CO 1	CLO1	CAAEB01.01
3	What is dynamics?	Dynamics is the study of forces on moving bodies. Application of forces when they are in motion.	Remember	CO 1	CLO1	CAAEB01.01
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	Remember	CO 1	CLO1	CAAEB01.01

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		motion.				
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	CAAEB01.01
6	Explain the term momentum?	The product of mass and velocity is called momentum and it is denoted by M. Mathematically M=mv	Understand	CO 1	CLO1	CAAEB01.01
7	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.	Understand	CO 1	CLO1	CAAEB01.01
8	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	CAAEB01.01
9	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	CLO1	CAAEB01.01
10	State Newton's IIInd law.	The third law states that, for every action, there is an equal and opposite reaction.	Remember	CO 1	CLO1	CAAEB01.01
11	Explain law of transmissibility?	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.	Understand	CO 1	CLO1	CAAEB01.01
12	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.	Understand	CO 1	CLO1	CAAEB01.01
13	What is a force system?	When several forces acts simultaneous on a body they constitutes a system of force system	Remember	CO 1	CLO1	CAAEB01.01
14	Define particle?	It is matter having considerable mass but negligible dimension.	Remember	CO 1	CLO1	CAAEB01.01
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	CAAEB01.01

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16	What is resolution of force?	The process of breaking the force into no of component which are equivalent to the given force.	Understand	CO 1	CLO1	CAAEB01.01
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	CLO1	CAAEB01.01
18	Define couple?	The two non collinear parallel forces of equal magnitude and in opposite direction forms a couple.	Remember	CO 1	CLO1	CAAEB01.01
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.	Remember	CO 1	CLO1	CAAEB01.01
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	CAAEB01.01
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.	Remember	CO 1	CLO1	CAAEB01.01
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	CAAEB01.01
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.	Remember	CO 1	CLO1	CAAEB01.01
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	CLO1	CAAEB01.01
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	CLO1	CAAEB01.01
26	What is equilibrant?	The force which brings the set of forces in a equilibrium is called an equilibrant.	Remember	CO 1	CLO1	CAAEB01.01

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	UNIT-II FRICTION AND BASICS STRUCTURAL ANALYSIS					
1	What is friction?	When two bodies are in contact, and an effort to move one body over the other is resisted. This resistance to motion is called friction.	Remember	CO 2	CLO4	CAAEB01.04
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 2	CLO4	CAAEB01.04
3	What is dry friction?	The friction that exists between perfectly cleaned and dry solid surfaces is called dry friction.	Remember	CO 2	CLO4	CAAEB01.04
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.	Remember	CO 2	CLO4	CAAEB01.04
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.	Remember	CO 2	CLO4	CAAEB01.04
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	CLO4	CAAEB01.04
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	CLO4	CAAEB01.04
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	CLO4	CAAEB01.04
9	What is a beam?	It is a structural element that primarily resists loads applied transverse to the beam's axis.	Understand	CO 2	CLO6	CAAEB01.06
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	CLO4	CAAEB01.04
11	Describe kinetic friction?	The friction acting on a body which is actually in motion is called kinetic friction	Understand	CO 2	CLO4	CAAEB01.04
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	Remember	CO 2	CLO5	CAAEB01.05

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		pattern of triangle is called truss.				
13	List different types of beams?	Cantilever, simple supported, over hanged, continuous, and fixed.	Remember	CO 2	CLO6	CAAEB01.06
UNIT-III CENTROID AND CENTRE OF GRAVITY AND VIRTUAL WORK AND ENERGY METHOD						
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.	Remember	CO 3	CLO7	CAAEB01.07
2	Define centroid?	It is a point where the whole area of a plane is supposed to concentrate.	Remember	CO 3	CLO7	CAAEB01.07
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	CAAEB01.07
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	CAAEB01.07
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	CAAEB01.07
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.	Remember	CO 3	CLO7	CAAEB01.07
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	CAAEB01.07
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.	Remember	CO 3	CLO7	CAAEB01.07

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
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.	Understand	CO 3	CLO7	CAAEB01.07
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.	Understand	CO 3	CLO7	CAAEB01.07
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	CAAEB01.08
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	CAAEB01.08
13	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	CAAEB01.08
14	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	CAAEB01.08
15	Define potential energy?	Potential energy is defined as mechanical energy, stored energy, or energy caused by its position.	Remember	CO 3	CLO8	CAAEB01.08
	UNIT-IV PARTICLE DYNAMICS AND INTRODUCTION TO KINETICS					
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	CAAEB01.09
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	CAAEB01.09
3	Define translation?	If a straight line drawn on the	Remember	CO 4	CLO9	CAAEB01.09

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		moving body remains parallel to its original then such motion is called translation.				
4	Explain the term rectilinear motion?	If the path followed by a point is a straight line then such motion is called rectilinear motion.	Understand	CO 4	CLO9	CAAEB01.09
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	CAAEB01.09
6	Define term plane motion?	Plain motion is combination of both translation and rotation.	Remember	CO 4	CLO9	CAAEB01.09
7	What do you mean by a position?	Position means the location of a particle with respect to origin.	Remember	CO 4	CLO9	CAAEB01.09
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	CAAEB01.09
9	What is meant by speed?	The rate of change of distance with respect to time is called speed.	Remember	CO 4	CLO9	CAAEB01.09
10	Define trajectory?	The path traced by a projectile is called trajectory.	Remember	CO 4	CLO9	CAAEB01.09
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	CAAEB01.09
12	What is a maximum height?	When projectile reaches to the max height where vertical component of velocity is zero	Remember	CO 4	CLO9	CAAEB01.09
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	CAAEB01.09
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.	Understand	CO 4	CLO14	CAAEB01.14
15	Define the term angular velocity?	It defines the rate of change of angular position with respect to time.	Remember	CO 4	CLO14	CAAEB01.14
16	What is Newton's second 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 4	CLO9	CAAEB01.09
17	What is D'Alembert's principle?	The algebraic sum of external forces and inertial forces is equal to zero.	Remember	CO 4	CLO11	CAAEB01.11
	UNIT-IV MECHANICAL VIBRATIONS					
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	Understand	CO 5	CLO15	CAAEB01.15

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		the equilibrium point, giving rise to oscillations or vibrations				
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	CAAEB01.15
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.	Understand	CO 5	CLO15	CAAEB01.15
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	CAAEB01.15
5	What are “Forced (or) driven Vibration	All free oscillations eventually die out because of the ever present damping forces. However, an external agency can maintain these oscillations. These are called forced or driven oscillations	Remember	CO 5	CLO15	CAAEB01.15
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.	Remember	CO 5	CLO15	CAAEB01.15
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	CLO15	CAAEB01.15
8	Recall wavelength.	A wavelength is a measure of distance between two identical peaks or crests.	Remember	CO 5	CLO15	CAAEB01.15
9	Define frequency.	Frequency is the number of occurrences of a repeating event per unit time.	Remember	CO 5	CLO15	CAAEB01.15
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.	Remember	CO 5	CLO15	CAAEB01.15
11	Define amplitude.	The maximum extent of a vibration or oscillation, measured from the position of equilibrium.	Remember	CO 5	CLO15	CAAEB01.15
12	Define time period for simple pendulum?	It the time needed for one complete cycle of vibration to pass in a given point.	Understand	CO 5	CLO15	CAAEB01.15
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	Remember	CO 5	CLO16	CAAEB01.16

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		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.				
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	CAAEB01.16
15	Explain about under-damped systems.	An under-damped system yields an exponentially decreasing sinusoidal output in response to a step input.	Understand	CO 5	CLO15	CAAEB01.15
16	Describe critically-damped systems.	A critically damped system the minimum amount of damping that will yield a non-oscillatory output in response to a step input.	Understand	CO 5	CLO15	CAAEB01.15
17	What do you mean by over-damped systems?	An over-damped system also yields a non-oscillatory output in response to a step input, but has more damping than necessary to achieve the non-oscillatory output.	Understand	CO 5	CLO15	CAAEB01.15

Signature of the Faculty

Signature of HOD