UNIVERSAL INSTITUTE OF ENGINEERING & TECHNOLOGY
LALRU, MOHALI -140501

MECHANICAL ENGINEERING

Definitions and Terminologies Bank

Course Name : TOM
Course Code :
Class : B. Tech
Branch : ME
Year : 2019 – 2020

COURSE OBJECTIVES:

I	Understand the concept of equilibrium of a body subjected to static and dynamic forces.
II	Apply the phenomenon of friction for automobile application.
III	Analyze the significance of governors and its application in turning moment diagram.
IV	Determine the fundamental frequency of mechanical system.

GYROSCOPE AND DYNAMIC FORCES		
S.No	**QUESTION**	**ANSWER**
1	What do you mean by dynamics?	Dynamics refers to the branch of mechanics that deals with the movement of objects and the forces that drive that movement. In physics, dynamics is the study of bodies in motion and changes in that motion, and that idea can be applied to other areas as well.
2	What is the difference between dynamics and mechanics?	Mechanics deals with all interactions between the body with forces, and the resultant motion of the body. It's aim is to predict the nature of motion and rest under the action of forces. Mechanics is broader area of study, comprising of Dynamics and statics.
3	What are examples of dynamics?	Dynamics is defined as the branch of mechanics that deals with the effect of outside forces on something. An example of dynamics is how the moon affects the ocean waves. An example of dynamics are the effect of individual relationships on a group of friends.
4	What is gyroscope used for?	A gyroscope is a device that uses Earth's gravity to help determine orientation. Its design consists of a freely-rotating disk called a rotor, mounted onto a spinning axis in the center of a larger and more stable wheel.
5	What is the principle of gyroscope?	When the gyroscope is applied with external torques or rotations about the given axis, the orientation can be measured by a precession phenomenon. When an object rotating about an axis is applied with external torque along a direction perpendicular to the rotational axis, the precession occurs.
6	What is gyroscope couple?	The turning moment which opposes any change of the inclination of the axis of rotation of gyroscope.
7	What is gyroscopic acceleration?	Angular Acceleration is defined as the rate of change of angular velocity with respect to time. It is a Vector quantity. The direction of acceleration vector is not necessarily the same as the displacement and velocity vectors.
8	What is reactive gyroscopic couple?	Whenever an axis of rotation or spin axis changes its direction a gyroscopic couple will act about the third axis. A reactive gyroscopic couple will be experienced by bearings through the shaft.
9	What is gyroscopic torque?	The phenomenon in which the axis of a spinning object (e.g., a gyroscope) describes a cone in space when an external torque is applied to it. The phenomenon is commonly seen in a spinning toy top, but all rotating objects can undergo precession.

10	What is gyroscopic effect?	Gyroscopic effect is ability (tendency) of the rotating body to maintain a steady direction of its axis of rotation. The gyroscopes are rotating with respect to the axis of symmetry at high speed.
11	What do you mean by static force analysis?	When the inertia forces are neglected in comparison to the externally applied load, one may go for static force analysis. If the body is under equilibrium condition, then this equilibrium is known as static equilibrium and this condition is applicable in many machines where the movement is relatively slow.
12	What is static force?	A static force refers to a constant force applied to a stationary object. A static force is too weak to move an object because it is being countered by equally strong opposite forces. ... The force is then a kinetic force that is being resisted by kinetic friction.
13	What is an example of static force?	A static force refers to a constant force applied to a stationary object. A static force is too weak to move an object because it is being countered by equally strong opposite forces. The most common example of a static force is static friction on a stationary object.
14	What is the difference between static and dynamic mechanics?	Dynamics is the study of forces on moving bodies. Application of forces when they are in motion. Statics means study of all the forces couples moments etc. for a stationary object which is in the state of rest. Whereas Dynamics deals with study of all the forces when object is in motion.

Flywheels		
1	What are the uses of turning moment diagram?	Turning Moment (Or Crank Effort) Diagram (TMD) Turning moment diagram is a graphical representation of turning moment or torque (along Y-axis) versus crank angle (X-axis) for various positions of crank. Uses of TMD 1. The area under the TMD gives the work done per cycle.
2	What is the difference between flywheel and governor?	Flywheel stores rotational energy when the mechanical energy supplied is more than that's required for operation, whereas a governor regulates the fuel supply according to the varying load conditions. While hypothetically both serve the same purpose, that is speed control, they do it very differently.
3	What is mean resisting torque?	The resisting torque is the maximum torque above which the flywheel starts to rotate. Generally fly wheel has ver large mass,so a greater amount of torque is required to rotate the flywheel.
4	What is fluctuation of energy?	Fluctuation of energy, co-efficient of fluctuation of energy, co-efficient of fluctuation speed,maximum fluctuati on of energy. Answer:Fluctuations of energy: The variations of energy above and below the mean resisting torque line are called fluctuations of energy.

5	Where is flywheel used?	For dynamic balancing of the engine and to store energy. A flywheel is a rotating mechanical device that is used to store rotational energy. Flywheels have an inertia called the moment of inertia and thus resist changes in rotational speed.
6	How does a flywheel Work?	A flywheel is a mechanical device specifically designed to efficiently store rotational energy. Flywheels resist changes in rotational speed by their moment of inertia. ... For example, flywheels are used in reciprocating engines because the active torque from the individual pistons is intermittent. Energy storage systems.
7	What is meant by turning moment?	Moment. The turning effect of a force is known as the moment. It is the product of the force multiplied by the perpendicular distance from the line of action of the force to the pivot or point where the object will turn.
8	Why flywheel is used in punching machine?	A flywheel is the heavy rotating mass which is placed between the power source and the driven machine to act as a reservoir of energy. It is used to store the energy when the demand of energy of energy is less and deliver it when the demand of energy is high.
9	How energy is stored in flywheel?	In batteries, initially energy is stored by other electrical energy sources or energy is stored from a result of some chemical reaction. Flywheel energy storage can be compared to the battery in the same way. The flywheel energy storage system uses electrical energy and stores it in the form of kinetic energy.
10	What is governor and its type?	Governor is a device used to maintain the speed of an engine within specified limits when the engine works in varying of different loads. Based on the source of controlling force, the governors can be classified into two types. Governor types are centrifugal governors and inertia governors.
11	How does speed governor work?	Like many functions on modern, fuel- injected cars, speed limiters operate through electronic sensors and the engine computer Once you reach a pre-determined top speed, the computer steps in and restricts the flow of air and fuel to the engine and even the sparks that cause combustion.
12	What is the main function of governor?	The functions of a governor is to regulate the mean speed of an engine, when there are variations in the load. When the load on an engine increases, its speed decreases, therefore it becomes necessary to increases the supply of working fluid.

BALANCING OF ROTATING MASSES		
1	Why do we do balancing of rotating masses?	A rotating system of mass is in dynamic balance when the rotation does not produce any resultant centrifugal force or couple. ... If a system is initially unbalanced, to avoid the stress upon the bearings caused by the centrifugal couple, counterbalancing weights must be added.
2	What is static balancing of rotating masses?	Static Balancing A rotating mass is said to be statically balanced if the rotating mass can rest, without turning, at any angular position in its bearings. This condition is attained when the sum of the centrifugal forces on the rotating mass due to unbalanced masses is zero in any radial direction.

3	How the different masses rotating in different planes are balanced?	When several masses rotate in different planes, the centrifugal forces, in addition to being out of balance, also form couples. A system of rotating masses is in dynamic balance when there does not exist any resultant centrifugal force as well as resultant couple.
4	Why is balancing necessary?	Balancing of rotating parts is necessary for every engine, only in high speed engines it becomes very important. The force exerted by the rotating parts is proportional to the square of the rotational speed, omega. ... If the rotating parts are not balanced, then the vibrations caused by the parts will be too much.
5	Why balancing of dynamic forces are necessary?	The balancing of rotating bodies is important to avoid vibration. Dynamic and Static Balancing in Heavy Industrial machinery such as generators and motors can cause catastrophic failure, as well as noise and discomfort. To help with balancing, it involves simply moving the centre of gravity to the centre of rotation.
6	What is rotating mass?	Rotating unbalance is the uneven distribution of mass around an axis of rotation. Arotating mass, or rotor, is said to be out of balance when its center of mass (inertia axis) is out of alignment with the center of rotation (geometric axis).
7	What are the two types of wheel balancing?	There are two types of wheel balancing, static and dynamic.
8	Which balancing exercise is best for improving dynamic balance?	Balance is especially important for older adults hoping to reduce the risk of falls and injuries. Core stability is essential to both static and dynamic balance. Unfortunately, many traditional core-training exercises, such as crunches and leg raises, do little to improve stability.
9	What is reference plane in balancing?	When several masses revolve in different planes, they may be transferred to areference plane and this reference plane is a plane passing through a point on the axis of rotation and perpendicular to it. the couples about the reference plane must balance i.e., the resultant couple must be zero.
10	Why is a shaft dynamically balanced at one rotational speed also balanced at any other speed?	A shaft dynamically balanced at one rotational speed is also balanced at any other speed because the tangential velocity is constant. This means that only the acceleration due to changes of direction will affect the dynamical balance. It also shows that a shaft statically balance may also be dynamic ally balance.
11	Is balancing an engine necessary?	Street engines do not necessarily need balancing. Except for a couple of rare occasions, almost no factory engine ever came fully balanced, even most "performance" engines weren't balanced. Balancing helps an engine run smoother with less vibration which creates less havoc on main bearings and helps things last longer.
13	How do you calculate torque to rotate a mass?	To calculate torque, start multiplying the mass of the object exerting force by the acceleration due to gravity, which is 9.81. When the force is clockwise, its torque is negative, and when it's moving counterclockwise, it's positive.
14	How do you find the center of mass?	center of mass formula to find the exact location of the center of mass between a system of objects, you add all the masses times their positions and divide by the total mass, the position can be measured relative to any point you call X equals zero and the number you get out of that.