

Assignment - Rotational Dynamics
[Provide/Include "Hints" to each MCQs]

Day-1

1. A rigid body consists of a network of point masses. Which of the following about the individual mass is true, as the body rotates about an axis?
 - a. Each mass has the same linear acceleration.
 - b. Each mass has the same linear velocity.
 - c. Each mass has the same angular velocity and angular acceleration about the same axis.
 - d. All of the above.
 2. Which Quantity in rotational motion is analogous to force in linear motion? 'Or'
In rotational motion, the physical quantity that imparts angular acceleration is,
 - a. Force
 - b. Torque
 - c. Moment of inertia
 - d. Angular Momentum
 3. A fan makes 10 revolutions in 3 second which is just switched on. Considering uniform acceleration the number of revolution made by fan in next 3 second is:
 - a. 10
 - b. 20
 - c. 30
 - d. 40
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4.
 - a. What do you mean by moment of inertia? On what factor does it depend.
 - b. What is the physical meaning of moment of inertia of a body?
 - c. What is the counterpart of the mass and force in rotational motion?
 - d. Is the moment of inertia of a body is unique? Explain.
 - e. A particle starts rotating from rest describes the angular displacement as: $\theta = \frac{3t^3}{20} - \frac{t^2}{3} + 2$. Calculate the angular velocity and angular displacement at the end of 5sec.
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Day-2

1. For a body undergoing rotational motion, its radius of gyration depends on,
 - a. Shape
 - b. Size
 - c. Axis of rotation
 - d. All of the above
 2. If a body is rotating about an axis, passing through its center of mass then its angular momentum is directed along its
 - a. Radius
 - b. Tangent
 - c. Circumference
 - d. Axis of rotation
 3. K_1 and K_2 are radii of gyrations of a rod about the axes passing through its center and one end respectively and perpendicular to its length. $K_1 : K_2$ is equal to:
 - a. 1:1
 - b. 1:2
 - c. 2:1
 - d. $1:\sqrt{3}$
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4.
 - a. Define radius of gyration. Write the factors on which it depends.
 - b. A wheel starts from rest and accelerates with constant angular acceleration to an angular velocity of 15 *rev/sec* in 10*sec*. Calculate the angular acceleration and angle which the wheel has rotated at the end of 2*sec*.
 - c. An electric fan is turned off, and its angular velocity decreases uniformly from 500 *rev/min* to 200 *rev/min* in 4 *sec*. Find the angular acceleration and the number of revolutions made by the motor in the 4 *sec*. How many more seconds are required for the fan to come to rest if the angular acceleration remains constant?
 - d. A computer disc drive id turned on starting from rest and has constant angular complete acceleration, (a) how long did it take to make the first complete rotation, and (b) what is its angular acceleration? Given that the disk took 0.750*sec* for the drive to make its second complete revolution.
 - e. Obtain an expression for the moment of inertia of a thin and uniform rod about an axis passing through the Centre and perpendicular to its length.
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Day-3

1. A flywheel rotating about a fixed axis has a kinetic energy of 225 J when its angular speed is 30 rad/s. What is the moment of inertia of the flywheel about its axis of rotation?
 - a. 0.3kgm²
 - b. 0.5kgm²
 - c. 0.6kgm²
 - d. 0.8kgm²