INDIAN SCHOOL MUSCAT

NAME OF THE EXAMINATION-	SECOND PERIODIC TEST	CLASS: XI
DATE OF EXAMINATION	20.11.2023	SUBJECT: PHYSICS
TYPE	MARKING SCHEME	SET-A

SET	Q.NO	VALUE POINTS	MARK
A	1	(i) b (ii) c (iii) b (iv) d or c	4 x1 M
	2	a	1M
	3	a	1M
	4	Work is equal to the product of an applied force and the displacement caused in the direction of force. It is a scalar quantity. On the other hand, torque is measured as the product of the force and its perpendicular distance from the axis of rotation. It is a vector quantity.	1+1
	5	In the whirl wind of a cyclone, the air from the nearby region gets concentrated in a small space. As a result, the moment of inertia is decreased considerably. In order to conserve angular momentum, the angular speed of the whirl wind becomes extremely high.	2
	6	• position of the axis of rotation • orientation of the axis of rotation • shape and size of the body • distribution of mass of the body about the axis of rotation	4X½ M
	7	final volume, $V_2 = \frac{1}{64}$ initial volume, V_1 i.e., $\frac{4}{3}\pi R_2^3 = \frac{1}{64} \times \frac{4}{3}\pi R_1^3$ $R_2^3\left(\frac{1}{4}R_1\right)^3$ or $R_2 = \frac{1}{4}R_1$	½

		i.e., $I_2/T_2 = I_1/T_1$ $\left(\frac{2}{5}MR_2^2\right)\frac{1}{T_2} = \left(\frac{2}{5}MR_1^2\right) \times \frac{1}{T_1}$ $T_2 = \frac{R_2^2}{R_1^2} \times T_1$ As T_1 = time taken by earth to complate one revolution about its axis. i.e., normal lenght of the day = 24 hours $\therefore T_2 = \left(\frac{1}{4}\right)^2 \times 24 = 1.5h$	1 ½
	8	Derivation of Rotational KE. All particles are moving with same angular velocity about the axis of rotation but they have different linear velocity **– if this statement is not given deduct ½ marks**	3
	9	Answer: Here, M = 3 kg, R = 40 cm = 0.4 m Moment of inertia of the hollow cylinder about its axis. $I = MR^2 = 3(0.4)^2 = 0.48$ kg Force applied $F = 30$ N ∴ Torque, $\tau = F \times R = 30 \times 0.4 = 12$ N–m. If α is angular acceleration produced, then from $\tau = I\alpha$ $\alpha = \frac{\tau}{I} = \frac{12}{0.48} = 25$ rad s^{-2} Linear acceleration, $a = R\alpha = 0.4 \times 25 = 10$ ms^{-2}.	½ ½ ½ ½ ½ ½

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TYPE	MARKING SCHEME	SET-B

SET	Q.NO	VALUE POINTS	MARK
A	1	(i) b (ii) b (iii) bc (iv) c or d	4 x1 M
	2	a	1M
	3	a	1M
	4	final volume, $V_2 = \frac{1}{64}$ initial volume, V_1 i.e., $\frac{4}{3}\pi R_2^3 = \frac{1}{64} \times \frac{4}{3}\pi R_1^3$ $R_2^3\left(\frac{1}{4}R_1\right)^3$ or $R_2 = \frac{1}{4}R_1$ i.e., $I_2/T_2 = I_1/T_1$ $\left(\frac{2}{5}MR_2^2\right)\frac{1}{T_2} = \left(\frac{2}{5}MR_1^2\right) \times \frac{1}{T_1}$ $T_2 = \frac{R_2^2}{R_1^2} \times T_1$ As T_1 = time taken by earth to complate one revolution about its axis. i.e., normal lenght of the day = 24 hours $\therefore T_2 = \left(\frac{1}{4}\right)^2 \times 24 = 1.5h$	½ 1 ½
	5	Work is equal to the product of an applied force and the displacement caused in the direction of force. It is a scalar quantity. On the other hand, torque is measured as the product of the force and its perpendicular distance from the axis of rotation. It is a vector quantity.	2
	6	Statement the law of conservation of angular momentum.	2

		If mathematical expression given, give 1 mark	
	7	In the whirl wind of a cyclone, the air from the nearby region gets concentrated in a small space. As a result, the moment of inertia is decreased considerably. In order to conserve angular momentum, the angular speed of the whirl wind becomes extremely high.	2
	8	Answer: Here, M = 3 kg, R = 40 cm = 0.4 m Moment of inertia of the hollow cylinder about its axis. $I = MR^2 = 3(0.4)^2 = 0.48$ kg Force applied $F = 30$ N $\therefore$ Torque, $\tau = F \times R = 30 \times 0.4 = 12$ N–m. If α is angular acceleration produced, then from $\tau = I\alpha$ $\alpha = \frac{\tau}{I} = \frac{12}{0.48} = 25$ rad s^{-2} Linear acceleration, $a = R\alpha = 0.4 \times 25 = 10$ ms^{-2}.	½ ½ ½ ½ ½ ½
	9	Definition torque and angular momentum. Derivation of relation between torque and Angular momentum. Note- If Vector sign is not given over Torque and L, deduct ½ mark.	½ ½ 2

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TYPE	MARKING SCHEME	SET-C

SET	Q.NO	VALUE POINTS	MARK
A	1	(i) b (ii) c (iii) b (iv) d or c	4 x1 M
	2	a	1M
	3	a	1M
	4	Statement of law of conservation of angular momentum. If Mathematical expression given, give 1 mark.	2
	5	In the whirl wind of a cyclone, the air from the nearby region gets concentrated in a small space. As a result, the moment of inertia is decreased considerably. In	2

		order to conserve angular momentum, the angular speed of the whirl wind becomes extremely high.	
	6	Work is equal to the product of an applied force and the displacement caused in the direction of force. It is a scalar quantity. On the other hand, torque is measured as the product of the force and its perpendicular distance from the axis of rotation. It is a vector quantity.	1+1
	7	final volume, $V_2 = \frac{1}{64}$ initial volume, V_1 i.e., $\frac{4}{3}\pi R_2^3 = \frac{1}{64} \times \frac{4}{3}\pi R_1^3$ $R_2^3\left(\frac{1}{4}R_1\right)^3$ or $R_2 = \frac{1}{4}R_1$ i.e., $I_2 / T_2 = I_1 / T_1$ $\left(\frac{2}{5}MR_2^2\right)\frac{1}{T_2} = \left(\frac{2}{5}MR_1^2\right) \times \frac{1}{T_1}$ $T_2 = \frac{R_2^2}{R_1^2} \times T_1$ As T_1 = time taken by earth to complate one revolution about its axis. i.e., normal lenght of the day = 24 hours $\therefore T_2 = \left(\frac{1}{4}\right)^2 \times 24 = 1.5h$	½ 1 ½
	8	Derivation of Rotational KE. All particles are moving with same angular velocity about the axis of rotation but they have different linear velocity – **if this statement is not given deduct ½ marks**	3
	9	Answer: Here, M = 3 kg, R = 40 cm = 0.4 m Moment of inertia of the hollow cylinder about its axis. $I = MR^2 = 3(0.4)^2 = 0.48$ kg Force applied $F = 30$ N $\therefore$ Torque, $\tau = F \times R = 30 \times 0.4 = 12$ N–m. If α is angular acceleration produced, then from $\tau = I\alpha$ $\alpha = \frac{\tau}{I} = \frac{12}{0.48} = 25$ rad s^{-2} Linear acceleration, $a = R\alpha = 0.4 \times 25 = 10$ ms^{-2}.	½ ½ ½ ½ ½ ½