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PHYSICS TEST – CHAPTER 4: DYNAMICS-II

Name:		Roll No.		Section:

Total Time: 2:30 Hour
Time Allowed: 150 Minutes

Total Marks: 150

PAPER OBJECTIVE
SECTION-A (MARKS 150)

NOTE: Section-A is compulsory. All parts of this section are to be answered on these pages and handed over to the center superintendent. Deleting / overwriting is not allowed. Do not use lead pencil.

Q.1 Fill the relevant bubble for each part. All parts carry one mark.

Questions	A	B	C	D	A B C D
1. The line along which a force acts is called the:	moment arm	line of action of the force	axis of rotation	line of centres	○●○○
2. Two friends push a heavy piece of furniture together. How easily it moves depends on the:	colour of the furniture	weight of the friends	line of action of both forces	time of the day	○○●○
3. Parallel forces acting in the same direction are called:	unlike parallel forces	like parallel forces	opposite forces	normal forces	○●○○
4. Parallel forces acting in opposite directions are called:	like parallel forces	balanced torques	normal forces	unlike parallel forces	○○○●
5. A person pushes a cart with both hands in the same direction. The forces applied are:	unlike parallel forces	perpendicular forces	like parallel forces	non-contact forces	○○●○
6. While turning bike handlebars, one hand pushes down and the other pulls up. These forces are:	like parallel forces	unlike parallel forces	collinear forces	gravitational forces	○●○○
7. The turning effect produced in a body about a fixed point due to a force is called:	moment of force (torque)	momentum	impulse	inertia	●○○○
8. The SI unit of moment of force (torque) is:	N/m	N s	kg m/s	N m	○○○●
9. A line about which rotation takes place is called the:	line of action	axis of rotation	moment arm	pivot force	○●○○
10. Moment of force is equal to the force multiplied by the:	mass of the body	perpendicular distance from the axis of rotation	velocity of the body	time of rotation	○●○○
11. The perpendicular distance from the axis of rotation to the line of action of force is called the:	moment arm	amplitude	radius of gyration	displacement	●○○○
12. The mathematical formula for torque is:	$\tau = F/d$	$\tau = F \times d$	$\tau = F + d$	$\tau = d/F$	○●○○
13. A long-handled wrench makes a nut easier to loosen because it gives a larger:	weight	moment arm	friction	mass	○●○○
14. A 60 N force is applied perpendicular to a door 0.40 m from the hinge. The torque is:	150 N m	0.007 N m	24 N m	60 N m	○○●○

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Questions	A	B	C	D	A B C D
15. The same 60 N force is applied at 0.20 m from the hinge. The torque is:	12 N m	300 N m	3 N m	24 N m	● ○ ○ ○
16. Pushing a door along the line passing through its hinges does not rotate it because the:	force is zero	door is too heavy	air resists it	moment arm is zero	○ ○ ○ ●
17. A force of 50 N acts perpendicular on a spanner 20 cm long. The torque is:	1000 N m	2.5 N m	70 N m	10 N m	○ ○ ○ ●
18. A 100 N force must give the same 10 N m torque. The length of the spanner should be:	20 cm	10 cm	1 m	5 cm	○ ● ○ ○
19. A 40 N force acts perpendicular on a door at 0.5 m from the hinge. The torque is:	80 N m	20 N m	0.0125 N m	40 N m	○ ● ○ ○
20. The anticlockwise moment is conventionally taken as:	negative	zero	infinite	positive	○ ○ ○ ●
21. A nonzero net torque acting on a body produces:	constant speed	acceleration in rotation	linear velocity only	no change	○ ● ○ ○
22. A clockwise torque of 5 N m and an anticlockwise torque of 8 N m act on a body. The net torque is:	−3 N m (clockwise)	13 N m	40 N m	+3 N m (anticlockwise)	○ ○ ○ ●
23. The centre of mass of a rigid body is the point about which mass is:	zero	maximum	concentrated at the edge	equally distributed	○ ○ ○ ●
24. If the line of action of a force passes through the centre of mass of a body, it will:	not produce rotation	produce maximum rotation	stop the body	double its mass	● ○ ○ ○
25. A hammer is thrown into the air. Its centre of mass follows a:	straight line	zigzag path	circular path only	smooth parabolic path	○ ○ ○ ●
26. The centre of gravity of a body is the point where the whole ____ of the body appears to act.	weight	volume	density	speed	● ○ ○ ○
27. The centre of mass and centre of gravity are the same for:	small objects	mountains	tall buildings	all planets	● ○ ○ ○
28. The centre of mass and centre of gravity differ slightly for tall objects such as mountains because:	mass decreases with altitude	they have no weight	their volume changes	g decreases with altitude	○ ○ ○ ●
29. The centre of mass of a homogeneous sphere lies at its:	geometric centre	surface	lowest point	top	● ○ ○ ○
30. A uniform wooden rod can be balanced on a finger placed under its:	end	quarter point	edge	mid-point	○ ○ ○ ●
31. To find the centre of gravity of an irregular sheet, we hang it from at least ____ different points.	one	two	ten	three	○ ○ ○ ●

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Questions	A	B	C	D	A B C D
32. To locate the CG of an irregular lamina, vertical lines are drawn with the help of a:	plumb line	metre rule	stopwatch	thermometer	● ○ ○ ○
33. The CM/CG of an object:	may lie outside the body of the object	always lies inside	always lies on the surface	is always at the top	● ○ ○ ○
34. A body is in equilibrium when its net force and net torque are:	both maximum	equal and non-zero	perpendicular	both zero	○ ○ ○ ●
35. The first condition of equilibrium states that the vector sum of all forces on the body is:	maximum	equal to its weight	infinite	zero	○ ○ ○ ●
36. The second condition of equilibrium states that the vector sum of all torques is:	zero	equal to the force	maximum	equal to the weight	● ○ ○ ○
37. The second condition of equilibrium is also called the:	law of inertia	law of momentum	principle of moments	law of gravitation	○ ○ ● ○
38. The principle of moments states that for an object in equilibrium, the sum of clockwise moments equals the sum of:	forces in the body	weights of the body	anticlockwise moments about the same pivot	momentum in the body	○ ○ ● ○
39. A book rests on a table. The weight of the book is balanced by the normal reaction. The book is in:	dynamic translational equilibrium	static equilibrium	dynamic rotational equilibrium	no equilibrium	○ ● ○ ○
40. A paratrooper falls with a constant velocity. He is in:	static equilibrium	dynamic translational equilibrium	dynamic rotational equilibrium	no equilibrium	○ ● ○ ○
41. A ceiling fan rotates with unchanging speed. It is in:	dynamic rotational equilibrium	static equilibrium	translational equilibrium	no equilibrium	● ○ ○ ○
42. A body in equilibrium must not have:	speed	acceleration	velocity	momentum	○ ● ○ ○
43. On a uniform metre stick pivoted at its centre, 4 N hangs 0.2 m on one side and 2 N hangs 0.4 m on the other. The stick:	tips toward the 4 N	tips toward the 2 N	moves linearly	balances	○ ○ ○ ●
44. Kamil weighs 250 N and sits 0.6 m from a seesaw pivot. Bilal weighs 200 N. For balance Bilal should sit at:	0.48 m	1.33 m	0.75 m	0.6 m	○ ○ ● ○
45. In the seesaw example, the lighter child must sit farther from the pivot because:	he has more mass	a smaller force needs a larger moment arm	he has less inertia	friction acts on him	○ ● ○ ○
46. A 300 N child sits 1.0 m from the pivot of a seesaw. Another child weighing 500 N should sit at ___ to balance.	1.67 m	0.3 m	1.0 m	0.6 m	○ ○ ○ ●
47. A weight of 6 N hangs 0.3 m left of a pivot. To balance, a 4 N weight must hang on the right at:	0.2 m	0.9 m	1.2 m	0.45 m	○ ○ ○ ●
48. A long uniform bar is pivoted at its middle. A mass of 0.6 kg is 0.2 m away. A mass at 0.3 m on the other side balances it. Its value is:	0.9 kg	0.6 kg	0.12 kg	0.4 kg	○ ○ ○ ●

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Questions	A	B	C	D	A B C D
49. A seesaw balances with two equal-weight children at equal distances from the fulcrum. If one child moves closer to the fulcrum:	it stays balanced	it tips toward the child who moved closer	the seesaw tips toward the child who stayed farther away	it topples	○○●○
50. When the line of action of a force passes through its pivot point, the moment of force is:	zero	maximum	minimum	infinite	●○○○
51. If a body is at rest or moving with uniform rotational velocity, the torque acting on it is:	zero	maximum	minimum	infinite	●○○○
52. Stability is a measure of the ability of an object to:	return to its original position after a disturbing force is removed	move faster	gain weight	lose mass	●○○○
53. The stability of an object is affected by the position of its:	colour	shape of shadow	centre of gravity	temperature	○○●○
54. Tall vehicles tend to overturn when rounding a corner because their CG is:	low	at the road	high	at the wheel axle only	○○●○
55. An object's stability can be improved by:	raising its CG	reducing its base area	increasing its height only	lowering its CG or increasing its base area	○○○●
56. Racing cars are built low and wide to make them more:	unstable	slippery	stable	heavy	○○●○
57. A body is in stable equilibrium if, when slightly tilted and released, it:	moves further away	returns to its original position	stays in its new position	rotates forever	○●○○
58. A book lying on a table is tilted slightly about one edge and released. It returns to its position. This is:	unstable equilibrium	neutral equilibrium	no equilibrium	stable equilibrium	○○○●
59. A pencil balanced on its tip falls when disturbed. This is:	stable equilibrium	neutral equilibrium	unstable equilibrium	dynamic equilibrium	○○●○
60. A ball displaced on a horizontal surface stays in its new position. This is:	stable equilibrium	unstable equilibrium	dynamic equilibrium	neutral equilibrium	○○○●
61. A cone standing on its base and tilted slightly returns to its place. The cone is in:	unstable equilibrium	neutral equilibrium	dynamic equilibrium	stable equilibrium	○○○●
62. Self-righting toys such as wobbling dolls are designed with their centre of mass:	below the support point	above the support point	outside the toy	at the top	●○○○
63. An egg-shaped toy is tilted. The weight acting at its CG produces a moment that turns it:	further away	upside down	back toward the vertical position	sideways	○○●○
64. A tightrope walker carries a long pole placed horizontally. This ___ stability.	reduces	improves	has no effect on	destroys	○●○○
65. When standing in a crowded bus, standing with legs spread apart gives better stability because it:	raises the CG	increases the area of support	reduces the weight	lowers the mass	○●○○

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Questions	A	B	C	D	A B C D
66. Friction is the resistance to ___ motion between two materials in contact.	relative	absolute	circular	rotational only	●○○○
67. Friction always acts in a direction ___ the motion.	opposite to	along	perpendicular to	unrelated to	●○○○
68. A block is pushed to the right along a floor. The friction on the block acts to the:	right	up	down	left	○○○●
69. When an object falls downward through air, the air resistance acts:	downward	upward	sideways	not at all	○●○○
70. Even a highly polished surface looks rough under a microscope. Friction is caused by:	gravity between the surfaces	interlocking of surface roughness	magnetism of the surfaces	colour of the surfaces	○●○○
71. A cyclist pulls the brake lever. The force that slows the wheel is the sliding friction between the:	tyre and the road only	pedals and the shoes	chain and the frame	brake pads and the rim	○○○●
72. The bicycle rim brakes slow the wheel using:	rolling friction only	tension only	sliding friction	magnetism	○○●○
73. Which of these is a disadvantage of friction?	It helps us walk	It wastes energy in machinery	It holds nails in wood	It helps in driving cars	○●○○
74. Polishing a rough surface reduces friction because the surface becomes:	heavier	larger	smoother	colder	○○●○
75. A ball bearing reduces friction by converting sliding friction into:	fluid friction	static friction	rolling friction	tension	○○●○
76. Applying oil or grease between machine parts reduces friction because friction of liquids is ___ that of solids.	less than	greater than	equal to	double	●○○○
77. Which is NOT a method of reducing friction?	Polishing	Using ball bearings	Roughening the surfaces	Using lubricants	○○●○
78. A book is slid on a table, then placed on a few pencils and rolled. Less effort is needed because:	the book becomes lighter	rolling friction is smaller	gravity is reduced	the table is smoother	○●○○
79. Discovery of the wheel was a milestone because rolling friction is:	larger than sliding friction	equal to sliding friction	much smaller than sliding friction	zero always	○○●○
80. A heavy deep freezer fitted with wheels is moved easily because of:	rolling friction	sliding friction	fluid friction	no friction	●○○○
81. The retarding force experienced by an object moving through a fluid is called:	drag force	thrust	normal force	tension	●○○○
82. You put your palm out of a moving car window. The force you feel is:	thrust	tension	drag force	weight	○○●○

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Questions	A	B	C	D	A B C D
83. Skydivers and swimmers change their effective size and orientation to control:	drag and speed	their mass	gravity	their weight	● ○ ○ ○
84. A narrow tyre and a wide tyre of the same weight have ___ friction.	the same	different	zero	double	● ○ ○ ○
85. Wider tyres spread the weight of the car over a larger area, which reduces:	friction	mass	heat and wear	gravity	○ ○ ● ○
86. Tyre treads are made to:	increase friction on dry roads	reduce mass	displace water from the road and avoid skidding	increase weight	○ ○ ● ○
87. Many racing cars use tyres without treads because they race on:	wet roads	dry days	icy tracks	sand	○ ● ○ ○
88. While falling freely, an object does not speed up indefinitely because the:	drag force increases with speed	weight decreases	mass decreases	gravity vanishes	● ○ ○ ○
89. An object reaches terminal velocity when drag force becomes equal to its:	mass	weight	momentum	volume	○ ● ○ ○
90. At terminal velocity the acceleration of the falling object is:	maximum	9.8 m/s^2	increasing	zero	○ ○ ○ ●
91. For humans in air, the terminal speed is about:	5 m/s	53 m/s	10 m/s	530 m/s	○ ● ○ ○
92. After the parachute opens, the terminal speed of a skydiver reduces to between:	20 m/s and 30 m/s	50 m/s and 60 m/s	5 m/s and 10 m/s	0 and 1 m/s	○ ○ ● ○
93. The terminal speeds of a raindrop, a snowflake and a hailstone compare as:	Raindrop > Snowflake > Hailstone	Hailstone > Raindrop > Snowflake	Snowflake > Raindrop > Hailstone	all are equal	○ ● ○ ○
94. A dissipative force:	increases mechanical energy	decreases the mechanical energy of a system	creates mass	has no effect	○ ● ○ ○
95. When the parachute opens, some energy is dissipated into the air, increasing its:	mass	colour	density	temperature	○ ○ ○ ●
96. In winter when we rub our hands, they feel warm because friction:	decreases their temperature	removes energy	increases their temperature	has no effect	○ ○ ● ○
97. A shooting star glows because friction with air:	cools the meteor	stops the meteor	heats the meteor to a high temperature	increases its mass	○ ○ ● ○
98. A feather and a bowling ball are dropped from the same height. Which reaches terminal velocity first?	The bowling ball	Both together	Neither	The feather	○ ○ ○ ●
99. It is more difficult to walk on a slippery surface because of:	reduced friction	increased friction	high grip	lower weight	● ○ ○ ○

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Questions	A	B	C	D	A B C D
100. When an object moves in a circle with constant speed, its direction is:	continuously changing	constant	zero	opposite always	● ○ ○ ○
101. The force that pulls an object out of its straight-line path into a circular path is called:	thrust	friction	normal force	centripetal force	○ ○ ○ ●
102. The centripetal force on a mass m moving at speed v in a circle of radius r is:	mv/r	mr/v²	mv²/r	m²v/r	○ ○ ● ○
103. The direction of centripetal force is:	away from the centre	along the tangent	along the velocity	towards the centre of the circle	○ ○ ○ ●
104. The negative sign in F_c = −mv²/r shows that the force is directed:	away from the centre	along the velocity	towards the centre of the circular path	downward only	○ ○ ● ○
105. A satellite moves around the Earth at uniform speed. The centripetal force on it is provided by:	tension in a string	friction	gravitational force	thrust	○ ○ ● ○
106. A ball is swung in a circle on a string. The centripetal force is the:	tension in the string	weight of the ball	friction	thrust	● ○ ○ ○
107. The centripetal force that keeps planets in orbit around the Sun is the:	tension	gravitational force	friction	normal force	○ ● ○ ○
108. A 2 kg ball moves at 4 m/s in a circle of radius 2 m. The centripetal force is:	16 N	4 N	8 N	32 N	● ○ ○ ○
109. A 0.5 kg stone is whirled at 6 m/s in a circle of radius 1.2 m. The centripetal force is:	2.5 N	3.6 N	15 N	36 N	○ ○ ● ○
110. Bilal throws a hammer: a 5 kg ball is whirled at 25 m/s on a 1.5 m wire. The centripetal force is:	83.3 N	2083.3 N	208.3 N	20 833 N	○ ● ○ ○
111. A 1000 kg car takes a curve of radius 50 m at 10 m/s. The centripetal force is:	200 N	2000 N	20 000 N	10 000 N	○ ● ○ ○
112. A 800 kg car moves at 20 m/s round a bend of radius 50 m. The centripetal force needed is:	320 N	16 000 N	640 N	6400 N	○ ○ ○ ●
113. If the speed of an object in circular motion is doubled (same m and r), the centripetal force becomes:	double	half	four times	one-fourth	○ ○ ● ○
114. If the radius of the circular path is doubled (same m and v), the centripetal force becomes:	double	four times	half	unchanged	○ ○ ● ○
115. The force that always changes the direction of velocity and not its magnitude is the:	gravitational force	electric force	friction	centripetal force	○ ○ ○ ●
116. A car moving on a horizontal road is thrown out of the road while taking a turn due to:	lack of sufficient centripetal force	rolling friction	the reaction of the ground	gravitational force	● ○ ○ ○

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Questions	A	B	C	D	A B C D
117. A car drives at steady speed around a perfectly circular track. Its acceleration and net force point:	inward	outward	forward	zero	● ○ ○ ○
118. A satellite of mass m orbits Earth at speed v. If the satellite's mass is doubled, its orbital speed becomes:	double	the same	half	one-fourth	○ ● ○ ○
119. An orbit is a regular, repeating path that one object takes around:	another object	a straight line	itself only	a magnet	● ○ ○ ○
120. The Moon is a ___ satellite.	artificial	man-made	natural	geostationary only	○ ○ ● ○
121. The International Space Station is an example of an ___ satellite.	natural	stellar	lunar	artificial	○ ○ ○ ●
122. Objects orbit each other because of:	friction	tension	magnetism only	gravity	○ ○ ○ ●
123. To put an artificial satellite in orbit, it is first lifted to a high altitude and then given the required:	mass	charge	tangential speed	colour	○ ○ ● ○
124. If a satellite's speed is too high, the spacecraft will:	fall back to Earth	stop in orbit	move in an elliptical orbit or escape	slow down at once	○ ○ ● ○
125. If a satellite's speed is too low, it will:	escape forever	orbit faster	stay in orbit	fall back to Earth	○ ○ ○ ●
126. The time taken by an object to orbit once around another is called the:	orbital radius	orbital charge	orbital mass	orbital period	○ ○ ○ ●
127. The further a planet is from the Sun, the ___ its orbital period.	shorter	longer	same	zero	○ ● ○ ○
128. Neptune takes almost ___ to orbit the Sun.	16.5 years	1.65 years	1650 years	165 years	○ ○ ○ ●
129. In one complete orbit, a satellite travels a distance equal to the ___ of its orbit.	radius	circumference	diameter	area	○ ● ○ ○
130. The average orbital speed of a satellite is given by:	$2\pi r/T$	$T/2\pi r$	$\pi r^2/T$	$2\pi T/r$	● ○ ○ ○
131. At a given distance from Earth's centre, all satellites have the same orbital speed irrespective of their:	size	distance	orbit radius	gravity	● ○ ○ ○
132. Two satellites follow each other in the same circular orbit. If the rear one increases its speed, its radius will:	decrease, so it catches up	increase, so it cannot catch up	stay the same	become zero	○ ● ○ ○
133. The Earth orbits the Sun at a radius of 1.5×10^{11} m with period 3.16×10^{7} s. Its orbital speed is about:	2.98×10^{2} m/s	2.98×10^{4} m/s	3.16×10^{7} m/s	1.5×10^{11} m/s	○ ● ○ ○

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Questions	A	B	C	D	A B C D
134. We do not feel the huge speed of Earth around the Sun because we are:	relatively at rest with the Earth	too heavy	in space	weightless	● ○ ○ ○
135. A geostationary satellite stays above the same point of the Earth's surface because its orbital period is:	12 hours	1 hour	24 hours	1 year	○ ○ ● ○
136. Communication satellites in geostationary orbit must maintain a specific:	mass	orbital speed	colour	temperature	○ ● ○ ○
137. The network of ___ satellites called GPS can be used to determine the position of an object.	6	12	24	240	○ ○ ● ○
138. A single satellite locates an object somewhere on a circle. With a third satellite the exact position is found at the:	centre of one circle	edge of the map	intersection of three circles	satellite itself	○ ○ ● ○
139. According to Table 4.1, the planet nearest to the Sun is:	Venus	Mercury	Earth	Mars	○ ● ○ ○
140. According to Table 4.1, the planet farthest from the Sun is:	Neptune	Uranus	Saturn	Jupiter	● ○ ○ ○
141. The planet with the largest mass in Table 4.1 is:	Saturn	Earth	Neptune	Jupiter	○ ○ ○ ●
142. The planet with the longest orbital period in Table 4.1 is:	Neptune	Uranus	Saturn	Mars	● ○ ○ ○
143. The planet with the highest average surface temperature in Table 4.1 is:	Venus	Mercury	Earth	Mars	● ○ ○ ○
144. The planet with the lowest average surface temperature in Table 4.1 is:	Uranus	Saturn	Neptune	Mars	○ ○ ● ○
145. The planet with the highest density in Table 4.1 is:	Mercury	Earth	Venus	Jupiter	○ ● ○ ○
146. The planet with the lowest density in Table 4.1 is:	Jupiter	Saturn	Neptune	Mars	○ ● ○ ○
147. A planet has g = 3.7 N/kg, a period of 1.88 years and a temperature of −65 °C. It is:	Mercury	Venus	Mars	Uranus	○ ○ ● ○
148. The orbital period of the Earth in Table 4.1 is:	0.615 years	1.88 years	11.9 years	1 year	○ ○ ○ ●
149. The average surface temperature of the Sun in Table 4.1 is:	5600 °C	167 °C	464 °C	−200 °C	● ○ ○ ○
150. A planet with distance 108.2 Gm, g = 8.9 N/kg and temperature 464 °C is:	Venus	Earth	Mercury	Mars	● ○ ○ ○

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