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JAN-24

Scoring Indicators
APPLIED PHYSICS - I

Q No	Scoring Indicators	Split score	Sub Total	Total score
I	PART A			
1	10^{-6}			9
2	Inertia of motion	1	1	
3	2π	1	1	
4	$\frac{2}{3} MR^2$	1	1	
5	Zero	1	1	
6	Temperature	1	1	
7	Compressibility	1	1	
8	Cohesion or Cohesive forces	1	1	
9	Streamline flow or Steady flow	1	1	
II	PART B			
1	Newton's third law - statement			24
	Any two properties of action and reaction forces	1	3	
2	$s = r\theta$ $v = \frac{s}{t} = \frac{r\theta}{t}$ <p>Since $\omega = \frac{\theta}{t}, v = r\omega$</p>	1 1 1	3	
3	Example for positive work Example for negative work Example for zero work	1 1 1	3	
4	Kinetic energy - definition + equation Potential energy - definition + equation	1.5 1.5	3	
5	Any three disadvantages of friction	3	3	

6	$P = \frac{W}{t} = \frac{FS}{t} = \frac{mgS}{t}$ $P = \frac{600 \times 9.8 \times 5}{10} = 2940 \text{ W}$	1.5		
		1.5	3	
7	Any three advantages of pyrometers	3	3	
8	Stress – definition, equation, and unit	1.5		
	Strain – definition, equation, has no unit	1.5	3	
9	Atmospheric pressure as the weight of the air column	1		
	Atmospheric pressure decreases with altitude	1		
	Value of atmospheric pressure at sea level	1	3	
	Or any three relevant points			
10	Terminal velocity – definition	2		
	Stoke's equation, $F = 6\pi\eta rv$	1	3	
III	PART C			42
1	$a_{mean} = 3.7$ $\Delta a_{mean} = 0.12$ $\text{Relative error} = \frac{0.12}{3.7} = 0.0324$ $\text{Percentage error} = 3.24 \%$	1		
		3		
		2	7	
		1		
2	Statement of the law of conservation of momentum	1		
	Figure and description	1		
	Applying Newton's second law to derive the equations for action and reaction forces		7	
	Applying newton's third law to get the final result	3		
		2		
3	Role of centripetal force in banking of roads	4		
	$\theta = \tan^{-1} \left\{ \frac{v^2}{rg} \right\}$	1		
	$\theta = \tan^{-1} \left\{ \frac{15^2}{50 \times 9.8} \right\} = \tan^{-1}(0.4592) = 24.66^\circ$	2	7	

4	Definition of moment of inertia	1	7	
	Statement of parallel axes theorem + figure + equation	3		
	Statement of perpendicular axes theorem + figure + equation	3		
5	CGS system (fundamental quantities and units)	1.5	7	
	MKS system (fundamental quantities and units)	1.5		
	SI system (fundamental quantities and units)	4		
6	Torque (definition + equation)	2	7	
	Angular momentum (definition + equation)	2		
	Statement of the law of conservation of angular momentum	1		
	Explanation with an example	2		
7	Note on different forms of energy (one mark for each form of energy)	7	7	
8	Static friction – definition, self-adjusting property, limiting friction	2	7	
	Kinetic friction – definition, properties like independent of velocity and opposite to the direction of motion	2		
	Three methods to reduce friction	3		
9	Young's modulus (definition + derivation of equation)	2	7	
	Rigidity modulus (definition + derivation of equation)	3		
	Bulk modulus (definition + derivation of equation)	2		
10	Bernoulli's theorem (statement + figure)	2	7	
	Schematic diagram of the atomizer and its description	2		
	Working of atomizer	3		

11	Conduction of heat through solids	2	7	
	Thermal conductivity and derivation of equation	3		
	Two practical uses of thermal conductivity	2		
12	Diagram	1	7	
	<i>Force = Pressure × area, $F_1 = P_1A$ and $F_2 = P_2A$</i>	1		
	$(P_2 - P_1) A = mg$	1		
	$(P_2 - P_1) A = \rho gh$	2		
	$P_1 = P_{atm}, P_2 = P, P = P_{atm} + \rho gh$	2		