

**(A)** 1:3 **(B)** 3:1 **(C)** 9:1 **(D)** 1:9



**Q.6** If in casa A, elimination in wire of length  $Lis\Delta L$ , thenfor the same wire, elongation in case B will be

**Q.7** A tensile force of magnitude 200 kN is applied on the prismatic steel rod having radius 10 mm and length 1 m Young's modulus of steel is  $2 \times 10^{11}$ N/m<sup>2</sup>, find out the elongation in steel rod.



**Q.8** Find the volumetric strain of the spherical ball of radius 10 cm whose volume changes by 4.18×10<sup>-6</sup>) m<sup>3</sup> under the application of bulk stresses.



**Q.9** A tangential force (F) is applied on the surface of the cuboidalboxas Shown in figure. Find out the shearing strain.



**Q.10** Two wires A and B of same material have radii in ratio 2: 1 and length 4: 1. the ratio of the normal forces required to produce the same change in the length of these two wires is:



(D)10.7 kg/s

## WORK SHEET

Q.1 A particle of mass m is moving in a straight line with momentum p. Starting at time t = 0, a force F = kt (k is a constant) acts along the direction of motion of particle for the time interval T so that its momentum changes from p to 5p. The value of T is

(A)
$$\sqrt{\frac{2p}{k}}$$
 (B) $2\sqrt{\frac{p}{k}}$  (C) $2\sqrt{\frac{2p}{k}}$  (D) $2\sqrt{\frac{k}{p}}$ 

**Q.2** If the thrust on a rocket moving with a velocity of 300 m/s is 210 N, the rate of combustion of the fuel is

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(A)0.007 kg/s
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**Q.3** Which of the following statements are correct?

(B)1.4 kg/s

- **1.** Centre of mass of a body always coincides with the centre of gravity of the body.
- 2. Centre of gravity of a body is the point where total gravitational torque on the body is zero.
- **3.** A couple on a body produces both translational and rotational motion in a body.

(C)0.4 kg/s

**Q.4** A rigid ball of mass m strikes a wall at 60° and gets reflected without loss of speed as shown in figure. The value of impulse imparted by the wall on the ball will be



**Q.5** A body of mass 1 kg begins to move under the action of a time dependent force  $\vec{F} = (2t\hat{i} + 3t^2\hat{j}) N$ , where  $\hat{i}$  and  $\hat{j}$  are the unit vectors along the x and y axis. What power will be developed by the force at the time t?

(A) 
$$(2t^3 + 3t^4)$$
 W (B) $(2t^3 + 3t5)$  W (C)  $(2t^3 + 3t3)$  W (D)  $(2t^2 + 4t4)$  W

- **Q.6** A man (mass = 70 kg) and his son (mass = 20 kg) are standing on a frictionless surface facing in same direction. The man pushes his son, so that he starts moving with a speed of  $0.90 \text{ ms}^{-1}$  with respect to man. The speed of man with respect to the surface is **(A)**  $0.20 \text{ ms}^{-1}$  **(B)**  $0.5 \text{ ms}^{-1}$  **(C)**  $0.6 \text{ ms}^{-1}$  **(D)**  $0.85 \text{ ms}^{-1}$
- Q.7 The potential energy of a system increases if work is done
  (A)upon the system by a non-conservative force.
  (B)by the system against a conservative force.
  (C) by the system against a non-conservative force.
  (D)upon the system by a conservative force.

**Q.8** An automobile moves on a rough road with a speed of 54 kmh<sup>-1</sup>. The radius of its wheels is 0.45 m and the moment of inertia of the wheel about its axis of rotation is 3 kg-m<sup>2</sup>. If the wheel is brought to rest in 15 s, then find magnitude of average torque transmitted by the brakes to wheel. Assume no slipping at all points of contact.

(A) 10.86 kg  $m^2 s^{-2}$ 

(C)  $6.66 \text{ kg m}^2 \text{s}^{-2}$ 

(D) $8.58 \text{ kg m}^2 \text{s}^{-2}$ 

Q.9 A mass m is moving with a constant velocity v along a line parallel to X-axis, away from origin. Then, its angular momentum with respect to the origin
 (A) is zero
 (B) remains constant
 (C) goes on increasing
 (D) goes on decreasing

**Q.10** The moment of inertia of a solid sphere, about an axis parallel to its diameter and at a distance of xfrom it is I(x). Which one of the graphs represents the variation of I(x) with x correctly?



**Q.11** A body submerged in water experiences which of the following types of strain?

**(B)**  $2.86 \text{ kg m}^2 \text{s}^{-2}$ 



	<b>(A)</b> Longitudinal strain	1	( <b>B)</b> Shear strain ( <b>D)</b> None of these						
	(C)Volumetric strain								
Q.12	Which option is correct about the elasticity of steel and rubber?								
	(A)Rubber is more ela	stic than steel.	<b>(B)</b> Steel is more	<b>(B)</b> Steel is more elastic than rubber.					
	<b>(C)</b> Both are equally el	astic.	<b>(D)</b> None of thes	<b>(D)</b> None of these					
Q.13	The value of Young's modulus of a perfectly rigid body is								
	<b>(A)</b> 1	<b>(B)</b> less than 1	<b>(C)</b> zero	(D)infinite					
Q.14	In a series combination of copper and steel wires of same length and same diameter, a force is applied at one of their ends while the other end is kept fixed. The combined length gets increased by 2 <i>cm</i> . The wires will have								
	(A)same stress and sa	me strain.	<b>(B)</b> different str	(B) different stress and different strain.					
	(C) different stress an	d same strain.	(D) same stress	(D) same stress and different strain.					
Q.15	Due to addition of impurities, the modulus of elasticity								
	(A) decreases		(B) increases	(B) increases					
	(C) remain Constant		(D) may increas	(D) may increases or decrease					

Q.18





**Q.17** A block of mass 3 kg produces an extension of 1 mm in a wire of length 4 m and diameter 4 mm when suspended at one end. The Young's modulus of the material of the wire will be (Assume:  $g = 10 \text{ m/s}^2$  and  $\pi = 3$ )



- (A)2 mm
   (B)4 mm
   (C)1 mm
   (D)8 mm
   (A)2 mm
   (B)4 mm<sup>2</sup> in area of cross section. If it takes 200 N to stretch this wire by
- (A) 200 N
   (B) 2000 N
   (C) 4000 N
   (D) 400 N
   (D) 400 N
  - 5 kg-wt? (Young's modulus of elasticity of wire (Y) =  $15 \times 10^{11}$  dyne/cm² and g = 10 m/s²)(A)0.19(B)0.019(C)1.9(D)19

Q.	1	2	3	4	5	6	7	8	9	10	
Sol.	(B)	(B)	(C)	(C)	(D)	(C)	(A)	(D)	(B)	(D)	
WORK SHEET											
Q.	1	2	3	4	5	6	7	8	9	10	
Sol.	(C)	(C)	(D)	(A)	(B)	(A)	(B)	(C)	(B)	(B)	
Q.	11	12	13	14	15	16	17	18	19	20	
Sol.	(C)	(B)	(D)	(D)	(D)	(C)	(A)	(B)	(B)	(A)	

ANSWER KEY