

Time : 1hr

Max. Marks = 80

PART TEST - 1

PAPER-2

INSTRUCTIONS

A. Question paper format:

1. The question paper consists of Physics Part. There are 4 sections.
2. Section I contains 4 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which only one is correct.
3. Section II contains 5 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which one or more is/are correct.
4. Section III contains 2 questions. Each question has four statements (A, B, C and D) given in column I and four statements (p, q, r and s) in Column II. Any given statement in Column I can have correct matching with one or more statement(s) given in Column II. For example, if for a given question, statement B matches with the statements given in q and r, then for that particular question, match B with q and r
5. Section IV contains 8 questions. The answer to each of the questions is a single - digit integer, ranging from 0 to 9.

B. Marking scheme:

6. For each question in Section I you will be awarded 3 marks for the correct answer and zero mark if question is not attempted. In case of incorrect answer, minus one (-1) mark will be awarded.
7. For each question in Section II, you will be awarded 4 marks for the correct choice(s) for the answer, and zero mark if question is not attempted. In all other cases, Minus one (-1) mark will be awarded.

8. For each question in Section IV, you will be awarded 2 marks for correct matching of each row in column 1 to the correct answer in column 2.

Thus, each question in this section carries a maximum of 8 marks. There is no negative marking for incorrect answer(s) for this section.

9. For each question in Section IV, you will be awarded 4 marks for the correct answer and zero mark if question is not attempted. In all other cases, minus one (-1) mark will be awarded.

SECTION-I

Single Correct Choice Type

This section contains 4 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out which **ONLY ONE** is correct.

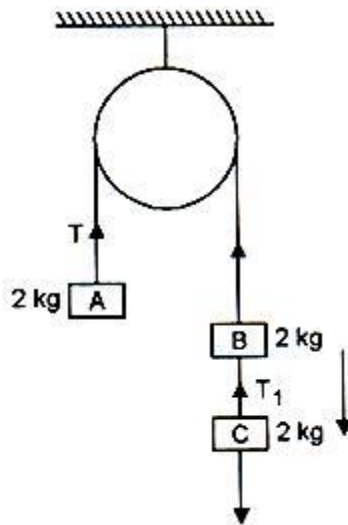
1. Which of the following pairs of quantities have the same dimensions?

- (A) density and specific gravity
- (B) stress and strain
- (C) force constant and surface tension
- (D) current and rate of flow liquid

2. A particle moves with a constant speed u along the curve $y = \sin x$. The magnitude of its acceleration at the point corresponding to $x = \pi/2$ is

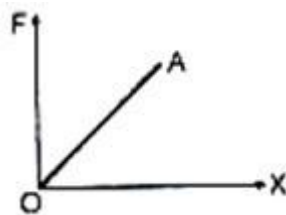
- (A) $u^2/2$
- (B) $u^2/ 2$
- (C) u^2
- (D) $2u^2$

3. Three equal weights A, B, C of mass 2 kg each are hanging on a string passing over a fixed frictionless pulley as shown. Tension in the string connecting weights B and C is approximately



- (A) 3.3 N
- (B) 6.6 N
- (C) zero
- (D) 13 N

4. A force required to stretch a spring varies with the distance as shown in the figure. If the experiment is performed with the above spring of half the length, the line OA will:



- (a) Shift towards F-axis

- (b) Shift towards X-axis
- (c) Remain as it is
- (d) Become double in length

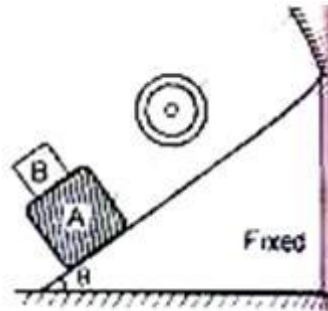
SECTION-II

Multiple Correct Choice Type

This section contains 5 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out which **ONE OR MORE** is/are correct.

5. The pair(s) of physical quantities that have the same dimensions is (are):
- (a) volumetric strain and coefficient of friction
 - (b) disintegration constant of a radioactive substance and frequency of light wave
 - (c) heat capacity and gravitational potential
 - (d) Planck's constant and torque
6. Two particles are projected from ground with same initial velocities at angles 30° and 60° (with horizontal). Let R_1 and R_2 be their horizontal ranges, H_1 and H_2 their maximum heights and T_1 and T_2 are the time of flights. Then:
- (a) $H_1/R_1 < H_2/R_2$
 - (b) $H_1/R_1 < H_2/R_2$
 - (c) $H_1/T_1 > H_2/T_2$
 - (d) $H_1/T_1 < H_2/T_2$

7. In the arrangement shown in figure pulley is smooth and massless and string is light. Friction coefficient between A and B is μ . Friction is absent between A and plane. Select the correct alternative(s):

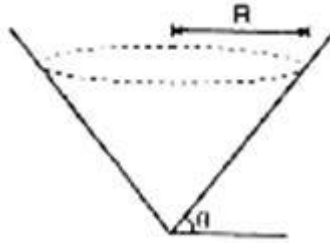


- (a) acceleration of the system is zero if $\mu \geq ((m_B - m_A)/m_B) \tan \theta$ and $m_B > m_A$
- (b) force of friction between A and B is zero if $m_A = m_B$
- (c) B moves upwards if $m_B < m_A$
- (d) tension in the string is $mg (\sin \theta - \mu \cos \theta)$ if $m_A = m_B = m$

8. The law of inertia applies to

- (A) moving objects
- (B) objects at rest
- (C) both moving and non moving objects
- (D) heavy objects only

9. A block of mass m is moving in a circle of radius R with speed v inside a smooth cone as shown in figure. Choose the wrong options.



- (a) $N = 0$ if $v = \sqrt{Rg \tan \theta}$
- (b) $N \sin \theta = mv^2/R$
- (c) block is in equilibrium
- (d) block is accelerated

SECTION - III

Matrix - Match Type

This section contains 2 questions. Each question contains statements given in two columns, which have to be matched. The statements in **Column I** are labeled A, B, C and D, while the statements in **Column II** are labeled p, q, r, s and t. Any given statement in **Column I** can have correct matching with **ONE OR MORE** statement(s) in **Column II**.

10. In the diagram shown in figure, match the following ($g = 10 \text{ m/s}^2$)

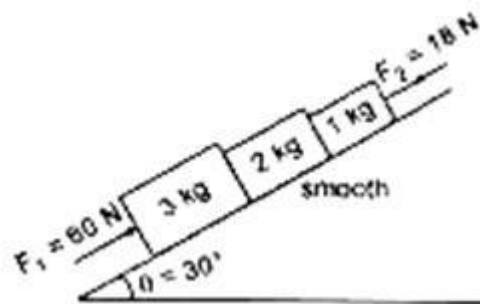


Table - 1		Table - 2	
(a)	Acceleration of 2 kg block	(p)	8 SI unit
(b)	Net force on 3 kg block	(q)	25 SI unit
(c)	Normal reaction between 2 kg and 1 kg	(r)	2 SI unit
(d)	Normal reaction between 3 kg and 2 kg	(s)	45 N
		(t)	None

(A) A(q,r),B(t),C(q),D(t)

(B) A(t),B(r),C(q),D(t)

(C) A(r),B(t),C(r),D(t)

(D) A(r),B(t),C(q),D(t)

11. In the system shown in figure, mass m is released from rest from position A. Suppose potential energy of m at point A with respect to point B is E . Dimensions of m are negligible and all surfaces are smooth. When mass m reaches at point B:

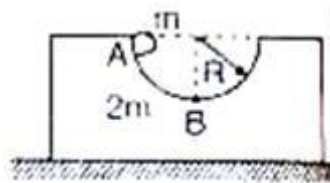


Table - 1		Table - 2	
(a)	Kinetic energy of m	(p)	$E/2$
(b)	Kinetic energy of $2m$	(q)	$2E/3$
(c)	Momentum of m	(r)	$(4/3 m/E)$
(d)	Momentum of $2m$	(s)	$(2/3 m/E)$
		(t)	None

(A) A(q),B(p),C(r),D(r)

- (B) A(q),B(p),C(r),D(t)
- (C) A(q,s),B(p),C(r),D(r)
- (D) A(q),B(p,q),C(r),D(r)

SECTION - IV

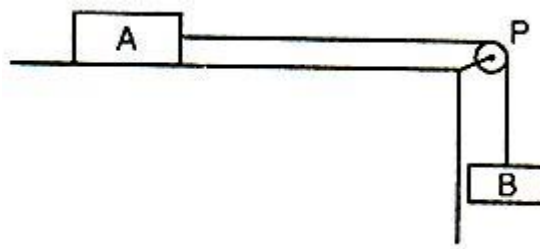
Integer Answer Type

This section contains 8 questions. The answer to each of the questions is a single digit integer, ranging from 0 to 9.

12. A particle moves along the sides AB, BC, CD of a square of side 25 m with a velocity of 15 ms^{-1} . Its average velocity is

- (A) 7m/s
- (B) 5m/s
- (C) 6m/s
- (D) 4m/s

13. Two blocks A and B are arranged as shown in the figure. The mass of block A is 10 kg. The coefficient of friction between block A and the horizontal plane is 0.2. What should be the minimum mass of block B to start motion?



- (A) 2Kg
- (B) 3Kg
- (C) 4Kg

(D) 1Kg

14. A ball is dropped from a height of 12 m. It loses 25% of its K.E. on striking the ground. Calculate the height to which it would bounce.

(A) 8m

(B) 7m

(C) 9m

(D) 6m

15. A body is under the action of two equal and opposite forces of 10 N each is displaced by 5 m. Work done is

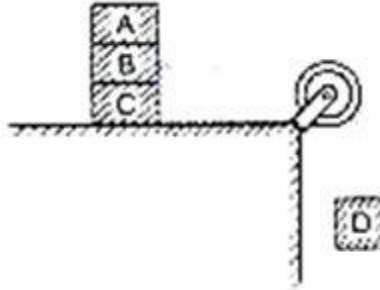
(A) 3J

(B) 4J

(C) 0J

(D) 2J

16. Three blocks A, B and C of equal mass m are placed one over the other on a smooth horizontal ground as shown in figure. Coefficient of friction between any two blocks of A, B and C is $\frac{1}{2}$. The maximum value of mass of block D so that the blocks A, B and C move without slipping over each other is:

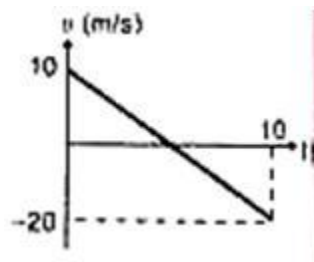


- (A) 3
- (B) 4
- (C) 5
- (D) 2

17. Two racing cars of masses m_1 and m_2 are moving in circles of radius 5Km and 10Km respectively. Their speeds are such that they make a complete circle in the same length of time. What is the ratio of the angular speeds of the first to the second car?

- (A) 2
- (B) 1
- (C) 3
- (D) 0

18. Velocity-time graph of a particle moving in a straight line is as shown in figure. Mass of the particle is 20 kg . What is the Work done by all the forces in KJ acting on the particle in time interval between $t = 0$ to $t = 10\text{ s}$?



- (A) 5KJ
- (B) 8KJ
- (C) 6KJ
- (D) 3KJ

19. A cyclist turns around a curve at 15 mile/hour. If he turns at double the speed, the tendency to overturn is how many times than that at 15 mile/hour?

- (A) 4 times
- (B) 8 times
- (C) 2 times
- (D) 6 times