

JUJUA University
Faculty of natural and computational sciences
Department of physics

General physics (phys.1011) Mid-term. Exam.

Time allowed: $1\frac{1}{2}$ hrs.

Date: 19- Jan-2024

Total mark: 30%

Instructions:

- No cell phones/ iPods are allowed during the examination at any time. You will be dismissed from the testing site if you are seen with one out. Please do not talk during the examination.
- If you have a problem, please raise your hand and wait quietly for a teacher.
- Please do not open examination booklet until directed to do so.
- Please ensure that you have the correct examination in front of you.
- Use a pen not a pencil on the answer sheet.
- Write your name and ID. No clearly on the space provided when directed to do so.
- At the conclusion of your examination please refrain from speaking until you are outside the exam room as there may still be other examination still in progress.
- Students are reminded that they are not permitted to leave the examination room early.

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ID. No: 4396

For instructors use only

Total Mark Obtained: _____



INSTRUCTION: I. Choose the best answer from the given alternatives and write your answer on the answer sheet in CAPITAL letter. Each question is worth $1\frac{1}{2}$ point.

The following constants will be given in the exam

$$g = 10\text{m/s}^2 \quad \sin 30^\circ = \cos 60^\circ = 0.5, \quad \cos 30^\circ = \sin 60^\circ = 0.866,$$

$$\sin 70^\circ = \cos 20^\circ = 0.94, \quad \cos 70^\circ = \sin 20^\circ = 0.34$$

- Which of the following numbers has least number of significant figures?
(A) 0.50530
(B) 0.20300
(C) 0.08097
(D) 60.134
- Which of the following has the dimension of work?
(A) $[ML^2T^{-2}]$
(B) $[MLT^{-1}]$
(C) $[ML^{-2}T^{-2}]$
(D) $[MLT^{-1}]$
- Which of the following lists comprises three vector quantities?
(A) Displacement, velocity, momentum
(B) velocity, acceleration, power
(C) displacement, velocity, energy
(D) Force, work, energy
- Three vectors $\vec{A} = \vec{B} + \vec{C}$ and the magnitudes of $\vec{A}$, $\vec{B}$, $\vec{C}$ are 5, 4, and 3 units, then the angle between $\vec{A}$ and $\vec{C}$ is
(A) $\cos^{-1}(3/5)$
(B) $\cos^{-1}(4/5)$
(C) $\sin^{-1}(3/4)$
(D) $\pi/2$
- A body moves 4m towards east and then 3m north. The displacement and distance covered by the body are
(A) 6m, 5m
(B) 5m, 7m
(C) 4m, 3m
(D) 7m, 6m



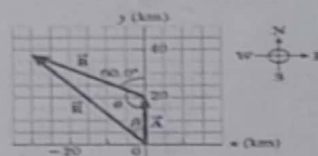
6. A and B are two towns I drive at 20kmh^{-1} from A to B and then back at 30kmh^{-1} from B to A. what was the average speed during my overall drive?

(A) 25 kmh^{-1}
 (B) 24 kmh^{-1}
 (C) 5 kmh^{-1}
 (D) 30 kmh^{-1}

7. Physical independence of force is a consequence of

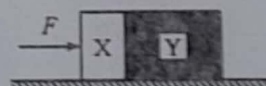
(A) Third law of motion
 (B) second law of motion
 (C) first law of motion
 (D) All of these laws

8. A car travels 20.0 km due north and then 35.0 km in a direction 60.0° west of north as shown in the figure, below. What are the magnitude and direction of the car's resultant displacement?



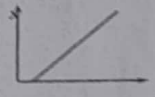
(A) $R = [50.1\text{ km}, 116^\circ]$
 (B) $R = [63.3\text{ km}, 110^\circ]$
 (C) $R = [74.5\text{ km}, 135^\circ]$
 (D) $R = [48.2\text{ km}, 129^\circ]$
 (E) $R = [38.7\text{ km}, 120^\circ]$

9. Two blocks, X and Y have masses m and $3m$ respectively. The given diagram below shows the blocks being accelerated along a smooth horizontal surface by a force F applied to block X. during the acceleration, what is the magnitude of the force exerted by block X on block Y?



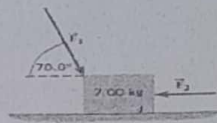
(A) $\frac{1}{4}F$
 (B) $\frac{1}{3}F$
 (C) $\frac{1}{2}F$
 (D) $\frac{3}{4}F$



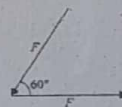
10. If a particle moves with a constant velocity
- (A) Its acceleration is positive
 - (B) its acceleration is negative
 - (C) its acceleration is zero
 - (D) its speed is zero
11. The position vectors of two-point masses 2 kg and 6 kg are $(-3\hat{i} + 2\hat{j} + 4\hat{k})$ m and $(3\hat{i} + 6\hat{j} + 5\hat{k})$ m respectively. Locate the position of center of mass
- (A) $3/2\hat{i} + 5\hat{j} + 19/4\hat{k}$
 - (B) $3/2\hat{i} + 2\hat{j} + 19\hat{k}$
 - (C) $3/2\hat{i} + 1/2\hat{j} + 1/4\hat{k}$
 - (D) $3\hat{i} + \hat{j} + 2\hat{k}$
12. The graph of position versus time for a car is given below. What can you say about the velocity of the car over time?
- 
- (A) It speeds up all the time
 - (B) It slows down all the time
 - (C) It moves at constant velocity
 - (D) Sometimes it speeds up and sometimes it slows down
13. The kinetic energy of a body of mass 2kg and momentum of 2kgm/s is
- (A) 1 J
 - (B) 2 J
 - (C) 3 J
 - (D) 4 J
14. A body of mass 10 kg initially at rest acquires velocity of 10 ms^{-1} . What is the work done?
- (A) -500 J
 - (B) 500 J
 - (C) -50 J
 - (D) 50 J



15. Two forces $\vec{F}_1$ and $\vec{F}_2$ act on the 7 kg block shown in the Fig. below. The magnitude of the forces are $F_1 = 82\text{ N}$ and $F_2 = 42\text{ N}$. What is the horizontal acceleration of the block



- (A) 2 m/s^2 west
 (B) 4 m/s^2 west
 (C) 6 m/s^2 west
 (D) 18 m/s^2 west
16. A body of mass 2 kg moves with a constant speed in a horizontal circle of radius 5 m . if one complete revolution takes 3 s what is the magnitude of the resultant force acting on the body?
- (A) $40\pi^2/9\text{ N}$
 (B) $4\pi^2/9\text{ N}$
 (C) $100\pi^2/9\text{ N}$
 (D) $400\pi^2/9\text{ N}$
17. Two forces each equal to F , act as shown in fig below. The resultant is



- (A) $F/2$
 (B) F
 (C) $\sqrt{3} F$
 (D) $\sqrt{5} F$
18. A block is given an initial velocity of 5.0 m/s up a frictionless incline of angle $\theta = 20.0^\circ$ (see Fig. below). How far up the incline does the block slide before coming to rest?



- (A) $\Delta S = 4.56\text{ m}$
 (B) $\Delta S = 6.40\text{ m}$
 (C) $\Delta S = 3.65\text{ m}$
 (D) $\Delta S = 5.36\text{ m}$



19. A block slides down an incline of 30° with an acceleration equal to $g/4$. Find the coefficient of kinetic friction.

(A) $1/\sqrt{3}$

(B) $1/2\sqrt{3}$

(C) $2\sqrt{3}$

(D) $4\sqrt{3}$

20. Which of the following is correct

(A) Momentum is conserved in all collisions, but kinetic energy is conserved only in inelastic collisions

(B) Neither momentum nor kinetic energy is conserved in inelastic collisions

(C) Momentum is conserved in all collisions but not kinetic energy

(D) Both momentum and kinetic energy are conserved in all collisions

