

SECTION-A (20x1=20 Mark)**Answer all the questions, each question carries 1 mark**

1) Choose the correct order of magnitude of forces of the following (F_g =Gravitational force , F_e = Electrical force , F_n = Nuclear force)

a) $F_g < F_n < F_e$

b) $F_g < F_e < F_n$

c) $F_e > F_g > F_n$

d) $F_n < F_e < F_g$

2) $1 \text{ kg-m}^2/\text{s} = \text{_____ g-cm}^2/\text{s}$

a) 10^3

b) 10^{-7}

c) 10^7

d) 10^{-3}

3) $1''$ (1 arc second) = _____ rad

a) $\frac{\pi}{180}$

b) $\frac{2\pi}{180 \times 60}$

c) $\frac{2\pi}{360 \times 60 \times 60}$

d) None

4) Absolute error of the measurement is

a) the difference between the individual measurement and the true value of the quantity cubed.

b) the difference between the individual measurement and the true value of the quantity

c) the difference between the individual measurement and the true value of the quantity squared.

d) the difference between two individual measurements and their mean

5) A physical quantity X is related to four measurable quantities a,b,c and d as $X = a^3 b^2 c^{3/2} d^{-4}$.

The percentage error in the measurement of a,b,c, and d are 2%,4%,6% and 3%. What is the percentage error in X?

a) 35

b) 12

c) 11

d) 21

6) A force F is given by $F = ct + dt^2$, where t is time. What are the dimensions of c and d? (Hint :- Force $F = ma$, where m is mass & a is acceleration)

a) MLT^{-1} and MLT^0

b) MLT^{-3} and ML^2T^{-4}

c) MLT^{-4} and MLT^1

d) MLT^{-3} and MLT^{-4}

7) If mass of the substance is 85.23 g and its volume is 2.54 cm^3 , the density of the substance in correct significant figures is

a) 33.6 g/cm^3

b) 33.5 g/cm^3

c) 33.55 g/cm^3

d) 33.56 g/cm^3

8) The slope of position –time graph form motion is

a) displacement

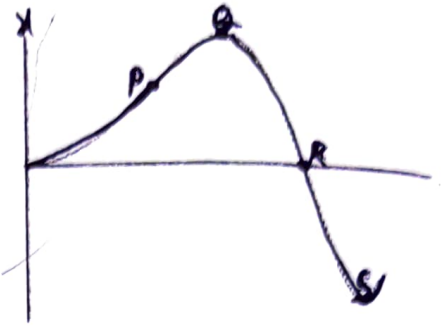
b) average velocity

c) acceleration

d) None

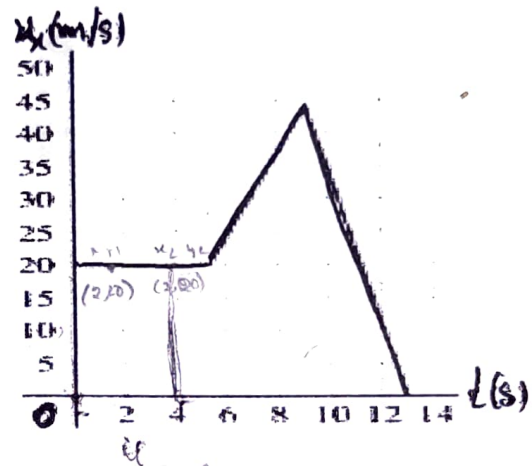
9) In the given x-t graph, at what point the velocity is zero and acceleration is negative

- a) P
- b) Q
- c) R
- d) S



10) In the given velocity-time graph, find the displacement in the time interval from $t=0$ to $t=4$ s

- a) 60 m
- b) 120 m
- c) 70 m
- d) 80 m



11) The numerical ratio of average speed to average velocity is

- a) Greater than or equal to 1
- b) Less than or equal to 1
- c) equal to 1
- d) Zero

12) A bullet is moving with a speed of 80 m/s strikes a wooden block and penetrates 2 cm before stopping. What is the retardation of the bullet in the wooden block in m/s^2 ?

- a) 160000
- b) 16000
- c) 160
- d) 1600

13) An athlete finishes a round of circular track of radius R in 40 sec. What is his distance and displacement at the end of 2 min?

- a) $2\pi R, 6R$
- b) $4\pi R, 2R$
- c) $6\pi R, 0$
- d) $2R, 6\pi R$

14) A boy starts from a point A, travels to a point B at a distance of 6 km from A and returns to A. If he takes three hours to do so, his speed is

- a) 2 km/h
- b) 3 km/h
- c) 4 km/h
- d) 0 km/h

15) What is the magnitude of unit vector

- a) Zero
- b) one
- c) Constant but not zero
- d) None

16) Pick up scalar from the following physical quantities

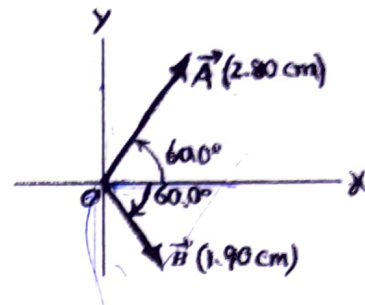
- a) force
- b) acceleration
- c) velocity
- d) temperature

17) The angle made by the vector $A=2\mathbf{i}+2\mathbf{j}$ with positive x-axis

- a) 135°
- b) 45°
- c) 225°
- d) 315°

18) Find the magnitude and direction of resultant vector $R = A + B$ from the given fig.

- a) 2.47 cm, 18.3° b) 2.47 cm, 71.7°
 c) 2.47 cm, -18.3° d) 2.47 cm, 198.3°

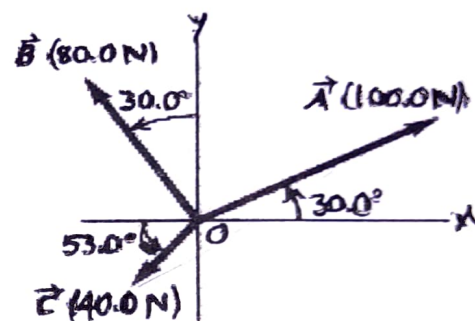


19) When two right angled vectors of magnitude 6 units and 8 units combine, what is the magnitude of their resultant

- a) 10 ✓ b) 8 c) 6 d) 14

20) What are the x and y-components of resultant vector, $R = A + B - C$ for the given picture.

- a) $R_x = 22.53 \text{ N}$, $R_y = 87.3 \text{ N}$
 b) $R_x = 70.67 \text{ N}$, $R_y = 151.2 \text{ N}$
 c) $R_x = -22.53 \text{ N}$, $R_y = -87.3 \text{ N}$
 d) $R_x = -70.67 \text{ N}$, $R_y = -151.2 \text{ N}$



Section- B (2x5 = 10 Marks)

Answer any 2 questions from the following. Each question carries 5 marks

- a) Define accuracy and precision of an instrument. (2M)

b) In case of a simple pendulum, the time period of oscillation depends on its length (l), mass of the bob (m) and the acceleration due to gravity (g). Derive the expression for its time period using the method of dimensions. (3M)
- a) Define average speed and average velocity. (2M)

b) The position of an object moving along x-axis is given by $X = a + bt^2$ Where $a = 6 \text{ m}$; $b = 2 \text{ ms}^{-2}$ and 't' is measured in seconds. (i) What is its velocity at $t = 3$ Seconds (ii) What is the average velocity between $t = 3$ Sec and $t = 6$ Sec. (3M)
- a) Derive the kinematic equations of a motion of a body moving with constant acceleration. (3M)

b) A ball is thrown vertically upwards with a velocity of 10 m/s from the top of a building. The height of the building is 25 m . Find the time taken by the ball to reach the ground (2M).
- a) State parallelogram law of vectors. Derive an expression for the magnitude and direction of the resultant vector. (3M)

b) Two forces of magnitudes '3' units each act at 120° with each other. What is the magnitude of their resultant? (2M)