



## Part - II

## II. Answer any 3 questions: (Ques.No.14 is compulsory)

3 x 2 = 6

11. Write any four limitations of dimensional analysis.
12. Define the S.I. unit of temperature.
13. Write down the Kinematic equations of circular motion.
14. Two balls are released simultaneously from the top of a building, one is allowed to fall freely and the other thrown with some horizontal velocity. Of the two balls, which one will hit the earth first? Substantiate your answer with proper reasoning.
15. Calculate the average velocity of the particle whose position vector changes from  $\vec{r}_1 = 5\hat{i} + 6\hat{j}$  to  $\vec{r}_2 = 2\hat{i} + 3\hat{j}$  in a time 5 second.

## Part - III

## III. Answer any 3 questions: (Ques.No.20 is compulsory)

3 x 3 = 9

16. If in cgs system the value of 76 cm of mercury pressure is  $76 \times 13.6 \times 980 \text{ dyne cm}^{-2}$ , convert it into S.I. unit.
17. Write any 6 rules for determining significant figures.
18. Derive an expression for the magnitude of resultant vector of two vectors using triangle law of addition of vectors.
19. Deduce the relation between linear speed and angular speed.
20. In the cricket game, a batsman strikes the ball such that it moves with the speed  $30 \text{ ms}^{-1}$  at an angle  $30^\circ$  with the horizontal. The boundary line of the cricket ground is located at a distance of 75 m from the batsman. Will the ball go for a six? (Neglect the air resistance and take acceleration due to gravity  $g = 10 \text{ ms}^{-2}$ )

## Part - IV

## IV. Answer all the questions:

2 x 5 = 10

21. The force  $F$  acting on a body moving in a circular path depends on mass of the body ( $m$ ), velocity ( $v$ ) and radius ( $r$ ) of the circular path. Obtain the expression for the force by dimensional analysis method. (Take the value of  $k = 1$ ) [5]  
(or)
  - i) Show that the path of the projectile thrown in horizontal direction is a parabola. [3]
  - ii) If an object thrown horizontally with initial speed  $10 \text{ ms}^{-1}$  from the top of a building of height 100 m. What is the horizontal distance covered by the particle. [2]
22. Derive the Kinematic equations of motion for constant acceleration. [5]  
(or)
  - i) What is meant by mean absolute error? Give its equation. [2]
  - ii) The voltage across a wire is  $(100 \pm 5) \text{ V}$  and the current passing through it is  $(10 \pm 2) \text{ A}$ . Find the distance of the wire. [3]

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