Q:1.The co-ordinates of a moving particle at any time *‘t’* are goven by *x = αt3* and *y = βt3*. The speed of the particle at time *‘t’* is given by:

(A) 

(B) 

(C) 

(D) 

Q:2.A goods train accelerating uniformly on a straight railway track, approaches an electric pole standing on the side of track. Its engine passes the pole with velocity *u* and the guard’s room passes with velocity *v*. The middle wagon of the train passes the pole with a velocity:

(A) 

(B) 

(C) 

(D) 

Q:3.A particle starts moving rectilinearly at time t = 0 such that its velocity v changes with time t according to the equation v = t2 – t where t is in seconds and v is in m/s. Find the time interval for which the particle retards:

(A) < t < 1

(B) > t > 1

(C) < t < 1

(D) < t < 

4.A metro train starts from rest and in five seconds achieves a speed 108 km/h. After that it moves with constant velocity and comes to rest after travelling 45m with uniform retardation. If total distance travelled is 395m, find total time of travelling:

(A) 12.2 s

(B) 15.3 s

(C) 9 s

(D) 17.2 s

5.The deceleration experienced by a moving motor boat after its engine is cut off, is given by dc/dt = – kv3 where k is a constant. If v0 is the magnitude of the velocity a cut-off, the magnitude of the velocity at a time *t* after the cut-off is:

(A) 

(B) v0 e–kt

(C) v0 / 2

(D) v0

6.A ball is dropped from the top of a tower of height 100 m and at the same time another ball is projected vertically upwards from ground with a velocity 25 ms–1. Then the distance from the top of the tower, at which the two balls meet is:

(A) 68.4 m

(B) 48.4 m

(C) 18.4 m

(D) 78.4 m

7.A stone tied to the end of a string of 1 m long is whirled in a horizontal circle with a constant speed. If the stone makes 22 revolutions in 44 seconds, what is the magnitude and direction of acceleration of the stone:

(A) π2 m s–2 and direction along the radius towards the centre

(B) π2 m s–2 and direction along the radius away from the centre

(C) π2 m s–2 and direction along the tangent to the circle

(D) π2/4 m s–2 and direction along the radius towards the centre

8.A particle moves so that its position vector is given by . Where is a constant. Which of the following is true ?

(A) Velocity and acceleration both are perpendicular to 

(B) Velocity and acceleration both are parallel to 

(C) Velocity is perpendicular to and acceleration is directed towards the origin

(D) Velocity is perpendicular to and acceleration is directed away from the origin

9.A ship A is moving Westwards with a speed of 10 km h–1 and a ship B 100 km South of A, is moving Northwards with a speed of 10 km h–1 . The time after which the distance between them becomes shortest is :

(A) 5 h

(B) h

(C) h

(D) 0 h

10.Two particles start simultaneously from the same point and move along two straight lines, one with uniform velocity *v* and other with a uniform acceleration *a.* If α is the angle between the lines of motion of two particles then the least value of relative velocity will be at time given by:

(A) sin α

(B) cos α

(C) tan α

(D) cot α