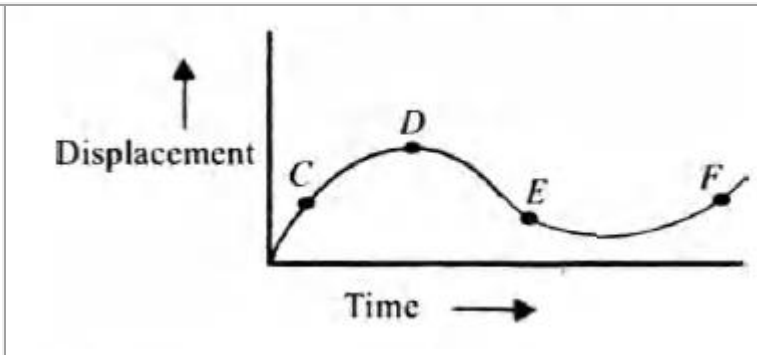
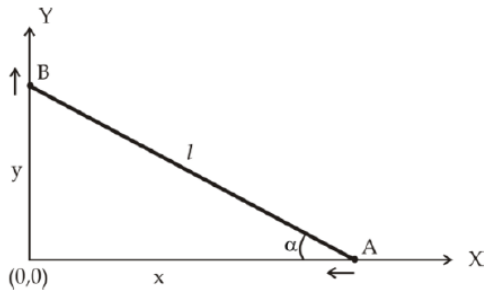
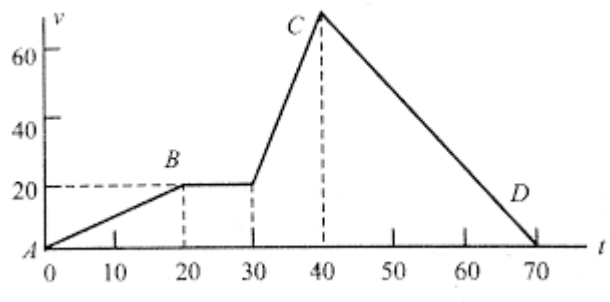
S.No.	Question Details			Marks
.	MCQS			
1	Speeds of two identical cars are u and 4 u at a specific instant. The ratio of the respective distance at which the two cars are stopped from that instant is			**1**
a	1:1	b	1:4	
c	1:8	d	1:16	
2	A car, starting from rest, accelerates at the rate f through a distance S, then continues at constant speed for time t and then decelerates at the rate f/2 to come to rest. If the total distance traversed is 5 S, then			**1**
a	S= f t	b	$S = 1/6\ f\ t^2$	
c	$S = ½\ f\ t^2$	d	$S = ¼\ f\ t^2$	
3	From a building two balls A and B are thrown such that A is thrown upwards and B downwards (both vertically). If V_A and V_B are their respective velocities on reaching the ground, then			**1**
a	$V_B > V_A$	b	$V_A = V_B$	
c	$V_A > V_B$	d	Their velocities depend on their masses	
4	A projectile can have the same range R for two angles of projection. If T1 and T2 be the times of flight in the two cases, then the product of two times of flight is directly proportional to:			**1**
a	$1/ R^2$	b	1/ R	
c	R	d	R^2	
5	A particle is acted upon by a force of constant magnitude, which is always perpendicular to the velocity of the particle. The motion of the particle takes place in a plane. It follows that			**1**
a	Its velocity is constant	b	Its acceleration is constant	
c	Its kinetic energy is constant	d	It moves in a circular path	
6	The displacement- time (x-t) graph of a moving particle is as shown in the figure			**1**

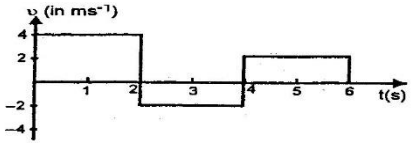
	 The instantaneous velocity of the particle is negative at the point			
a	C	b	D	
c	E	d	F	
7	Two particles A and B are connected by a rigid rod AB. The rod slides along perpendicular rails as shown. The velocity of A to the left is 10m/s. What is the velocity of B, when the angle α = 60˚? 			**1**
a	5.8 m/s	b	8.9 m/s	
c	11.2 m/s	d	17.3 m/s	
8	A cricket ball is hit at 45˚ to the horizontal with a kinetic energy E. The kinetic energy at the highest point is			**1**
a	0	b	E/2	
c	$E/\sqrt{2}$	d	E	
9	A particle of mass M is moving in a horizontal circle of radius R with uniform speed v. When it moves from one point to a diametrically opposite point, its			**1**
a	Kinetic energy changes by ½ M v^2	b	Momentum does not change	
c	Momentum changes by 2 M v	d	Kinetic energy changes by M v^2	

10	The velocity versus time curve of moving point is as shown in the figure. The maximum acceleration will be:  			**1**
a	$4\ m/s^2$	b	$3\ m/s^2$	
c	$2\ m/s^2$	d	$1\ m/s^2$	
11	A bullet loses 1/20 of its velocity after penetrating a plank. How many planks are required to stop the bullet?			**1**
a	6	b	9	
c	11	d	13	
12	The area of the acceleration- displacement curve of a body gives			**1**
a	impulse	b	Change in momentum per unit mass	
c	Change in kinetic energy per unit mass	d	Total change in energy	
13	The angle for which maximum height and horizontal range are same for a projectile is:			**1**
a	32˚	b	48˚	
c	76˚	d	84˚	
14	At the uppermost point of a projectile, its velocity and acceleration are at an angle of			**1**
a	0˚	b	45˚	
c	90˚	d	180˚	
15	A ball is rolled off along the edge of a horizontal table with velocity 4 m/s. It hits the ground after time 0.4 s. Which one of the following is correct?			**1**

a	The height of the table is 0.8 m	b	It hits the ground at an angle of 60˚ with the vertical	
c	It covers a horizontal distance 1.6 m from the table	d	It hits the ground with a vertical velocity of 4m/s	
16	Assertion: A body may be accelerated even when it is moving uniformly. Reason: When direction of motion of the body is changing, the body must have acceleration.			**1**
a	Assertion is correct, reason is correct; reason is a correct explanation for assertion	b	Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
c	Assertion is correct, reason is incorrect	d	Assertion is incorrect, reason is correct	
17	The position-time graph of a uniform motion, in one dimension of a body cannot have negative slope. Reason: In one – dimensional motion the position does not reverse, so it cannot have a negative slope			
a	Assertion is correct, reason is correct; reason is a correct explanation for assertion	b	Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
c	Assertion is correct, reason is incorrect	d	Assertion is incorrect, reason is correct	
18				
a	Assertion is correct, reason is correct; reason is a correct explanation for assertion	b	Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
c	Assertion is correct, reason is incorrect	d	Assertion is incorrect, reason is correct	
19				
a	Assertion is correct, reason is correct; reason is a correct explanation for assertion	b	Assertion is correct, reason is correct; reason is not a correct explanation for assertion	

c	Assertion is correct, reason is incorrect	d	Assertion is incorrect, reason is correct	
20				
a	Assertion is correct, reason is correct; reason is a correct explanation for assertion	b	Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
c	Assertion is correct, reason is incorrect	d	Assertion is incorrect, reason is correct	
21	Two trains along the same straight rails are moving with constant velocity of 60 km/hr and 30 km/hr towards each other. If at time t= 0, the distance between them is 90 km. Find the time they collide.			**1**
22	The position of stone dropped from a cliff is given by $x = 5\ t^2$ where x is in meters and t is in seconds. What is the acceleration of the stone at t = 2 s?			**1**
23	The velocity- time graph of two bodies A and B make angles of 30˚ and 60˚ with the time axis. What is the ratio of their accelerations?			**1**
24	What is the acceleration of a body when its v-t graph is i) Perpendicular to time axis ii) Parallel to time axis			**1**
25	A stone is thrown vertically upward with an initial velocity of 14 m/s. What is the maximum height reached? ($g = 9.8\ m/s^2$)			**1**
26	A body is dropped from a height h. In how much time will it reach the ground?			**1**
27	What is the velocity of a body on reaching the point, from which it was projected upwards?			**1**
28	Two projectiles are projected with the same velocity. If one is projected at an angle of 30˚ and the other at 60˚ to the horizontal, then find the ratio of maximum height reached.			**1**
29	A body is released from the top of a tower of height h metres. It takes t seconds to reach the ground. Where is the ball at time t/2 seconds?			**1**
30	The magnitudes of vectors **A, B** and **C** are 12, 5 and 13 units respectively and **A+ B = C**. Find the angle between vectors A and B?			**1**

31	A moving body is covering distances in proportion to the square of time along a straight line. How does the acceleration of the body change? (Ans-Acceleration remains constant)	**1**
32	If the displacement- time graphs of a particle parallel to (a) displacement axis (b) the time axis, what will be the velocity of the particle?	**1**
33	A boat is moving with a velocity (3 **i** + 4 **j**) with respect to ground. The water in the river is moving with a velocity (3 **i** - 4 **j**) with respect to ground. What is the relative velocity of boat with respect to water?	**1**
34	What is the angle made by vector of A =2 **i** + 2 **j** with x-axis?	**1**
35	Find the ratio of the distance covered to the displacement covered by a body along a semi – circle of radius r (Ans – Π/ 2)	**1**
36	Two bodies are projected at a angle θ and (90 - θ) to the horizontal with the same speed. Find the ratio of their times of flight?	**1**
37	Two particles are moving with constant speed *v* such that they are always at a constant distance *d* apart and their velocities are always equal and opposite. After what time, they return to their initial positions?	**2**
38	A body travels with velocity v_1 for time t_1 second and with velocity v_2 for time t_2 second in the same direction. Find the average velocity of the body?	**2**
39	An electron starting from rest has a velocity that increases linearly with time that is $v=kt$, where $k=2m/s^2$. What will be the distance covered in first 3 seconds of its motion?	**2**
40	There are two displacement vectors, one of the magnitude 3 meter and the other4 meters. How would the two vectors be added so that the magnitude of the resultant vector be (a) 7 meters (b)1 meter and (c) 5 meters.	**2**
41	Prove that there are two times for which the projectile travels the same vertical distance.	**2**
42	Find the angle of projection for a projectile motion whose range R is *n* times the maximum height H.	**2**
43	A table clock has its minute hand 4.0 cm long. Find the average velocity of the tip of the minute hand (a) between 6 a.m to 6.30 a.m. and (b) between 6 a.m to 6.30 p.m. [Ans. (a) 4.48×10^{-3}cm/s (b) 1.8×10^{-4} cm/s]	**3**

44	A ship moves due east at 12 km h^{-1} for one hour and then turns exactly towards south to move for an hour at 5 km h^{-1}. Calculate its average velocity for the given motion. [Ans. 6.5 km h^{-1}]	**3**
45	A train 110 m in length travels at 60 kmh^{-1}. In what time will it pass a man who is walking at 6 kmh^{-1} (a)in the opposite direction (b) in the same direction? [Ans. (a) 6 sec (b) 7.33 sec]	**3**
46	Two trains, each of length 100m, are running on parallel tracks. One overtakes the other in 20 second and one crosses the other than in 10 second. Calculate the velocities of two trains. [Ans. 15m/s, 5m/s]	**3**
47	From the top of a tower 200m in height, a ball is dropped and at the same time another ball is projected vertically upwards from the ground with a velocity of 50 ms^{-1}. Find when and where the two balls will meet. [Ans. 4sec after start, 78.4 from top]	**3**
48	A stone is dropped from a balloon at an altitude of 300 m. How long will the stone take to reach the ground if (a) the balloon is ascending with a velocity of 5 ms^{-1}.(b) the balloon is descending with a velocity of 5 ms^{-1} (c) the balloon is stationary? [Ans.(i)8.36s (ii)7.33s (iii)7.82s]	**3**
49	The velocity time graph of a body moving in a straight line is shown in Fig. Find the displacement and the distance travelled by the body in 6 seconds. [Ans: 8m, 16 m]  	**3**
50	Two cars start off to race with velocities v_1 and v_2 and let the corresponding acceleration be a_1 and a_2. If they reach the final path at the same instant, show that the length of the path is $2(v_1 - v_2)(v_1a_2 - v_2 a_1) / (a_1 - a_2)^2$	**3**
51	A car covers the first one third of a distance x at a speed of 10 km/hr, the second one third at a speed of 20 km/hr and the last one third at a speed of 60 km/hr. Determine the average speed of the car over the entire distance x (Ans- 18 km/hr)	**3**

52	If the horizontal range of a projectile is R and the maximum height attained by it is H, then prove that the velocity of projection is **$U = [\, 2\, g\, \{\, H + (R^2 / 16\, H)\}]^{1/2}$**	**3**
53	A body falling from rest describes distances S1, S2 and S3 in the first, second and third seconds of its fall. Find the ratio of S1:S2: S3 (Ans: 1:3:5)	**3**
54	A solid ball of density half that of water falls freely under gravity from a height of 19.6 m and then enters water. Up to what depth will the ball go. How much time will it take to come again to the water surface? Neglect air resistance and viscosity effects of water. (Ans. time take is 2 sec)	**3**
55	A boatman can row with a speed of 10 km/hr in still water. If the river flows steadily at 5 km/hr, in which direction should the boatman row in order to reach a point on the other bank directly opposite to the point from where he started? The width of the river is 2 km. (Ans: The boatman should row making an angle of 120˚with the bank of the river)	**3**
56	A boat covers a given distance in 6 hours moving downstream of a river. It covers the same distance in 10 hours moving upstream. What would it take to cover the same distance in still water? (Ans 7.5 seconds)	**3**
57	A particle is projected making an angle of 45˚ with the horizontal having kinetic energy K. What will be the kinetic energy at the highest point? (Ans: K/2)	**3**
58	If retardation produced by air resistance of projectile is one -tenth of acceleration due to gravity, how is the time taken to reach maximum height effected? (Ans: The time taken decreases to 90 percent)	**3**
59	A gun throws a shell with a muzzle speed of 98m/s. When the elevation is 45˚, the range is found to be 900 m. How much is the range decreased by air resistance? (Ans 80 m)	**3**
60	CASE STUDY -1 Read the following paragraph and answer the questions. When an object moves along a straight line with uniform acceleration, it is possible to relate its velocity, acceleration during motion and the distance covered by it in a certain time interval by a set of equations known as the equations of motion. For convenience, a set of three such equations are given below: v = u + at s = ut + ½ at2 2a s = v2 – u2 Where u is the initial velocity of the object which moves with	

	uniform acceleration a for Time t, v is the final velocity and s is the distance travelled by the object in time t. (i) Equation of motions are applicable to motion with a) uniform acceleration b) non uniform acceleration c) constant velocity d) none of these . (ii) An object is dropped from a tower falls with a constant acceleration of 10 m/s2. Find its speed 10 s after it was dropped. (iii) The brakes applied to a car produce an acceleration of 10 m/s2 in the opposite direction to the motion. If the car takes 1 s to stop after the application of brakes, calculate the distance traveled during this time by car. OR (iii)A bullet hits a Sand box with a velocity of 10 m/s and penetrates it up to 5 cm. Find the deceleration of the bullet in the sand box	
61	Case Study:2 Read the following paragraph and answer the questions. Average Speed and Average Velocity When an object is in motion, its position changes with time. So, the quantity that describes how fast is the position changing w.r.t. time and in what direction is given by average velocity. It is defined as the change in position or displacement (Δx) divided by the time interval (Δt) in which that displacement occurs. However, the quantity used to describe the rate of motion over the actual path, is average speed. It defined as the total distance travelled by the object divided by the total time taken. (i) A 250 m long train is moving with a uniform velocity of 45 km/h. Find the time taken by the train to cross a bridge of length 750 m. (ii) A cyclist is moving on a circular track of radius 40 m completes half a revolution in 40 s. Its average velocity (in m/s) is (iii) Average speed of a car between points A and B is 20 m/s, between B and C is 15 m/s and between C and D is 10 m/s. What is the average speed between A and D, if the time taken in the mentioned sections is 20s, 10s and 5s, respectively? OR	

	(iii) A truck requires 3 hours to complete a journey of 150 km. What is average speed?	