K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

	InSem Examination-I Winter 2023		
	Exam Seat No.:		
	Academic Year : 2023-2024	Semester : I	
	Name of Programme : F.Y.B.Tech	Pattern : 2023	
	Name of Course : Applied Physics (B)	Course Code : 2300103B	
	Max. Marks : 30	Duration : 1 Hr.	

|	**Instructions:** Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use. 1. This question paper contains 3 pages. 2. Answer to each new question is to be started on a new page. 3. Assume suitable data wherever required, but justify it. 4. Draw the neat labelled diagrams, wherever necessary. 5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question	

Question No. 1 Attempt following Question

a) Derive the equation of motions for the uniformly accelerated rectilinear motion of the particle using integrated method.   (6)   CO1

OR

b) Draw & interpret the following graphs pertaining the rectilinear motion

   i) Displacement - time curve

   ii) Velocity - time curve   (6)   CO1

   iii) Acceleration - time curve

c) The v-t diagram for the motion of the train as it moves from station A to station B is shown in fig. Determine the distance between the train and average speed of the train.

Also calculate the acceleration from v-t diagram and draw the a-t curve.
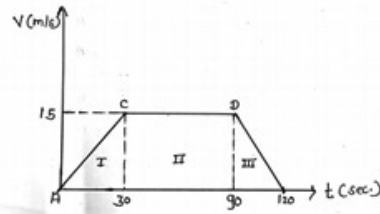
(5)   CO5

OR

d) The position of a particle is defined by $x = [(5t^4) + (6t^3) + (4t^2) + (3t)]$, where t is in seconds. Determine the magnitude of the position, velocity and acceleration when $t = 5$ s.

(5)   CO5

e) A ball is projected vertically upwards from a tower of height 24.6 m at a speed of 7 m/s. Find

1) Maximum height reached by ball

2) Time when it passes from its mean position.

(4)   CO4

OR

f) At an instant, two cars A & B move at a speed of 15 m/s in the same direction. Car B is 300 meter ahead of car A. If car A is accelerated at 6 m/s^2 while car B continues to move at the same speed, what will be the time taken by car A to overtake car B?

(4)   CO4

Question No. 2 Attempt following Question

a) Explain the terms angle of projection, horizontal range of a projectile and hence derive the equation for a trajectory of path of a projectile motion on a horizontal plane.

(6)   CO1

OR

b) Derive the equation for unit vector, velocity and acceleration using normal and tangential coordinate system for a particle moving along a curve.

(6)   CO1

c) A motorist is driving at 80 km/hr on the curved position of 400 m radius. He suddenly applies the brakes and that causes the speed to decrease to 45 km/hr at a constant rate in 8 seconds. Determine the tangential and normal components of acceleration immediately after the application of brakes and 4 seconds later.

(5)   CO5

OR

d) The polar coordinates of a particle moving along a plane curve are given by $r = t^3 - 3t + 10$ and $\theta = (0.5 r)$, where r is in meters, θ is in radians and t is in seconds. Determine the velocity and acceleration of a particle at $t = 2$ sec.

(5)   CO5

e)

A projectile is fired with a velocity of 75 m/s on horizontal plane.
Find its time of flight in the following two cases -

1) Its maximum height and horizontal range are
equal.

(4)   CO4

2) Its range is 4 times the maximum height .

OR

f)

A particle moves along curve $r = (5t^4)i - (t^3+6)j$, where t in sec
determine magnitude of particle velocity and acceleration when
t = 4.5 sec.

(4)   CO4