

## MAY JUNE 2017

- e) The position of a particle which moves along a straight line is given by  $x = t^3 - 6t^2 - 15t + 40$  where  $x$  is in meters and  $t$  is in seconds. Find the time at which velocity will be zero. Also find the position of the particle in that time. [4]

- Q6 a) The acceleration of an oscillating particle is defined by the relation  $a = -kx$ . Determine (i) the value of  $k$  such that  $v = 15$  m/sec when  $x = 0$  and  $v = 0$  when  $x = 3$  m and (ii) the speed of the particle when  $x = 2$  m. [4]

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## DEC 2016

- (c) A particle travels on a circular path whose arc distance travelled is defined by  $S = (0.5t^3 + 3t^2)$  m. If total acceleration is  $10 \text{ m/s}^2$  at  $t = 2$  sec, find radius of curvature. [4]

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## DEC 2016

- b. A particle starts from rest from origin and its acceleration is given by,  $a = \frac{k}{(x+4)^2} \text{ m/s}^2$ . Knowing that  $V = 4 \text{ m/s}$  when  $x = 8\text{m}$ , find (i) value of  $k$  and (ii) Position when  $V = 4.5\text{m/s}$ . [4]

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## DEC 2015

- c) A particle travels on a circular path, whose distance travelled is defined by  $S = (0.5t^3 + 3t)$  m. If the total acceleration is  $10 \text{ m/s}^2$ , at  $t = 2$  sec, find its radius of curvature. [4]

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## MAY 2015

- b) The  $y$  coordinate of a particle is given by  $y = 6t^3 - 5t$ . If  $a_x = 14t \text{ m/sec}^2$  &  $v_x = 4 \text{ m/sec}$  at  $t = 0$ , determine the velocity & acceleration of particle when  $t = 1$  second. 6

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## DEC 2014

- d. Acceleration of a particle moving along a straight line is represented by the relation  $a = 30 - 4.5x^2 \text{ m/s}^2$ . The starts with zero initial velocity at  $x = 0$ . Determine (a) the velocity when  $x = 3$  m (b) the position when the velocity is again zero (c) the position when the velocity is maximum. [4]

- c. A particle moves along a track which has a parabolic shape with a constant speed of  $10\text{m/sec}$ . The curve is given by  $y = 5 + 0.3x^2$ . Find the components of velocity and normal acceleration when  $x=2\text{m}$ . [4]
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## MAY 2014

- c) A point moves along the path  $y=x^2/3$  with a constant speed of  $3\text{m/s}$ . What are the x and y components of the velocities when  $x=3$ . What is the acceleration of the point when  $x=3$ . [4]
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## MAY 2013

- (d) A curvilinear motion of a particle is defined by  $v_x = 25 - 8t \text{ m/s}$  and  $y = 48 - 3t^2 \text{ m}$ . At  $t = 0$ ,  $x = 0$ . Find out position, velocity and acceleration at  $t = 4 \text{ sec}$ . 4
- (c) For a particle in rectilinear motion  $a = -0.05 V^2 \text{ m/s}^2$ , at  $v = 20 \text{ m/s}$ ,  $x = 0$ . Find  $x$  at  $v = 15 \text{ m/s}$  and  $\text{acc}^n$  at  $x = 50 \text{ m}$ . 4
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## DEC 2012

- d) A particle moving in the +ve x direction has an acceleration,  $a = 100 - 4v^2 \text{ m/s}^2$ . Determine, the time interval and displacement of a particle when speed changes from  $1\text{m/s}$  to  $3\text{m/s}$ . [04]
- b) A point moves along a path  $y=x^2/3$  with a constant speed of  $8\text{m/s}$ . What are the x and y components of its velocity when  $x=3$ ? What is the acceleration of the point at this instant? [06]
- c) The car moves in a straight line such that for a short time its velocity is defined by  $v = (9t^2 + 2t) \text{ m/s}$ . Where t is in seconds. Determine its position and acceleration when  $t = 3\text{sec}$ . [04]
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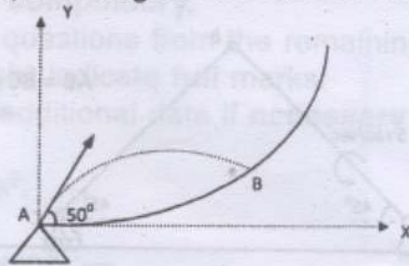
## DEC 2010

- 5A). The acceleration of the particle is defined by the relation  $a = 25 - 3x^2 \text{ mm/s}^2$ . The particle starts with no initial velocity at the position  $x = 0$ . (a) Determine the velocity when  $x = 2\text{mm}$  (b) the position when velocity is again zero (c) position where the velocity is maximum and the corresponding maximum velocity. (08 marks)
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## MAY JUN 2010

- (b) A particle moves in a plane with constant acceleration  $a = 4i \text{ m/s}^2$ . At  $t = 0$  the velocity of the particle was  $v_0 = i + 1.732j \text{ m/s}$ . Find velocity of the particle at  $t = 1 \text{ sec}$ . 8

- (b) The water sprinkler positioned at the base of a hill releases a stream of water with a velocity of 6 m/s as shown. Determine the point B (x,y) where the water particles strike the ground on the hill. Assume that the hill is defined by the equation  $y = 0.2 x^2$  m, and neglect the size of the sprinkler. 8



6. (a) A particle moves along a circle of radius 20 cm so that  $s = 20 \pi t^2$  cm. Find its tangential and normal acceleration after it has completed a revolution. 8