AIEEEAPPLICATION IN MECHANICS

1. If $2t = v^2$, then *dv*/*dt* is equal to

(a) 0 (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{v}$

2. The equation of motion of a particle moving along a straight line is $s = 2t^3 - 9t^2 + 12t$, where the units of *s* and *t* are *cm* and *sec*. The acceleration of the particle will be zero after

(a) $\frac{3}{2}$ *sec* (b) $\frac{2}{3}$ *sec* (c) $\frac{1}{2}$ *sec* (d) Never

3. A body moves according to the formula $v = 1 + t^2$, where *v* is the velocity at time *t*. The acceleration after 3 *sec* will be (*v* in *cm*/*sec*)

(a) 24 *cm*/*sec*^{2} (b) 12 *cm*/*sec*^{2} (c) 6 *cm*/*sec*^{2} (d) None of these

4. A particle moves in a straight line so that its velocity at any point is given by $v^2 = a + bx$, where $a, b \neq 0$ are constant. The acceleration is

(a) Zero (b) Uniform (c) Non-uniform (d) Indeterminate

5. The distance in seconds, described by a particle in *t* seconds is given by $s = ae^t + \frac{b}{e^t}$. The acceleration of the particle at time *t* is

(a) Proportional to *t* (b) Proportional to *s* (c) *s* (d) Constant

6. A stone thrown vertically upwards rises '*s*' *metre* in *t* seconds, where $s = 80t - 16t^2$, then velocity after 2 seconds is

(a) 8 *m per sec.* (b) 16 *m per sec.* (c) 32 *m per sec.* (d) 64 *m per sec.*

7. If the distance '*s*' travelled by a particle in time *t* is $s = a\sin t + b\cos 2t$, then the acceleration at $t = 0$ is

(a) *a* (b) $-a$ (c) $4b$ (d) $-4b$

8. A particle is moving on a straight line, where its position *s* (in *metres*) is a function of time *t* (in *seconds*) given by $s = at^2 + bt + 6, \quad t \geq 0$. If it is known that the particle comes to rest after 4 *seconds* at a distance of 16 *metres* from the starting position $(t = 0)$, then the retardation in its motion is

(a) $-1 m/\sec^2$ (b) $\frac{5}{4} m/\sec^2$ (c) $-\frac{1}{2} m/\sec^2$ (d) $-\frac{5}{4} m/\sec^2$

9. A point moves in a straight line during the time $t = 0$ to $t = 3$ according to the law $s = 15t - 2t^2$. The average velocity is

(a) 3 (b) 9 (c) 15 (d) 27

10. If the rate of increase of area of a circle is not constant but the rate of increase of perimeter is constant, then the rate of increase of area varies

(a) As the square of the perimeter (b) Inversely as the perimeter (c) As the radius (d) Inversely as the radius

11. Gas is being pumped into a spherical balloon at the rate of 30 *ft*^{3}/*min*. Then the rate at which the radius increases when its reaches the value 15 *ft* is

(a) $\frac{1}{30\pi} ft/\min.$ (b) $\frac{1}{15\pi} ft/\min.$ (c) $\frac{1}{20} ft/\min.$ (d) $\frac{1}{25} ft/\min.$

12. On dropping a stone in stationary water circular ripples are observed. Rate of flow of ripples is 6 *cm*/sec. When radius of the circle is 10 *cm*, then fluid rate of increase in its area is

(a) $120\pi\, cm/\sec$ (b) $120\, sq\, cm/\sec$ (c) $\pi\, sq\, cm/\sec$ (d) $120\pi\, sq\, cm/\sec$