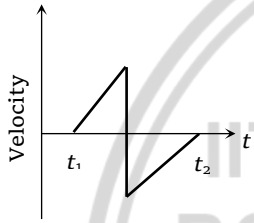
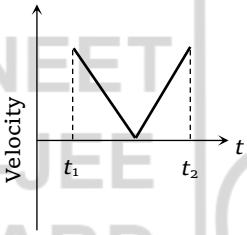
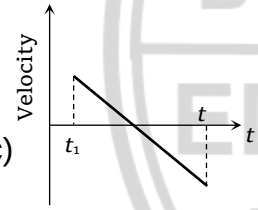
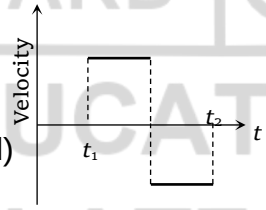
Graphical Question

1. A batsman hits a sixer and the ball touches the ground outside the cricket ground. Which of the following graph describes the variation of the cricket ball's vertical velocity v with time between the time t_1 as it hits the bat and time t_2 when it touches the ground

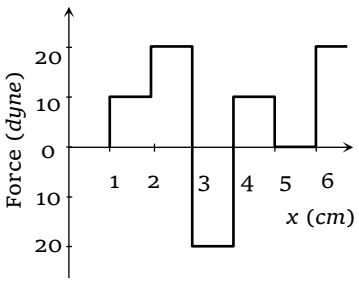
(a) 

(b) 

(c) 

(d) 

2. The relationship between force and position is shown in the figure given (in one dimensional case). The work done by the force in displacing a body from $x = 1\ cm$ to $x = 5\ cm$ is



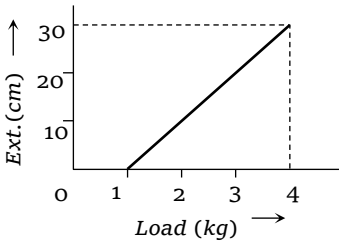
(a) 20 *ergs*

(b) 60 *ergs*

(c) 70 *ergs*

(d) 700 *ergs*

3. The pointer reading *v/s* load graph for a spring balance is as given in the figure. The spring constant is



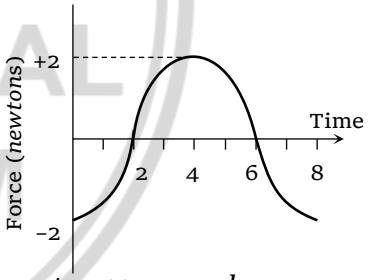
(a) 0.1 *kg/cm*

(b) 5 *kg/cm*

(c) 0.3 *kg/cm*

(d) 1 *kg/cm*

4. A force-time graph for a linear motion is shown in figure where the segments are circular. The linear momentum gained between zero and 8 *second* is



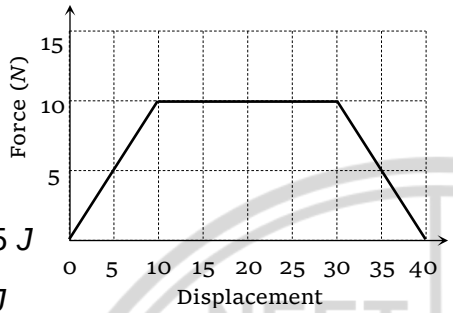
(a) $-2\pi newton \times second$

(b) $Zero\ newton \times second$

(c) $+4\pi newton \times second$

(d) $-6\pi newton \times second$

5. Adjacent figure shows the force-displacement graph of a moving body, the work done in displacing body from $x = 0$ to $x = 35m$ is equal to



(a) 50 *J*

(b) 25 *J*

(c) 287.5 *J*

(d) 200 *J*

6. A 10*kg* mass moves along *x*-axis. Its acceleration as a function of its position is shown in the figure. What is the total work done on the mass by the force as the mass moves from $x = 0$ to $x = 8cm$

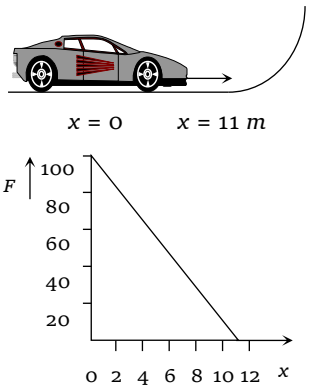
(a) $8 \times 10^{-2} joules$

(b) $16 \times 10^{-2} joules$

(c) $4 \times 10^{-4} joules$

(d) $1.6 \times 10^{-3} joules$

7. A toy car of mass 5 *kg* moves up a ramp under the influence of force *F* plotted against displacement *x*. The maximum height attained is given by



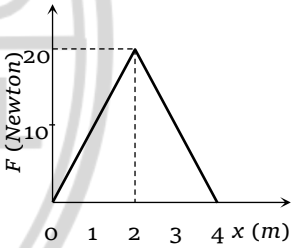
(a) $y_{max} = 20m$

(b) $y_{max} = 15m$

(c) $y_{max} = 11m$

(d) $y_{max} = 5m$

8. The graph between the resistive force *F* acting on a body and the distance covered by the body is shown in the figure. The mass of the body is 25 *kg* and initial velocity is 2 *m/s*. When the distance covered by the body is *4m*, its kinetic energy would be



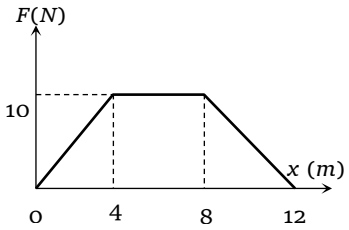
(a) 50 *J*

(b) 40 *J*

(c) 20 *J*

(d) 10 *J*

9. A particle of mass 0.1 *kg* is subjected to a force which varies with distance as shown in fig. If it starts its journey from rest at $x = 0$, its velocity at $x = 12m$ is



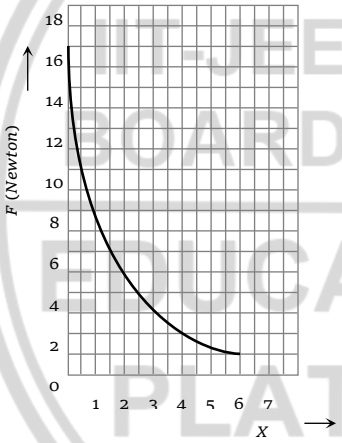
(a) 0 *m/s*

(b) $20\sqrt{2}m/s$

(c) $20\sqrt{3}m/s$

(d) $40m/s$

10. The relation between the displacement X of an object produced by the application of the variable force F is represented by a graph shown in the figure. If the object undergoes a displacement from $X = 0.5m$ to $X = 2.5m$ the work done will be approximately equal to



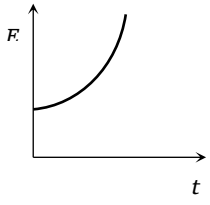
(a) 16 *J*

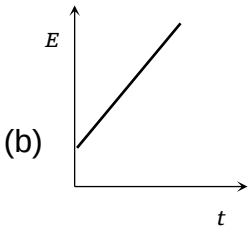
(b) 32 *J*

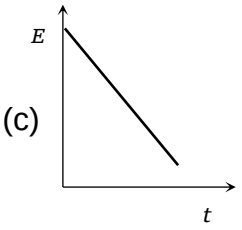
(c) 1.6 *J*

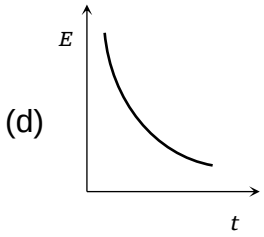
(d) 8 *J*

11. A particle is dropped from a height *h*. A constant horizontal velocity is given to the particle. Taking *g* to be constant every where, kinetic energy *E* of the particle *w. r. t.* time *t* is correctly shown in

(a) 

(b) 

(c) 

(d) 

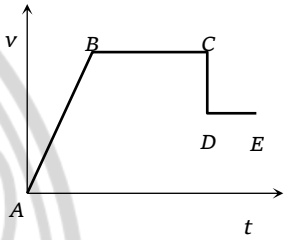
12. The adjoining diagram shows the velocity versus time plot for a particle. The work done by the force on the particle is positive from

(a) *A* to *B*

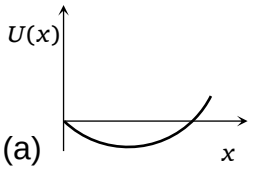
(b) *B* to *C*

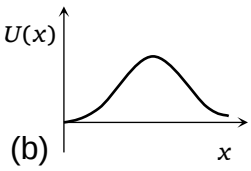
(c) *C* to *D*

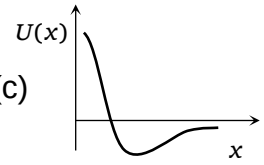
(d) *D* to *E*

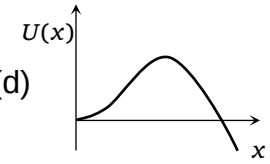


13. A particle which is constrained to move along the *x*-axis, is subjected to a force in the same direction which varies with the distance x of the particle from the origin as $F(x) = -kx + ax^3$. Here *k* and *a* are positive constants. For $x \geq 0$, the functional from of the potential energy $U(x)$ of the particle is

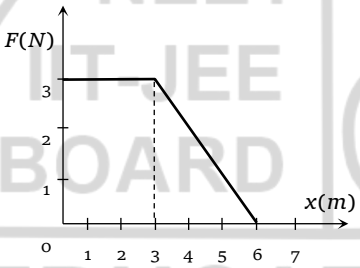
(a) 

(b) 

(c) 

(d) 

14. A force F acting on an object varies with distance x as shown here. The force is in *newton* and x in *metre*. The work done by the force in moving the object from $x = 0$ to $x = 6m$ is



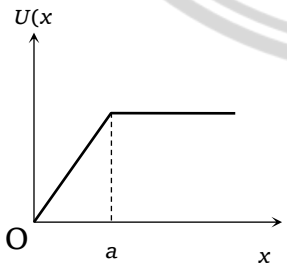
(a) 4.5 *J*

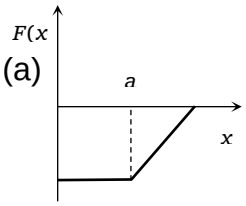
(b) 13.5 *J*

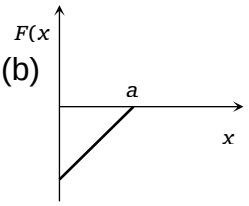
(c) 9.0 *J*

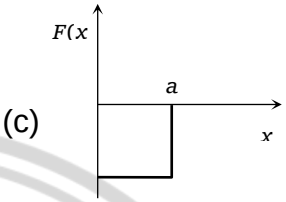
(d) 18.0 *J*

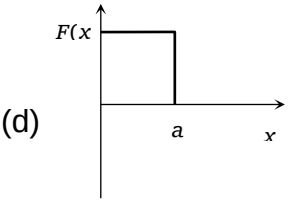
15. The potential energy of a system is represented in the first figure. the force acting on the system will be represented by

I. 

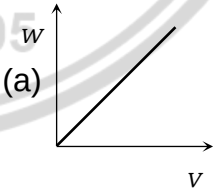
(a) 

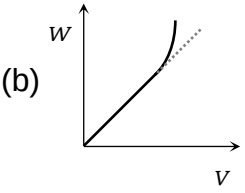
(b) 

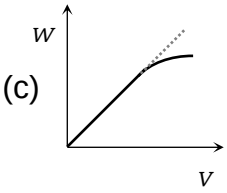
(c) 

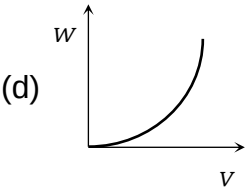
(d) 

16. A particle, initially at rest on a frictionless horizontal surface, is acted upon by a horizontal force which is constant in size and direction. A graph is plotted between the work done (W) on the particle, against the speed of the particle, (v). If there are no other horizontal forces acting on the particle the graph would look like

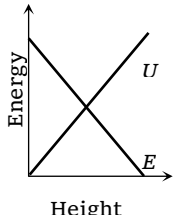
(a) 

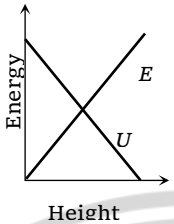
(b) 

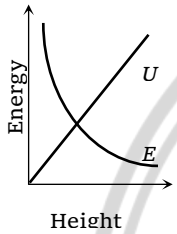
(c) 

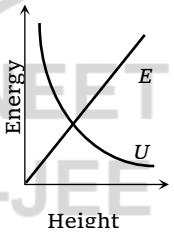
(d) 

17. Which of the following graphs is correct between kinetic energy (E), potential energy (U) and height (h) from the ground of the particle

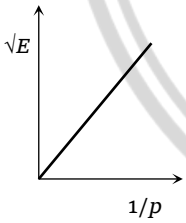
(a) 

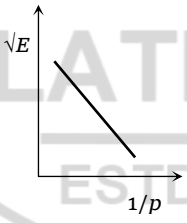
(b) 

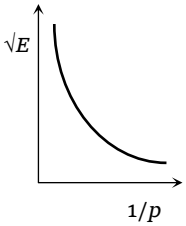
(c) 

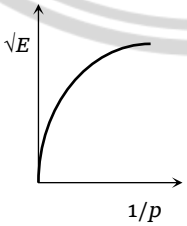
(d) 

18. The graph between $\sqrt{E}$ and $\frac{1}{p}$ is (E =kinetic energy and p = momentum)

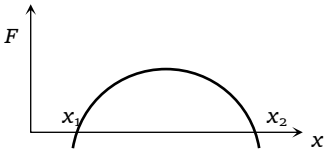
(a) 

(b) 

(c) 

(d) 

19. The force acting on a body moving along x-axis varies with the position of the particle as shown in the fig.



The body is in stable equilibrium at

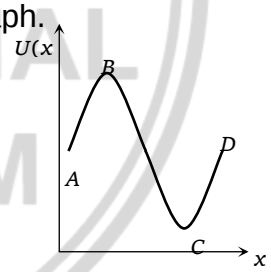
(a) $x = x_1$

(b) $x = x_2$

(c) both x_1 and x_2

(d) neither x_1 nor x_2

20. The potential energy of a particle varies with distance x as shown in the graph.

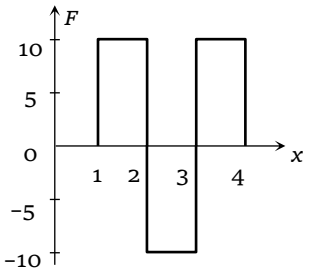


The force acting on the particle is zero at

(a) C (b) B

(c) B and C (d) A and D

21. Figure shows the F-x graph. Where F is the force applied and x is the distance covered

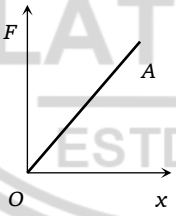


by the body along a straight line path. Given that F is in *newton* and x in *metre*, what is the work done ?

(a) 10 *J* (b) 20 *J*

(c) 30 *J* (d) 40 *J*

22. The force required to stretch a spring varies with the distance as shown in the figure. If the experiment is performed with the above spring of half length, the line OA will



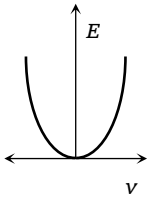
(a) Shift towards F-axis

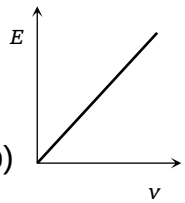
(b) Shift towards X-axis

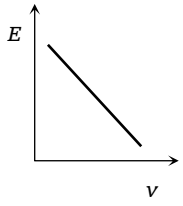
(c) Remain as it is

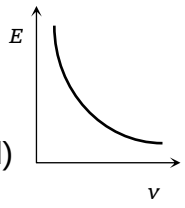
(d) Become double in length

23. The graph between E and v is

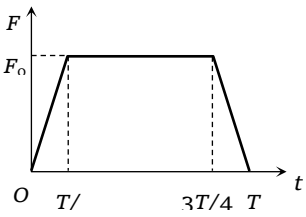
(a) 

(b) 

(c) 

(d) 

24. A particle of mass m moving with a velocity u makes an elastic one dimensional collision with a stationary particle of mass m establishing a contact with it for extremely small time T. Their force of contact increases from zero to F_0 linearly in time $\frac{T}{4}$, remains constant for a further time $\frac{T}{2}$ and decreases linearly from F_0 to zero in further time $\frac{T}{4}$ as shown. The magnitude possessed by F_0 is



(a) $\frac{mu}{T}$

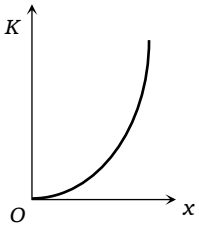
(b) $\frac{2mu}{T}$

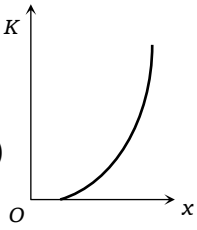
(c) $\frac{4mu}{3T}$

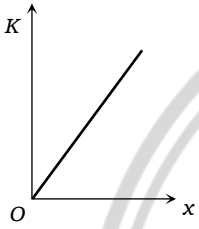
(d) $\frac{3mu}{4T}$

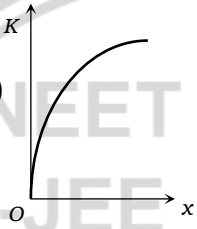
25. A body moves from rest with a constant acceleration. Which one of

the following graphs represents the variation of its kinetic energy K with the distance travelled x ?

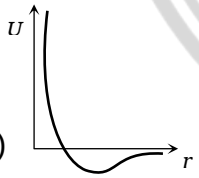
(a) 

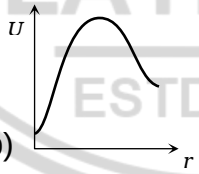
(b) 

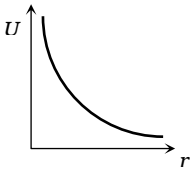
(c) 

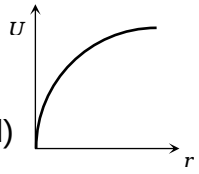
(d) 

26. The diagrams represent the potential energy U of a function of the inter-atomic distance r. Which diagram corresponds to stable molecules found in nature.

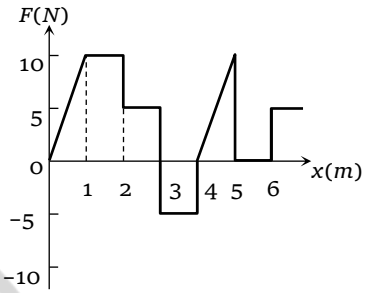
(a) 

(b) 

(c) 

(d) 

27. The relationship between the force F and position x of a body is as shown in figure. The work done in displacing the body from $x = 1\ m$ to $x = 5\ m$ will be



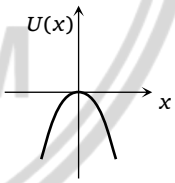
(a) 30 J

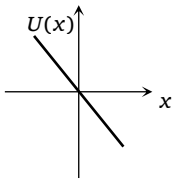
(b) 15 J

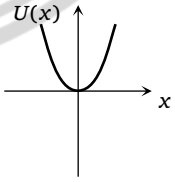
(c) 25 J

(d) 20 J

28. A particle is placed at the origin and a force $F = kx$is acting on it (where k is positive constant). If $U(0) = 0$, the graph of $U(x)$ versus x will be (where U is the potential energy function)

(a) 

(b) 

(c) 

(d)