# © 'doubtnut 

## PHYSICS

## BOOKS - NEET PREVIOUS YEAR

## (YEARWISE + CHAPTERWISE)

## WORK, ENERGY AND POWER

Objective

1. Consider a drop of rain water having mass 1 g
falling from a height of 1 km . It hits the ground
with a speed of $50 \mathrm{~m} / \mathrm{s}$ Take $g$ constant with a
volume $10 \mathrm{~m} / \mathrm{s}^{2}$. The work done by the
(i) gravitational force and the
(ii) resistive force of air is:
A. (i)-10J,(ii)-8.25J
B. (i)1.25J,(ii)-8.25J
C. (i)100J (ii) 8.75 J
D. (i) 10 J (ii)-8.75 J

Answer: d
2. A body of mass 1 kg begins to move under the action of a time dependent force $\vec{F}=\left(2 t \hat{I}+3 t^{2} \hat{j}\right) N$, where $\hat{i}$ and $\hat{j}$ are unit vectors along $x$-and $y$-axes. What power will be developed by the force at the time $t$ ?

$$
\begin{aligned}
& \text { A. }\left(2 t^{2}+4 t^{4}\right) W \\
& \text { B. }\left(2 t^{3}+3 t^{4}\right) W \\
& \text { C. }\left(2 t^{3}+3 t^{5}\right) W \\
& \text { D. }\left(2 t+3 t^{3}\right) W
\end{aligned}
$$

## - Watch Video Solution

3. What is the minimum velocity with which a body of mass $m$ must enter a vertical loop of radius R so that it can complete the loop?
A. $\sqrt{2 g R}$
B. $\sqrt{3 g R}$
C. $\sqrt{5 g R}$
D. $\sqrt{g R}$

## - Watch Video Solution

4. A paritcal of mass $10 g$ moves along a circle of radius 6.4 cm with a constant tangennitial acceleration. What is the magnitude of this acceleration. What is the magnitude of this acceleration if the kinetic energy of the partical becomes equal to $8 \times 10^{-4} J$ by the end of the second revolution after the beginning of the motion?
A. $0.15 m / s^{2}$

$$
\text { B. } 0.18 m / s^{2}
$$

C. $0.2 m / s^{2}$

$$
\text { D. } 0.1 \mathrm{~m} / \mathrm{s}^{2}
$$

## Answer: d

## D Watch Video Solution

5. Two identical balls $A$ and $B$ having velocity of $0.5 m / s$ and $-0.3 m / s$ respectively collide elastically in one dimension. The velocities of
$B$ and $A$ after the collision respectively will be
A. $-0.5 m / s$ and $0.3 m / s$
B. $0.5 m / s$ and $-0.3 m / s$
C. $-0.3 \mathrm{~m} / \mathrm{s}$ and $0.5 \mathrm{~m} / \mathrm{s}$

D. $0.3 \mathrm{~m} / \mathrm{s}$ and $0.5 \mathrm{~m} / \mathrm{s}$

## Answer: c

## - Watch Video Solution

6. A partical moves from a point $(-2 \hat{i}+5 \hat{j})$
to $(4 \hat{i}+3 \hat{j})$ when a force of (4hati +3 hatj) $\mathrm{N}^{\text {` }}$
is applied. How much work has been done by
the force?
A. 8 J
B. 11J
C. 5J
D. 2J

Answer: C

D Watch Video Solution
7. Two similar springs $P$ and $Q$ have spring constant $K_{P}$ and $K_{Q}$ such that $K_{P}>K_{Q}$. They are stretched, first by the same amount (case a), then the same force (case b). The work done by the spring $W_{P}$ and $W_{Q}$ are related as, in case (b), respectively

> А. $W_{P}=W_{Q}, W_{P}>W_{Q}$
> В. $W_{P}=W_{Q}, W_{P}=W_{Q}$
> с. $W_{P}>W_{Q}, W_{Q}>W_{P}$
D. $W_{P}<W_{Q}, W_{Q} t W_{P}$

## D Watch Video Solution

8. A block of mass 10 kg , moving in $x$-direction
with a constant speed of $10 \mathrm{~ms}^{-1}$, is subjected
to a retarding force $F=0.1 \times J / m$ during its
travel from $x=20 \mathrm{~m}$ to 30 m . Its final $K E$ will be
A. 475 J
B. 450 J
C. 275J

## D. 250J

## Answer: a

## - Watch Video Solution

9. A partical of mass $m$ is driven by a machine
that deleveres a constant power $k$ watts. If the partical starts from rest the force on the partical at time $t$ is

$$
\text { A. } \sqrt{\frac{m k}{2}} t^{-1 / 2}
$$

B. $\sqrt{m k} t^{-1 / 2}$
C. $\sqrt{2 m k} t^{-1 / 2}$

$$
\text { D. } \frac{1}{2} \sqrt{m k} t^{-1 / 2}
$$

## Answer: a

## - Watch Video Solution

10. Two particles of masses $m_{1}, m_{2}$ move with
initial velocities $u_{1}$ and $u_{2}$. On collision, one of
the particles get excited to higher level, after absording enegry. If final velocities of particles be $v_{1}$ and $v_{2}$ then we must have
A. $m_{1}^{2} u_{1}+m_{2}^{2} u_{2}^{2}-\varepsilon=m_{1}^{2} v_{1}+m_{2}^{2} v_{2}$
B.

$$
\frac{1}{2} m_{1} u_{1}^{2}+\frac{1}{2} m_{2} u_{2}^{2}=\frac{1}{2} m_{1} v_{1}^{2}+\frac{1}{2} m_{2} v_{2}-\varepsilon
$$

C.

$$
\frac{1}{2} m_{1} u_{1}^{2}+\frac{1}{2} m_{2} u_{2}^{2}-\varepsilon=\frac{1}{2} m_{1} v_{1}^{2}+\frac{1}{2} m_{2} v_{2}
$$

D.

$$
\frac{1}{2} m_{1} u_{1}^{2}+\frac{1}{2} m_{2} u_{2}^{2}+\varepsilon=\frac{1}{2} m_{1} v_{1}^{2}+\frac{1}{2} m_{2} v_{2}
$$

Answer: c
11. A mass $m$ moves in a circles on a smooth horizontal plane with velocity $v_{0}$ at a radius $R_{0}$. The mass is atteched to string which passes through a smooth hole in the plane as shown. The tension in string is increased gradually and finally $m$ moves in a cricle of radius $\frac{R_{0}}{2}$. the final value of the kinetic energy is


> A. $m v_{0}^{2}$
> B. $\frac{1}{4} m v_{0}^{2}$
> C. $2 m v_{0}^{2}$
> D. $\frac{1}{2} m v_{0}^{2}$

## Answer: C

## D Watch Video Solution

12. A ball is thrown vertically downwards from a
height of 20 m with an intial velocity $v_{0}$. It collides with the ground, loses $50 \%$ of its
energy in collision and rebounds to the same height. The intial velocity $v_{0}$ is (Take, $g=10$ $m s^{-2}$ )
A. $14 m s^{-1}$
B. $20 m s^{-1}$
C. $28 m s^{-1}$
D. $10 \mathrm{~ms}^{-1}$

Answer: b
13. The heart of a man pumps 5 liters of blood through the arteries per minute at a pressure of 150 mm of mercury. If the density of mercury be $13.6 \times 10^{3} \mathrm{~kg} / \mathrm{m}^{3}$ and $g=10 \mathrm{~m} / \mathrm{s}^{2}$ then the power of heat in watt is :
A. 1.7
B. 2.35
C. 3
D. 1.5

Answer: a
14. On a friction surface a block a mass $M$ moving at speed $v$ collides elastic with another block of same mass $M$ which is initially at rest .

After collision the first block moves at an angle
$\theta$ to its initial direction and has a speed $\frac{v}{3}$. The second block's speed after the collision is
A. $\frac{2 \sqrt{2}}{3}$
B. $\frac{3}{4} v$
C. $\frac{3}{\sqrt{2}} v$

$$
\text { D. } \frac{\sqrt{3}}{2} v
$$

## Answer: a

## - Watch Video Solution

15. A body of mass ( 4 m ) is laying in xy-plane at rest. It suddenly explodes into three pieces. Two pieces each mass ( m ) move perpedicular to each other with equal speeds (v). Total kinetic energy generated due to explosion is

[^0]B. $\frac{3}{2} m v^{2}$
C. $2 m v^{2}$
D. $4 m v^{2}$

Answer: b

## D Watch Video Solution

16. A uniform force of $(3 \hat{i}+\hat{j}) \mathrm{N}$ acts on a particle of mass 2 kg . Hence, the particle is displaced from position $(2 \hat{i}+\hat{k}) \mathrm{m}$ to position
$(4 \hat{i}+3 \hat{j}-\hat{k}) \mathrm{m}$. The work done by the force on the particle is
A. 9J
B. 6J
C. 13J
D. 15J

Answer: a

D Watch Video Solution
17. A body of mass $m$ taken form the earth's
surface to the height is equal to twice the radius $(R)$ of the earth. The change in potential energy of body will be
A. $m g 2 R$
B. $\frac{2}{3} m g R$
C. $3 m g R$
D. $\frac{1}{3} m g R$

Answer: b
18. The potential energy of a particle in a force
field is:
$U=\frac{A}{r^{2}}-\frac{B}{r}$, Where $A$ and $B$ are positive
constants and $r$ is the distance of particle from
the centre of the field. For stable equilibrium the distance of the particle is
A. $B / 2 A$
B. $2 \mathrm{~A} / \mathrm{B}$
C. $A / B$

## D. $B / A$

## Answer: b

## - Watch Video Solution

19. The potential energy of a system increased
if work is done
A. by the system against a conservative
force
B. by the system against a non conservative
force
C. upon the system by a conservative force

D. upon the system by a non conservative

force

Answer: a

- Watch Video Solution

20. force $F$ on a partical moving in a straight
line veries with distance $d$ as shown in the
figure. The work done on the partical during its
displacement of $12 m$ is

A. 21J
B. 26J
C. 13J

D. 18J

## Answer: c

## - Watch Video Solution

21. An engine pumps water through a hose pipe. Water passes through the pipe and leaves it with a velocity of $2 m s^{1}$. The mass per unit length of water in the pipe is $100 \mathrm{kgm}^{-1}$. What is the power of the engine?

# A. 400 W 

B. 200 W

C. 100W
D. 800 W

Answer: d

## D Watch Video Solution

22. An ideal spring with spring constant $k$ is
hung from the ceiling and a block of mass $M$ is attached to its lower end. The mass is released
with the spring initially unstretched. Then the maximum extension in the spring is
A. $\mathrm{Mg} / \mathrm{k}$
B. $2 \mathrm{Mg} / \mathrm{k}$
C. $4 \mathrm{Mg} / \mathrm{k}$
D. $\mathrm{Mg} / 2 \mathrm{k}$

Answer: b

- Watch Video Solution

23. An engine pumps water continously through a hose. Water leave the hose with a velocity $v$ and $m$ is the mass per unit length of the Water jet. What is the rate at Which kinetic energy is imparted to water?
A. $\frac{1}{2} m v^{3}$
B. $m v^{3}$
C. $\frac{1}{2} m v^{2}$
D. $\frac{1}{2} m^{2} v^{2}$

## - Watch Video Solution

24. A body of mass 1 kg is thrown upwards with a velocity $20 \mathrm{~ms}^{-1}$. It momentarily comes to rest after attaining a height of 18 m . How much energy is lost due to air friction? $\left(g=10 m s^{-2}\right)$
A. 20 J
B. 30J
C. 40 J

## D. 10J

## Answer: a

## - Watch Video Solution

25. An explosion blows a rock into three parts.

Two parts go off at right angles to each other .
These two are 1 kg first part moving with a velocity of $12 \mathrm{~ms}^{-1}$ and 2 kg second part moving with a velocity of $8 m s^{-1}$. If the third
part flies off with a velocity of $4 m s^{-1}$. Its mass would be
A. 5 Kg
B. 7 Kg
C. 17 Kg
D. 3 Kg

Answer: a

- Watch Video Solution

26. A shell of mass $200 g$ is ejected from a gun of mass 4 kg by an explosion that generate
$1.05 k J$ of energy. The initial velocity of the shell is
A. $100 m s^{-1}$
B. $80 m s^{-1}$
C. $40 m s^{-1}$

$$
\text { D. } 120 \mathrm{~ms}^{-1}
$$

Answer: a
27. Water falls from a height of 60 m at the rate
$15 \mathrm{~kg} / \mathrm{s}$ to operate a turbine. The losses due to
frictional forces are $10 \%$ of energy. How much power is generated to by the turbine? $\left(g=10 \mathrm{~m} / \mathrm{s}^{\wedge}(2)\right)^{\prime}$.
A. 8.1kW
B. 10.2 kW
C. 12.3 kW
D. 7.0kW

## D Watch Video Solution

28. 300 J of work is done in slinding a 2 kg block
up an inclined plane of height 10 m . Taking $\mathrm{g}=$
$10 \mathrm{~m} / \mathrm{s}^{2}$, work done against friction is
A. 200J
B. 100J
C. zero
D. 1000J

Answer: b

## - Watch Video Solution

29. A body of mass 3 kg is under a constant force which causes a displacement $s$ metre in it, given by the relation $s=\frac{1}{3} t^{2}$, where $t$ is in seconds. Work done by the force in 2 seconds is

> А. $\frac{5}{19} J$
> B. $\frac{3}{8} J$

> C. $\frac{8}{3} J$ D. $\frac{19}{5} J$

## Answer: c

## D Watch Video Solution

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

A. 4.5 J
B. 13.5 J
C. 9.0J
D. 18.0J

Answer: b
31. A bomb of mass 30 kg at rest explodes into two pieces of mass 18 kg and 12 kg . The velocity of mass $18 \mathrm{kgis} 6 \mathrm{~m} / \mathrm{s}$. The kinetic energy of the other mass is
A. 256 J
B. 486J
C. 524J
D. 324J

## - Watch Video Solution

32. A particle of mass m 1 is moving with a velocity $v_{1}$ and another particle of mass $m_{2}$ is moving with a velocity v2. Both of them have the same momentum but their different kinetic energies are E 1 and E 2 respectively. If $m_{1}>m_{2}$ then
A. $E_{1}<E_{2}$
B. $\frac{E_{1}}{E_{2}}=\frac{m_{1}}{m_{2}}$
C. $E_{1}>E_{2}$

$$
\text { D. } E_{1}=E_{2}
$$

## Answer: a

## - Watch Video Solution

33. A ball of mass 2 kg and another of mass 4 kg are dropped together from a 60 feet tall building. After a fall of 30 feet each towards earth, their respective kinetic energies will be the ratio of
A. $\sqrt{2}: 1$
B. 1: 4
C. $1: 2$
D. $1: \sqrt{2}$

## Answer: c

## D Watch Video Solution

34. A stone tied to a string of length $L$ is whirled in a vertical circle with the other end of the string at the centre. At a certain instant of
time the stone is at lowest position and has a
speed $u$. Find the magnitude of the change in
its velocity as it reaches a position, where the string is horizontal.

> A. $\sqrt{2\left(u^{2}-g l\right)}$
> B. $\sqrt{u^{2}-g l}$
> C. $u-\sqrt{u^{2}-2 g l}$
D. $\sqrt{2 g l}$

## Answer: a

## - Watch Video Solution

35. A stationary partical explodes into two partical of a masses $m_{1}$ and $m_{2}$ which move in opposite direction with velocities $v_{1}$ and $v_{2}$. The ratio of their kinetic energies $E_{1} / E_{2}$ is
A. 1
B. $\frac{m_{1} v_{1}}{m_{2} v_{2}}$
C. $\frac{m_{2}}{m_{1}}$
$m_{1}$
D. $\frac{m_{1}}{m_{2}}$

Answer: c

D Watch Video Solution
36. If kinetic energy of a body is increased by
$300 \%$, then percentage change in momentum will be
A. 1
B. 1.5
C. 2.65
D. 0.732

Answer: a
37. A stone is thrown at an angle of $45^{\circ}$ to the horizontal with kinetic energy K. The kinetic energy at the highest point is
A. $\frac{K}{2}$
B. $\frac{K}{\sqrt{2}}$
C. K
D. zero

Answer: a
38. A child is swinging a swing. Minimum and maximum heights fo swing from the earth's
surface are 0.75 m and 2 m respectively. The maximum velocity of this swing is
A. $5 m / s$
B. $10 m / s$
C. $15 m / s$
D. $20 \mathrm{~m} / \mathrm{s}$
39. Two bodies with kinetic energies in the ratio

4:1 are moving with equal linear momentum.
The ratio of their masses is
A. 1:2
B. 1:1
C. $4: 1$
D. 1:4

Answer: d

## - Watch Video Solution

40. Two equal masses $m_{1}$ and $m_{2}$ moving along the same straight line with velocites $+3 m / s$ and $-5 m / s$ respectively collide elastically. Their velocities after the collision will be respectively.
A. $+4 m / s$ for both
B. $-3 m / s$ and $+5 m / s$
C. $-4 m / s$ and $+4 m / s$

$$
\text { D. }-5 m / s \text { and }+3 m / s
$$

## Answer: d

## - Watch Video Solution

41. A foce acts on a 30.g particle in such a way
that the position of the particle as a function of time is given by
$x=3 t-4 t^{2}+t^{3}$, where x is in metre and t in
second. The work done during the first 4 s is
B. 450 mJ
C. 490 mJ
D. 528 mJ

## Answer: d

## D Watch Video Solution

42. A metal ball of mass 2 kg moving with a velocity of $36 \mathrm{~km} / \mathrm{h}$ has a head on collision with a stationery ball of mass 3 kg . If after the
collision, the two balls move together, the loss
in kinetic energy dur to collision is
A. 140J
B. 100J
C. 60J
D. 40 J

Answer: c
( Watch Video Solution
43. A body of mass $m$ moving with velocity
$3 \mathrm{~km} / \mathrm{h}$ collides with a body of mass 2 m at rest. Now, the coalesced mass starts to move with a velocity
A. $1 \mathrm{~km} / \mathrm{h}$
B. $2 k m / h$
C. $3 \mathrm{~km} / \mathrm{h}$
D. $4 \mathrm{~km} / \mathrm{h}$

Answer: a
44. If the momentum of a body is increased by $50 \%$, then the percentage increase in its kinetic energy is
A. 0.5
B. 1
C. 1.25
D. 2

Answer: c
45. The KE acquired by a mass $m$ in travelling a certain distance s, starting from rest, under the action of a constant force is directly proportional to :
A. $m$
B. $\sqrt{m}$
C. $\frac{1}{\sqrt{m}}$
D. independent $m$

## - Watch Video Solution

46. Two masses 1 g and 9 g are moving with equal kinetic energies. The ratio of the magnitudes of their respective linear momenta is
A. $1: 9$
B. 9:1
C. $1: 3$
D. $3: 1$

## Answer: c

## - Watch Video Solution

47. A force $\vec{F}=\left(7-2 x+3 x^{2}\right) \mathrm{N}$ is applied on a 2 kg mass which displaces it from $\mathrm{x}=0$ to $x=5 \mathrm{~m}$. Work done in joule is -
A. 35
B. 70
C. 135
D. 270

## D Watch Video Solution

48. Two identical balls $A$ and $B$ having velocity of $0.5 m / s$ and $-0.3 m / s$ respectively collide elastically in one dimension. The velocities of $B$ and $A$ after the collision respectively will be
A. $+0.5 m / s$ and $+0.3 m / s$
B. $-0.3 m / s$ and $+0.5 m / s$
C. $+0.3 \mathrm{~m} / \mathrm{s}$ and $0.5 \mathrm{~m} / \mathrm{s}$

$$
\text { D. }-0.5 \mathrm{~m} / \mathrm{s} \text { and }+0.3 \mathrm{~m} / \mathrm{s}
$$

## Answer: b

## D Watch Video Solution

49. The power of a motor pump is 2 kW . How much water per minute the pump can raise to a heiht of 10 m ? (Given $g=10 \mathrm{~m} / \mathrm{s}^{2}$ )
A. 1000 L
B. 1200 L

## C. 100L

## D. 2000L

## Answer: b

## - Watch Video Solution

50. A bullet of mass 10 g leaves a rifle at an intial velocity of $1000 \mathrm{~m} / \mathrm{s}$ and strikes the earth at the same level with a velocity of $500 \mathrm{~m} / \mathrm{s}$. The work done in joule to overcome the resistance of air will be
A. 375
B. 3750
C. 5000
D. 500

Answer: b

D Watch Video Solution
51. The coefficient of restitution e for a perfectly elastic collision is
A. 1
B. zero

## C. infinite

D. -1

Answer: a

- Watch Video Solution


[^0]:    A. $m v^{2}$

