

India's Number 1 Education App

## **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 1km. It hits the ground

with a speed of 50m/s Take g constant with a volume  $10m/s^2$ . 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) 8.75J

D. (i)10 J (ii)-8.75 J

## Answer: d

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

A. 
$$(2t^2 + 4t^4)W$$
  
B.  $(2t^3 + 3t^4)W$   
C.  $(2t^3 + 3t^5)W$   
D.  $(2t + 3t^3)W$ 

### Answer: c



**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. 
$$\sqrt{2gR}$$

B. 
$$\sqrt{3gR}$$

C. 
$$\sqrt{5gR}$$

D. 
$$\sqrt{gR}$$

Answer: c

**4.** A paritcal of mass 10g moves along a circle of radius 6.4cm 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  $8 imes 10^{-4}J$  by the end of the second revolution after the beginning of the motion?

A. 
$$0.15m/s^2$$

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

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

D.  $0.1m/s^2$ 

## Answer: d



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

B.  $0.5m/\mathrm{sand}-0.3m/s$ 

C. -0.3m/sand0.5m/s

D. 0.3m/sand0.5m/s

Answer: c

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6. A partical moves from a point  $\left(-2\hat{i}+5\hat{j}
ight)$  to  $\left(4\hat{i}+3\hat{j}
ight)$  when a force of (4hati + 3hatj) N`

is applied . How much work has been done by

the force?

A. 8J

B. 11J

C. 5J

D. 2J

Answer: c



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

A. 
$$W_P=W_Q, W_P>W_Q$$

B. 
$$W_P = W_Q, W_P = W_Q$$

 $\mathsf{C}.\,W_P > W_Q, W_Q > W_P$ 

D.  $W_P < W_Q, W_Q t W_P$ 

## Answer: c



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

A. 475J

B. 450J

## D. 250J

Answer: a

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**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

A. 
$$\sqrt{rac{mk}{2}}t^{-1/2}$$

B.  $\sqrt{mk}t^{-1/2}$ 

C. 
$$\sqrt{2mk}t^{\,-1\,/\,2}$$

D. 
$$rac{1}{2}\sqrt{mk}t^{-1/2}$$

## Answer: a



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. 
$$m_1^2 u_1 + m_2^2 u_2^2 - arepsilon = m_1^2 v_1 + m_2^2 v_2$$

Β.

$$rac{1}{2}m_1u_1^2+rac{1}{2}m_2u_2^2=rac{1}{2}m_1v_1^2+rac{1}{2}m_2v_2-arepsilon$$
 C.

$$rac{1}{2}m_1u_1^2+rac{1}{2}m_2u_2^2-arepsilon=rac{1}{2}m_1v_1^2+rac{1}{2}m_2v_2$$

$$rac{1}{2}m_1u_1^2+rac{1}{2}m_2u_2^2+arepsilon=rac{1}{2}m_1v_1^2+rac{1}{2}m_2v_2$$

## 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. $mv_0^2$ B. $\frac{1}{4}mv_0^2$ C. $2mv_0^2$ D. $\frac{1}{2}mv_0^2$

## Answer: c



12. A ball is thrown vertically downwards from a height of 20m 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  $ms^{-2}$ )

- A.  $14ms^{-1}$
- B.  $20ms^{-1}$
- C.  $28ms^{-1}$
- D.  $10ms^{-1}$

## Answer: b

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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  $13.6 \times 10^3 kg/m^3$  and  $g = 10m/s^2$  then the power of heat in watt is :

A. 1.7

B. 2.35

C. 3

D. 1.5



14. On a friction surface a block a mass Mmoving 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. 
$$\frac{3}{\sqrt{2}}v$$



## Answer: a

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**15.** A body of mass (4m) 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

A. 
$$mv^2$$

$$\mathsf{B}.\,\frac{3}{2}mv^2$$

 $C. 2mv^2$ 

D.  $4mv^2$ 

## Answer: b

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16. A uniform force of  $\left(3\hat{i}+\hat{j}
ight)$  N acts on a particle of mass 2kg. Hence, the particle is displaced from position  $\left(2\hat{i}+\hat{k}
ight)$ m to position

 $\left(4\hat{i}+3\hat{j}-\hat{k}
ight)$ m. The work done by the force

on the particle is

A. 9J

B. 6J

C. 13J

D. 15J



**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. mg2R

B. 
$$\frac{2}{3}mgR$$

C. 3mgR

D. 
$$rac{1}{3}mgR$$

## Answer: b

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**18.** The potential energy of a particle in a force field is:

$$U = rac{A}{r^2} - rac{B}{r}$$
, 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/2A

B. 2A/B

D. B/A

## Answer: b

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**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

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**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 12m is



A. 21J

## B. 26J

C. 13J

D. 18J

## Answer: c



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

A. 400 W

B. 200W

C. 100W

D. 800W

Answer: d



**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. Mg/k

B. 2Mg/k

C. 4Mg/k

D. Mg/2k

Answer: b



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. 
$$rac{1}{2}mv^3$$

B.  $mv^3$ 

C. 
$$rac{1}{2}mv^2$$
  
D.  $rac{1}{2}m^2v^2$ 



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

A. 20J

B. 30J

D. 10J

Answer: a

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**25.** An explosion blows a rock into three parts. Two parts go off at right angles to each other . These two are 1kg first part moving with a velocity of  $12ms^{-1}$  and 2kg second part moving with a velocity of  $8ms^{-1}$ . If the third part flies off with a velocity of  $4ms^{-1}$ . Its mass

would be

A. 5Kg

B.7Kg

C. 17Kg

D. 3Kg



**26.** A shell of mass 200g is ejected from a gun of mass 4kg by an explosion that generate 1.05kJ of energy. The initial velocity of the shell is

- A.  $100 m s^{-1}$
- B.  $80ms^{-1}$
- C.  $40ms^{-1}$
- D.  $120ms^{-1}$

## Answer: a

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**27.** Water falls from a height of 60m at the rate 15kg/s to operate a turbine. The losses due to frictional forces are 10% of energy . How much power is generated to by the turbine? (g=10 m//s^(2))`.

A. 8.1kW

B. 10.2kW

C. 12.3kW

D. 7.0kW

## Answer: a



**28.** 300J of work is done in slinding a 2 kg block up an inclined plane of height 10m. Taking g =  $10m/s^2$  , work done against friction is

A. 200J

B. 100J

C. zero

D. 1000J

## Answer: b



**29.** A body of mass 3kg 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

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

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

## Answer: c



**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=6m is



A. 4.5J

- B. 13.5J
- C. 9.0J
- D. 18.0J

## Answer: b



**31.** A bomb of mass 30kg at rest explodes into two pieces of mass 18kg and 12kg. The velocity of mass 18kgis6m/s. The kinetic energy of the other mass is

- A. 256J
- B. 486J
- C. 524J

D. 324J

Answer: b



**32.** A particle of mass m1 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 E1 and E2 respectively. If  $m_1 > m_2$  then

A. 
$$E_1 < E_2$$

$$\mathsf{B}.\,\frac{E_1}{E_2}=\frac{m_1}{m_2}$$

$$\mathsf{C}.\,E_1>E_2$$

D.  $E_1 = E_2$ 

Answer: a

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**33.** A ball of mass2kg and another of mass 4kg 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

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**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. 
$$\sqrt{2ig(u^2-glig)}$$
  
B.  $\sqrt{u^2-gl}$   
C.  $u-\sqrt{u^2-2gl}$   
D.  $\sqrt{2gl}$ 



**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. 
$$rac{m_1v_1}{m_2v_2}$$
  
C.  $rac{m_2}{m_1}$   
D.  $rac{m_1}{m_2}$ 

## Answer: c



**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



**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



**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. 5m/s
- B. 10m/s
- C. 15m/s
- D. 20m/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

**40.** Two equal masses  $m_1$  and  $m_2$  moving along the same straight line with velocites +3m/s and -5m/s respectively collide elastically. Their velocities after the collision will be respectively.

A. +4m/s for both

B. -3m/s and +5m/s

 $\mathsf{C.}-4m/\mathit{s} \mathrm{and}+4m/\mathit{s}$ 

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

Answer: d

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**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

 $x = 3t - 4t^2 + t^3$ , where x is in metre and t in

second. The work done during the first 4s is

A. 570mJ

B. 450mJ

C. 490mJ

D. 528mJ

Answer: d

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**42.** A metal ball of mass 2 kg moving with a velocity of 36km/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. 40J

Answer: c



**43.** A body of mass m moving with velocity 3km/h collides with a body of mass 2m at rest. Now, the coalesced mass starts to move with a velocity

A. 1km/h

 $\mathsf{B.}\,2km\,/\,h$ 

C. 3km/h

D. 4km/h

## Answer: a

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**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

Answer: d



**46.** Two masses 1g and 9g 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



**47.** A force 
$$\overrightarrow{F} = (7 - 2x + 3x^2)$$
 N is applied  
on a 2 kg mass which displaces it from x = 0 to  
x = 5 m. Work done in joule is -

A. 35

B. 70

C. 135

## Answer: c



**48.** Two identical balls A and B having velocity of 0.5m/s and -0.3m/s respectively collide elastically in one dimension. The velocities of B and A after the collision respectively will be

A. +0.5m/s and +0.3m/s

 ${\sf B.} - 0.3m/s \;\; {
m and} \;\; + 0.5m/s$ 

 $\mathsf{C.} + 0.3m/s$  and 0.5m/s

 $\mathsf{D.}-0.5m/s \;\; \mathrm{and} \;\; + 0.3m/s$ 

## Answer: b

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**49.** The power of a motor pump is 2kW. How much water per minute the pump can raise to a heiht of 10 m ? (Given  $g=10m/s^2$ )

A. 1000L

B. 1200L

C. 100L

D. 2000L

Answer: b



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**50.** A bullet of mass 10g leaves a rifle at an intial velocity of 1000m/s and strikes the earth at the same level with a velocity of 500m/s. The work done in joule to overcome the resistance of air will be

A. 375

B. 3750

C. 5000

D. 500

Answer: b

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**51.** The coefficient of restitution e for a perfectly elastic collision is

A. 1

## B. zero

## C. infinite

D. -1

