AIPMT 2006

1. 300 J of work is done in sliding a 2 kg block up an inclined plane of height 10m. The work done against friction is :-
(take g = 10 m/s^2)
(1) zero (2) 100 J
(3) 200 J (4) 300 J

2. A body of mass 3 kg is under a constant force which causes a displacement s in metres 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:-
(1) $\frac{5}{19}$ J (2) $\frac{3}{8}$ J (3) $\frac{8}{3}$ J (4) $\frac{19}{5}$ J

AIPMT 2009

3. A block of mass M is attached to the lower end of a vertical spring. The spring is hung from a ceiling and has force constant value k. The mass is released from rest with the spring initially unstretched. The maximum extension produced in the length of the spring will be :-
(1) Mg/2k (2) Mg/k
(3) 2Mg/k (4) 4Mg/k

4. An engine pumps water continuously through a hose. Water leaves 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 :-
(1) $\frac{1}{2}m^2v^2$ (2) $\frac{1}{2}mv^3$
(3) mv^3 (4) $\frac{1}{2}mv^2$

5. A body of mass 1 kg is thrown upwards with a velocity 20 m/s. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction ? (g = 10 m/s^2) :-
(1) 10 J (2) 20 J (3) 30 J (4) 40 J

AIPMT 2010

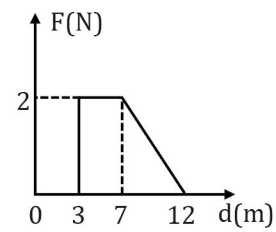
6. An engine pumps water through a hose pipe. Water passes through the pipe and leaves it with a velocity of 2 m/s. The mass per unit length of water in the pipe is 100 kg/m. What is the power of the engine?
(1) 800 W (2) 400 W
(3) 200 W (4) 100 W

AIPMT 2011

7. The potential energy of a system increases if work is done :-
(1) Upon the system by a nonconservative force
(2) By the system against a conservative force
(3) By the system against a nonconservative force
(4) Upon the system by a conservative force

8. A body projected vertically from the earth reaches a height equal to earth's radius before returning to the earth. The power exerted by the gravitational force is greatest :-
(1) At the highest position of the body
(2) At the instant just before the body hits the earth
(3) It remains constant all through
(4) At the instant just after the body is projected

9. Force F on a particle moving in a straight line varies with distance d as shown in the figure. The work done on the particle during its displacement of 12 m is :



(1) 18 J (2) 21 J
(3) 26 J (4) 13 J

AIPMT (Pre) 2012

10. 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 :

(1) A/B (2) B/A

(3) B/2A (4) 2A/B

AIPMT (Mains) 2012

11. A car of mass m starts from rest and accelerates so that the instantaneous power delivered to the car has a constant magnitude P_0. The instantaneous velocity of this car is proportional to :-

(1) $t^{-1/2}$ (2) $t/\sqrt{m}$ (3) t^2P_0 (4) $t^{1/2}$

NEET (UG) 2013

12. A uniform force of $(3\hat{i}+\hat{j})$ newton acts on a particle of mass 2kg. Hence the particle is displaced from position $(2\hat{i}+k)$ meter to position $(4\hat{i}+3\hat{j}-k)$ meter. The work done by the force on the particle is :-

(1) 15 J (2) 9 J (3) 6 J (4) 13 J

AIPMT 2015

13. A block of mass 10 kg, moving in x direction with a constant speed of 10 m/s, is subjected to a retarding force F = 0.1x J/m during its travel from x = 20 m to 30 m. Its final KE will be :

(1) 450 J (2) 275 J

(3) 250 J (4) 475 J

14. A particle of mass m is driven by a machine that delivers a constant power k watts. If the particle starts from rest the force on the particle at time t is :-

(1) $\sqrt{mk}\,t^{-1/2}$ (2) $\sqrt{2mk}\,t^{-1/2}$

(3) $\frac{1}{2}\sqrt{mk}\,t^{-1/2}$ (4) $\sqrt{\frac{mk}{2}}\,t^{-1/2}$

NEET-I 2016

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

(1) $(2t^2 + 3t^3)W$ (2) $(2t^2 + 4t^4)W$

(3) $(2t^3 + 3t^4)W$ (4) $(2t^3 + 3t^5)W$

NEET-II 2016

16. A particle moves from a point $(-2\hat{i}+5\hat{j})$ to $(4\hat{j}+3\hat{k})$ when a force of $(4\hat{i}+3\hat{j})$ N is applied. How much work has been done by the force ?

(1) 5 J (2) 2 J

(3) 8 J (4) 11 J

NEET(UG) 2017

17. 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 m/s. Take 'g' constant with a value 10 m/s^2. The work done by the (i) gravitational force and the (ii) resistive force of air is :-

(1) (i) 1.25 J (ii) – 8.25 J

(2) (i) 100 J (ii) 8.75 J

(3) (i) 10 J (ii) – 8.75 J

(4) (i) –10 J (ii) – 8.25 J

NEET(UG) 2019

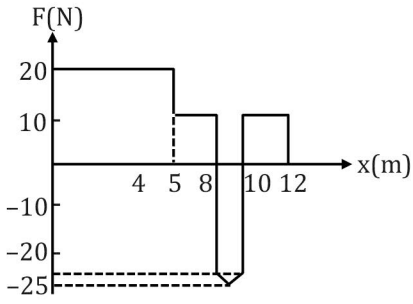
18. A force F = 20 + 10y acts on a particle in y-direction where F is in newton and y in meter. Work done by this force to move the particle from y = 0 to y = 1 m is :

(1) 30 J (2) 5 J

(3) 25 J (4) 20 J

NEET(UG) 2019 (Odisha)

19. An object of mass 500g, initially at rest is acted upon by a variable force, whose X component varies with x in the manner shown. The velocities of the object at point X = 8 m and X =12 m, would be the respective values of (nearly)



(1) 18 m/s and 24.4 m/s
(2) 23 m/s and 24.4 m/s
(3) 23 m/s and 20.6 m/s
(4) 18 m/s and 20.6 m/s

NEET (UG) 2021

20. A particle is released from height S from the surface of the Earth. At a certain height its kinetic energy is three times its potential energy. The height from the surface of earth and the speed of the particle at that instant are respectively :

(1) $\frac{S}{4}, \frac{3gS}{2}$ (2) $\frac{S}{4}, \frac{\sqrt{3gS}}{2}$

(3) $\frac{S}{2}, \frac{\sqrt{3gS}}{2}$ (4) $\frac{S}{4}, \sqrt{\frac{3gS}{2}}$

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

(1) 10.2 kW (2) 8.1 kW
(3) 12.3 kW (4) 7.0 kW

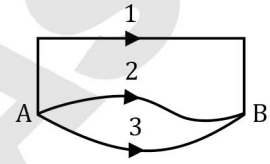
NEET (UG) 2022

22. An electric lift with a maximum load of 2000 kg (lift + passengers) is moving up with a constant speed of 1.5 ms^{-1}. The frictional force opposing the motion is 3000 N. The minimum power delivered by the motor to the lift in watts is: ($g = 10\ ms^{-2}$)

(1) 20000 (2) 34500
(3) 23500 (4) 23000

RE-NEET (UG) 2022

23. A gravitational field is present in a region and a mass is shifted from A to B through different paths as shown. If W_1, W_2 and W_3 represent the work done by the gravitational force along the respective paths, then :

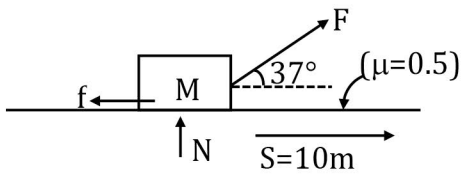


(1) $W_1 = W_2 = W_3$
(2) $W_1 > W_2 > W_3$
(3) $W_1 > W_3 > W_2$
(4) $W_1 < W_2 < W_3$

EXERCISE-II (Previous Year Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	2	3	3	2	2	1	2	2	4	4	4	2	4	4	4
Question	16	17	18	19	20	21	22	23							
Answer	1	3	3	3	4	2	2	1							

1. A block of mass M = 10kg is dragged 10m by force F = 100N on rough horizontal surface ($\mu = 0.5$)



Force on block		Work done by force on block	
A	Applied (F)	P	Zero
B	Normal (N)	Q	600 J
C	Friction (f)	R	800 J
D	Net resultant (F_{net})	S	– 200 J

Match the column

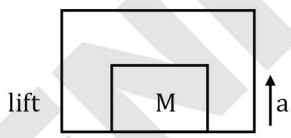
(1) [(A – Q), (B – P), (C – S), (D – R)]

(2) [(A – R), (B – P), (C – S), (D – Q)]

(3) [(A – P), (B – Q), (C – R), (D – S)]

(4) [(A – S), (B – R), (C – Q), (D – P)]

2. Block of mass M =10kg is kept inside a lift, which starts motion from rest in vertical upward direction with uniform acceleration ($a = 2m/sec^2$)



Power delivered to block by force		Power (in watt)	
A	By normal at 5 sec	P	– 500
B	By normal in 5 sec	Q	600
C	By Mg (gravity) at 5 sec	R	– 1000
D	By Mg (gravity) in 5 sec	S	1200

Match the column

(1) [(A – P), (B – Q), (C – R), (D – S)]

(2) [(A – Q), (B – S), (C – R), (D – P)]

(3) [(A – S), (B – Q), (C – P), (D – R)]

(4) [(A – S), (B – Q), (C – R), (D – P)]

3. Select the correct statements –

(a) Work done by conservative force along closed path is zero.

(b) A body with negative energy can't have linear momentum

(c) Net work done by all the internal force of a system is independent of choice of reference frame

(d) Work done by a non conservative force is always negative

(1) a, b and c (2) a and c

(3) a, b and d (4) All

4. Select the correct statements –

(a) Potential energy is defined only for gravitational force.

(b) Potential energy can be associated with frictional force.

(c) Work done by spring force is equal to change in potential energy of the spring.

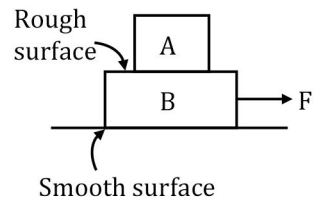
(1) a and b

(2) a and c

(3) all

(4) none of these

5.



If both blocks A and B are moving together, then select correct statements –

(a) Work done by the friction on block 'A' is zero

(b) Work done by the friction on block 'A' is positive

(c) Work done by the friction on block 'B' is negative

(d) Work done by friction forces on system (A) and (B) are zero

(1) a, c and d (2) b, c and d

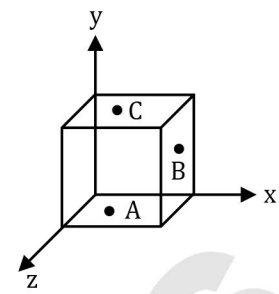
(3) a and d (4) none of these

6. For a system of particles –
(a) The work done by all external forces is equal to change in kinetic energy
(b) The work done by all forces is equal to change in mechanical energy
Select the correct statements :
(1) only a
(2) only b
(3) both a and b
(4) none of these

7. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.
Assertion (A) : Kinetic energy of a system can be increased without applying external force on the system.
Reason (R) : If external forces are absent then work done by internal forces is equal to change in kinetic energy.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

8. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.
Assertion (A) : Work done is positive when force acts in the direction of displacement.
Reason (R) : Work done by frictional force cannot be positive.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) (A) is false but (R) is true.

9. A particle is shifted from A to B and then from B to C where A, B and C are the midpoints of the corresponding faces of a cube of side 2m. If a force $\vec{F}=(3\hat{i}+4\hat{j}-5\hat{k})N$ is continuously acting on the particle, then select incorrect alternative



(1) work done from A to B is 7 J
(2) work done from B to C is 1 J
(3) work done A to C is 8 J
(4) force $\vec{F}$, is nonconservative force

10. **Statement : I** : Two balls of different masses are thrown vertically upwards with same speed. They will pass through their point of projection in the downward direction with the same speed in absence of air resistance.
and
Statement II : In absence of air resistance, the mechanical energy of a projectile is conserved.
(1) Statement-I is true, statement-II is true and statement-II is correct explanation for statement-I.
(2) Statement-I is true, statement-II is true and statement-II is NOT the correct explanation for statement-I.
(3) Statement-I is true, statement-II is false.
(4) Statement-I is false, statement-II is true.

11. Assume that in space potential energy U-depends on x-coordinate only by :

$$U = (x-3)^2(2-x)$$

A mass m can be kept on x-axis. In each position indicated in column-I, comment on the situation from column-II.

Column I	**Column II**
(A) x = 7/3	(P) Stable equilibrium
(B) x = 2	(Q) Unstable equilibrium
(C) x = 3	(R) Neutral equilibrium
	(S) Not in equilibrium

Options :-

(1) A → P, B → S, C → R

(2) A → S, B → P, C → Q

(3) A → P, B → S, C → Q

(4) A → Q, B → S, C → P

12. The potential energy (in joules) function of a particle in a region of space is given as :

$$U = (2x^2 + 3y^3 + 2z)$$

Here x, y and z are in metres. Find the magnitude of x component of force (in newton) acting on the particle at point P (1m, 2m, 3m).

(1) 4 (2) 2 (3) 6 (4) None

EXERCISE-III (Analytical Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12
Answer	2	4	2	4	2	4	1	3	4	1	3	1