

JEE MAIN WORK, ENERGY AND POWER — PYQS
Max. Marks: 108
Questions: 27
Section A (MCQ) — 25 questions

- Q.1** The rain drop of mass 1 g, starts with zero velocity from a height of 1 km. It hits the ground with a speed of 5 m/s. The work done by the unknown resistive force is _____ J.

 (take $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 6th April Morning Shift]

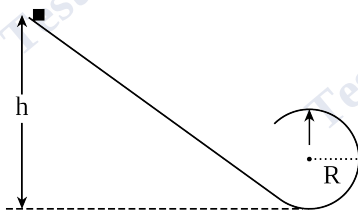
- (1) -8.75 (2) -8.35 (3) -9.55 (4) -9.98

Scan or tap for the full solution



- Q.2** A smooth inclined plane ends in a vertical circular loop, as shown in the figure. A small body is released from height h as shown. If the body exerts a force of three times its weight on the plane at the highest point of circle then the height $h = \alpha R$. The value of α is _____.

[JEE Main 2026 (Online) 6th April Morning Shift]



- (1) 2 (2) 4 (3) 3 (4) 6

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- Q.3** A body of mass 1 kg moves along a straight line with a velocity $v = 2x^2$. The work done by the body during displacement from $x = 0$ to 5 m is _____ J.

[JEE Main 2026 (Online) 6th April Evening Shift]

- (1) 0 (2) 250 (3) 1250 (4) 1000

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- Q.4** A mass of 1 kg is kept on an inclined plane with 30° inclination with respect to horizontal plane and it is at rest initially. Then the whole assembly is moved up with constant velocity of 4 m/s. The work done by the frictional force in time 2 s is _____ J. (Take $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 5th April Evening Shift]

- (1) 20 (2) 25 (3) 30 (4) 10

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- Q.5** A spherical ball of mass 2 kg falls from a height of 10 m and is brought to rest after penetrating 10 cm into sand.

The average force exerted by sand on the ball is _____ N.

 (Take $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 2nd April Evening Shift]

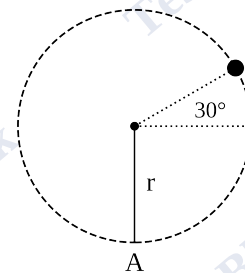
- (1) 1980 (2) 2020 (3) 2000 (4) 1000

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- Q.6** In case of vertical circular motion of a particle by a thread of length r , if the tension in the thread is zero at an angle 30° shown in figure, the velocity at the bottom point (A) of the circular path is ($g =$ gravitational acceleration)

[JEE Main 2026 (Online) 24th January Evening Shift]



- (1)
- $\sqrt{\frac{7}{2}gr}$
- (2)
- $\sqrt{4gr}$
- (3)
- $\sqrt{\frac{5}{2}gr}$
- (4)
- $\sqrt{5gr}$

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- Q.7** In a perfectly inelastic collision, two spheres made of the same material with masses 15 kg and 25 kg, moving in opposite directions with speeds of 10 m/s and 30 m/s, respectively, strike each other and stick together. The rise in temperature (in $^\circ\text{C}$), if all the heat produced during the collision is retained by these spheres, is :

 (specific heat of sphere material $31 \text{ cal/(kg } ^\circ\text{C)}$ and $1 \text{ cal} = 4.2 \text{ J}$)

[JEE Main 2026 (Online) 23rd January Morning Shift]

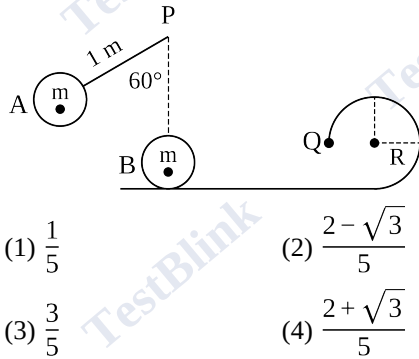
- (1) 1.75 (2) 1.44 (3) 1.95 (4) 1.15

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- Q.8** A small bob A of mass m is attached to a massless rigid rod of length 1 m pivoted at point P and kept at an angle of 60° with vertical as shown in figure. At distance of 1 m below point P, an identical bob B is kept at rest on a smooth horizontal surface that extends to a circular track of radius R as shown in figure. If bob B just manages to complete the circular path of radius R upto a point Q after being hit elastically by bob A, then radius R is _____ m.

[JEE Main 2026 (Online) 23rd January Morning Shift]



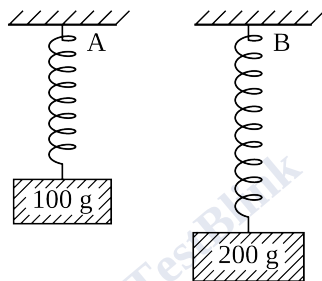
- (1) $\frac{1}{5}$ (2) $\frac{2 - \sqrt{3}}{5}$
(3) $\frac{3}{5}$ (4) $\frac{2 + \sqrt{3}}{5}$

Scan or tap for the full solution



- Q.9** Two blocks with masses 100 g and 200 g are attached to the ends of springs A and B as shown in figure. The energy stored in A is E . The energy stored in B, when spring constants k_A , k_B of A and B, respectively satisfy the relation $4k_A = 3k_B$, is :

[JEE Main 2026 (Online) 23rd January Morning Shift]



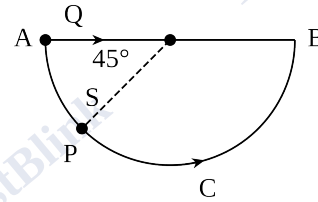
- (1) $4E$ (2) $2E$ (3) $\frac{4}{3}E$ (4) $3E$

Scan or tap for the full solution



- Q.10** A bead P sliding on a frictionless semi-circular string (ACB) and it is at point S at $t = 0$ and at this instant the horizontal component of its velocity is v . Another bead Q of the same mass as P is ejected from point A at $t = 0$ along the horizontal string AB, with the speed v , friction between the beads and the respective strings may be neglected in both cases. Let t_P and t_Q be the respective times taken by beads P and Q to reach the point B, then the relation between t_P and t_Q is

[JEE Main 2026 (Online) 23rd January Evening Shift]



- (1) $t_P < t_Q$ (2) $t_P = t_Q$
(3) $t_P > 1.25t_Q$ (4) $t_P > t_Q$

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- Q.11** Given below are two statements :

Statement-I: An object moves from position r_1 to position r_2 under a conservative force field $\vec{F}$. The work done by the force is $W = -\int_{r_1}^{r_2} \vec{F} \cdot d\vec{r}$.

Statement-II: Any object moving from one location to another location can follow infinite number of paths. Therefore, the amount of work done by the object changes with the path it follows for a conservative force.

In the light of the above statements, choose the correct answer from the options given below :

[JEE Main 2026 (Online) 22nd January Evening Shift]

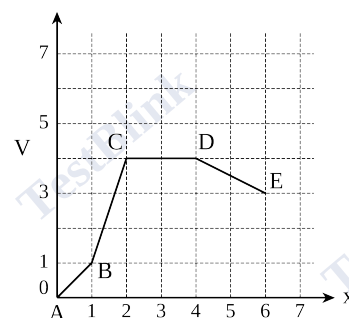
- (1) Statement-I is true but Statement-II is false
(2) Statement-I is false but Statement-II is true
(3) Both Statement-I and Statement-II are false
(4) Both Statement-I and Statement-II are true

Scan or tap for the full solution



- Q.12** Potential energy (V) versus distance (x) is given by the graph. Rank various regions as per the magnitudes of the force (F) acting on a particle from high to low.

[JEE Main 2026 (Online) 21st January Morning Shift]



- (1) $F_{BC} > F_{AB} > F_{DE} > F_{CD}$
(2) $F_{BC} > F_{CD} > F_{DE} > F_{AB}$
(3) $F_{CD} > F_{AB} > F_{BC} > F_{DE}$
(4) $F_{CD} > F_{DE} > F_{AB} > F_{BC}$

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- Q.13** A body of mass 2 kg is moving along x-direction such that its displacement as function of time is given by $x(t) = \alpha t^2 + \beta t + \gamma$ m, where $\alpha = 1 \text{ m/s}^2$, $\beta = 1 \text{ m/s}$ and $\gamma = 1 \text{ m}$. The work done on the body during the time interval $t = 2 \text{ s}$ to $t = 3 \text{ s}$, is _____ J. [JEE Main 2026 (Online) 21st January Evening Shift]
- (1) 42 (2) 24 (3) 49 (4) 12

Scan or tap for the full solution



- Q.14** An object of mass 1000 g experiences a time dependent force $\vec{F} = (2t\hat{i} + 3t^2\hat{j}) \text{ N}$. The power generated by the force at time t is: [JEE Main 2025 (Online) 7th April Morning Shift]
- (1) $(2t^2 + 18t^3) \text{ W}$ (2) $(3t^3 + 5t^5) \text{ W}$
 (3) $(2t^3 + 3t^5) \text{ W}$ (4) $(2t^2 + 3t^3) \text{ W}$

Scan or tap for the full solution



- Q.15** Which one of the following forces cannot be expressed in terms of potential energy? [JEE Main 2025 (Online) 7th April Evening Shift]
- (1) Frictional force (2) Coulomb's force
 (3) Restoring force (4) Gravitational force

Scan or tap for the full solution



- Q.16** A block of mass 25 kg is pulled along a horizontal surface by a force at an angle 45° with the horizontal. The friction coefficient between the block and the surface is 0.25. The block travels at a uniform velocity. The work done by the applied force during a displacement of 5 m of the block is: [JEE Main 2025 (Online) 4th April Evening Shift]
- (1) 490 J (2) 970 J (3) 735 J (4) 245 J

Scan or tap for the full solution



- Q.17** A particle is released from height S above the surface of the earth. At certain height its kinetic energy is three times its potential energy. The height from the surface of the earth and the speed of the particle at that instant are respectively. [JEE Main 2025 (Online) 3rd April Morning Shift]

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

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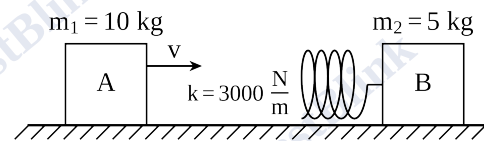
- Q.18** Two cylindrical vessels of equal cross sectional area of 2 m^2 contain water up to heights 10 m and 6 m, respectively. If the vessels are connected at their bottom then the work done by the force of gravity is (Density of water is 10^3 kg/m^3 and $g = 10 \text{ m/s}^2$) [JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) $1 \times 10^5 \text{ J}$ (2) $4 \times 10^4 \text{ J}$ (3) $8 \times 10^4 \text{ J}$ (4) $6 \times 10^4 \text{ J}$

Scan or tap for the full solution



Q.19



Consider two blocks A and B of masses $m_1 = 10 \text{ kg}$ and $m_2 = 5 \text{ kg}$ that are placed on a frictionless table. The block A moves with a constant speed $v = 3 \text{ m/s}$ towards the block B kept at rest. A spring with spring constant $k = 3000 \text{ N/m}$ is attached with the block B as shown in the figure. After the collision, suppose that the blocks A and B, along with the spring in constant compression state, move together, then the compression in the spring is, (Neglect the mass of the spring)

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 0.3 m (2) 0.1 m (3) 0.4 m (4) 0.2 m

Scan or tap for the full solution



- Q.20** A block of mass 1 kg, moving along x with speed $v_i = 10 \text{ m/s}$ enters a rough region ranging from $x = 0.1 \text{ m}$ to $x = 1.9 \text{ m}$. The retarding force acting on the block in this range is $F_r = -kx$, with $k = 10 \text{ N/m}$. Then the final speed of the block as it crosses the rough region is:

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 4 m/s (2) 10 m/s (3) 8 m/s (4) 6 m/s

Scan or tap for the full solution



- Q.21** A body of mass 'm' connected to a massless and unstretchable string goes in vertical circle of radius 'R' under gravity g . The other end of the string is fixed at the center of circle. If velocity at top of circular path is $n\sqrt{gR}$, where, $n \geq 1$, then ratio of kinetic energy of the body at bottom to that at top of the circle is:

[JEE Main 2025 (Online) 29th January Morning Shift]

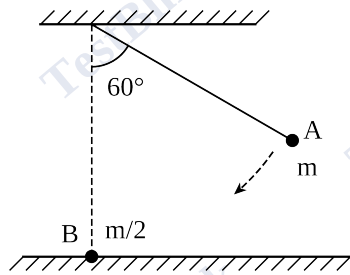
- (1) $\frac{n^2 + 4}{n^2}$ (2) $\frac{n + 4}{n}$ (3) $\frac{n^2}{n^2 + 4}$ (4) $\frac{n}{n + 4}$

Scan or tap for the full solution



- Q.22** As shown below, bob A of a pendulum having massless string of length 'R' is released from 60° to the vertical. It hits another bob B of half the mass that is at rest on a frictionless table in the center. Assuming elastic collision, the magnitude of the velocity of bob A after the collision will be (take g as acceleration due to gravity.)

[JEE Main 2025 (Online) 29th January Morning Shift]



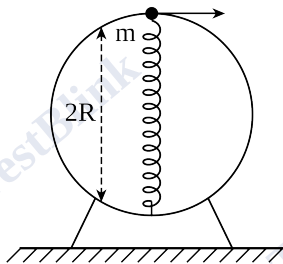
- (1) $\frac{4}{3}\sqrt{Rg}$ (2) $\frac{1}{3}\sqrt{Rg}$ (3) $\sqrt{Rg}$ (4) $\frac{2}{3}\sqrt{Rg}$

Scan or tap for the full solution



- Q.23** A bead of mass 'm' slides without friction on the wall of a vertical circular hoop of radius 'R' as shown in figure. The bead moves under the combined action of gravity and a massless spring (k) attached to the bottom of the hoop. The equilibrium length of the spring is 'R'. If the bead is released from top of the hoop with (negligible) zero initial speed, velocity of bead, when the length of spring becomes 'R', would be (spring constant is 'k', g is acceleration due to gravity)

[JEE Main 2025 (Online) 28th January Morning Shift]



- (1) $\sqrt{2Rg + \frac{kR^2}{m}}$ (2) $\sqrt{3Rg + \frac{kR^2}{m}}$
 (3) $\sqrt{2Rg + \frac{4kR^2}{m}}$ (4) $2\sqrt{gR + \frac{kR^2}{m}}$

Scan or tap for the full solution



- Q.24** Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**
Assertion (A): In a central force field, the work done is independent of the path chosen.
Reason (R): Every force encountered in mechanics does not have an associated potential energy.

In the light of the above statements, choose the most appropriate answer from the options given below

[JEE Main 2025 (Online) 28th January Morning Shift]

- (1) A is false but R is true
 (2) Both A and R are true but R is NOT the correct explanation of A
 (3) A is true but R is false
 (4) Both A and R are true and R is the correct explanation of A

Scan or tap for the full solution



- Q.25** A body of mass 4 kg is placed on a plane at a point P having coordinates (3, 4) m. Under the action of force $\vec{F} = (2\hat{i} + 3\hat{j})$ N, it moves to a new point Q having coordinates (6, 10) m in 4 sec. The average power and instantaneous power at the end of 4 sec are in the ratio of :

[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) 4 : 3 (2) 13 : 6 (3) 1 : 2 (4) 6 : 13

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Section B (Numerical) — 2 questions

- Q.26** A 1 kg block subjected to two simultaneous forces $(2\hat{i} + 3\hat{j} + 4\hat{k})$ N and $(3\hat{i} - \hat{j} - 2\hat{k})$ N is moved a distance of 25 m along $(3\hat{i} - 4\hat{j})$ direction. The work done in this process is _____ J.

[JEE Main 2026 (Online) 4th April Morning Shift]

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- Q.27** A body of mass 2 kg begins to move under the influence of time dependent force $\vec{F} = (2t\hat{i} + 6t^2\hat{j})$ N, where $\hat{i}$ and $\hat{j}$ are unit vectors along x and y-axis respectively. The power produced by the force at $t = 2$ s is _____ W.

[JEE Main 2026 (Online) 4th April Morning Shift]

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ANSWER KEY

Section A (MCQ) — 25 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	4	2	3	1	2	1	2	1	4	1	3
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	1	2	3	1	4	3	3	2	3	1	2
Ques.	23	24	25								
Ans.	2	2	4								

Section B (Numerical) — 2 questions

Ques.	26	27					
Ans.	35	200					