RK VISION ACADEMY

PHYSICS

XI – WORK, ENERGY, POWER AND COLLISIONS

SECTION A

1. **If the unit of force and length each be increased by four times, then the unit of energy is increased by**
(1) 16 times
(2) 8 times
(3) 2 times
(4) 4 times

2. **A body of mass 10 kg is dropped to the ground from a height of 10 metres. The work done by the gravitational force is**
(1) – 490 Joules
(2) + 490 Joules
(3) – 980 Joules
(4) + 980 Joules

3. **A force $\vec{F} = 5\hat{i} + 6\hat{j} - 4\hat{k}$ acting on a body, produces a displacement $\vec{s} = 6\hat{i} + 5\hat{k}$. Work done by the force is**
(1) 18 units
(2) 15 units
(3) 12 units
(4) 10 units

4. **A force of 5 N, making an angle θ with the horizontal, acting on an object displaces it by 0.4m along the horizontal direction. If the object gains kinetic energy of 1J, the horizontal component of the force is**
(1) 1.5 N
(2) 2.5 N
(3) 3.5 N
(4) 4.5 N

5. **The energy which an e^- acquires when accelerated through a potential difference of 1 volt is called**
(1) 1 Joule
(2) 1 Electron volt
(3) 1 Erg
(4) 1 Watt.

6. **A body of mass 6kg is under a force which causes displacement in it given by $s = \frac{t^2}{2}$ metres where t is time. The work done by the force in 2 seconds is**
(1) 12 J
(2) 9 J
(3) 6 J
(4) 3 J

7. **A body of mass 10kg at rest is acted upon simultaneously by two forces 4 N and 3N at right angles to each other. The kinetic energy of the body at the end of 10 sec is**
(1) 100 J
(2) 300 J
(3) 50 J
(4) 125 J

8. **In an explosion a body breaks up into two pieces of unequal masses.**
(1) Both parts will have numerically equal momentum
(2) Lighter part will have more momentum
(3) Heavier part will have more momentum
(4) Both parts will have equal kinetic energy

9. **A uniform chain of length 2m is kept on a table such that a length of 60cm hangs freely from the edge of the table. The total mass of the chain is 4kg. What is the work done in pulling the entire chain on the table**
(1) 7.2 J
(2) 3.6 J
(3) 120 J
(4) 1200 J

10. **A ball of mass m moves with speed v and strikes a wall having infinite mass and it returns with same speed then the work done by the ball on the wall is**
(1) Zero
(2) mv J
(3) m/v.J
(4) v/m J

11. **A man starts walking from a point on the surface of earth (assumed smooth) and reaches diagonally opposite point. What is the work done by him**
(1) Zero

	(2) Positive (3) Negative (4) Nothing can be said
12.	**A ball is released from the top of a tower. The ratio of work done by force of gravity in first, second and third second of the motion of the ball is** (1) 1 : 2 : 3 (2) 1 : 4 : 9 (3) 1 : 3 : 5 (4) 1 : 5 : 3
13.	**A cord is used to lower vertically a block of mass M by a distance d with constant downward acceleration g/4. Work done by the cord on the block is** (1) Mg (d/4) (2) 3Mg (d/4) (3) – Mg (d/4) (4) Mgd
14.	**A spring of force constant 10 N/m has an initial stretch 0.20 m. In changing the stretch to 0.25 m, the increase in potential energy is about** (1) 0.1 joule (2) 0.2 joule (3) 0.3 joule (4) 0.5 joule
15.	**A position dependent force $F = 7 - 2x - 3x^2$ newton acts on a small body of mass 2 kg and displaces it from x = 0 to x = 5 m. The work done in joules is** (1) 70 (2) 270 (3) 35 (4) 135
16.	**A body of mass 0.1 kg moving with a velocity of 10 m/s hits a spring (fixed at the other end) of force constant 1000 N/m and comes to rest after compressing the spring. The compression of the spring is** (1) 0.01m (2) 0.1m (3) 0.2m (4) 0.5 m
17.	**A spring when stretched by 2 mm its potential energy becomes 4 J. If it is stretched by 10 mm, its potential energy is equal to** (1) 4 J (2) 54 J (3) 415 J (4) None
18.	**A mass of 0.5kg moving with a speed of 1.5 m/s on a horizontal smooth surface, collides with a nearly weightless spring of force constant k = 50 N/m. The maximum compression of the spring would be** (1) 0.15 m (2) 0.12 m (3) 1.5 m (4) 0.5 m
19.	**The potential energy of a body is given by, $U = A - Bx^2$ (Where x is the displacement). The magnitude of force acting on the particle is** (1) Constant (2) Proportional to x (3) Proportional to x^2 (4) Inversely proportional to x
20.	**Which one of the following is not a conservative force** (1) Gravitational force (2) Electrostatic force between two charges (3) Magnetic force between two magnetic dipoles (4) Frictional force
21.	**A light and a heavy body have equal momenta. Which one has greater K.E** (1) The light body (2) The heavy body (3) The K.E. are equal (4) Data is incomplete
22.	**If the momentum of a body is increased n times, its kinetic energy increases** (1) n times (2) 2n times (3) $\sqrt{n}$times (4) n^2 times
23.	**When work is done on a body by an external force, its** (1) Only kinetic energy increases (2) Only potential energy increases (3) Both kinetic and potential energies may increase

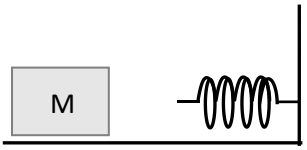
	(4) Sum of kinetic and potential energies remains constant
24.	**From a stationary tank of mass 125000 pound a small shell of mass 25 pound is fired with a muzzle velocity of 1000 ft/sec. The tank recoils with a velocity of** (1) 0.1 ft/sec (2) 0.2 ft/sec (3) 0.4 ft/sec (4) 0.8 ft/sec
25.	**A bomb of 12 kg explodes into two pieces of masses 4 kg and 8 kg The velocity of 8kg mass is 6 m/sec. The kinetic energy of the other mass is** (1) 48 J (2) 32 J (3) 24 J (4) 288 J
26.	**A rifle bullet loses 1/20th of its velocity in passing through a plank. The least number of such planks required just to stop the bullet is** (1) 5 (2) 10 (3) 11 (4) 20
27.	**A body of mass 2 kg is thrown up vertically with K.E. of 490 joules. If the acceleration due to gravity is 9.8 m/s^2, then the height at which the K.E. of the body becomes half its original value is given by** (1) 50 m (2) 12.5 m (3) 25 m (4) 10 m
28.	**If the stone is thrown up vertically and return to ground, its potential energy is maximum** (1) During the upward journey (2) At the maximum height (3) During the return journey (4) At the bottom
29.	**If the K.E. of a body is increased by 300%, its momentum will increase by** (1) 100% (2) 150% (3) $\sqrt{300\%}$
	(4) 175%
30.	**If the water falls from a dam into a turbine wheel 19.6 m below, then the velocity of water at the turbine is (g =9.8 ms^{-2})** (1) 9.8 m/s (2) 19.6 m/s (3) 39.2 m/s (4) 98.0 m/s
31.	**The force constant of a weightless spring is 16 N/m. A body of mass 1.0 kg suspended from it is pulled down through 5 cm and then released. The maximum kinetic energy of the system (spring + body) will be** (1) 2 X 10^{-2} J (2) 4 X 10^{-2} J (3) 8 X 10^{-2} J (4) 16 X 10^{-2} J
32.	**The kinetic energy of a body of mass 2 kg and momentum of 2 Ns is** (1) 1 J (2) 2 J (3) 3 J (4) 4 J
33.	**A 0.5 kg ball is thrown up with an initial speed 14 m/s and reaches a maximum height of 8.0m. How much energy is dissipated by air drag acting on the ball during the ascent** (1) 19.6Joule (2) 4.9 Joule (3) 10 Joule (4) 9.8 Joule
34.	**If a body looses half of its velocity on penetrating 3 cm in a wooden block, then how much will it penetrate more before coming to rest** (1) 1 cm (2) 2 cm (3) 3 cm (4) 4 cm
35.	**A bomb of mass 9kg explodes into 2 pieces of mass 3kg and 6kg. The velocity of mass 3kg is 1.6 m/s, the K.E. of mass 6kg is** (1) 3.84 J (2) 9.6 J (3) 1.92 J (4) 2.92 J

SECTION B

36. **If a shell fired from a cannon, explodes in mid air, then**
(1) Its total kinetic energy increases
(2) Its total momentum increases
(3) Its total momentum decreases
(4) None of these

37. **A body is moving with a velocity v, breaks up into two equal parts. One of the part retraces back with velocity v. Then the velocity of the other part is**
(1) v in forward direction
(2) 3v in forward direction
(3) v in backward direction
(4) 3v in backward direction

38. **The block of mass M moving on the frictionless horizontal surface collides with the spring of spring constant K and compresses it by length L. The maximum momentum of the block after collision is**



(1) Zero
(2) ML^2 / K
(3) $\sqrt{ML}/ L$
(4) $KL^2 / 2M$

39. **A man is riding on a cycle with velocity 7.2 km/hr up a hill having a slope 1 in 20. The total mass of the man and cycle is 100 kg. The power of the man is**
(1) 200 W
(2) 175 W
(3) 125 W
(4) 98 W

40. **An electric motor creates a tension of 4500 newton in a hoisting cable and reels it in at the rate of 2 m/sec. What is the power of electric motor**
(1) 15 kW
(2) 9 kW
(3) 225 W
(4) 9000 HP

41. **Two perfectly elastic particles P and Q of equal mass travelling along the line joining them with velocities 15 m/sec and 10 m/sec. After collision, their velocities respectively (in m/sec) will be**
(1) 0, 25
(2) 5, 20
(3) 10, 15
(4) 20, 5

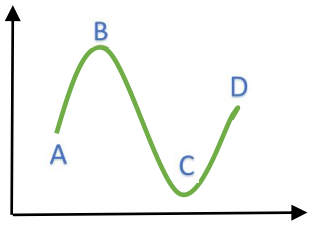
42. **When two bodies collide elastically, then**
(1) Kinetic energy of the system alone is conserved
(2) Only momentum is conserved
(3) Both energy and momentum are conserved
(4) Neither energy nor momentum is conserved

43. **A metal ball falls from a height of 32 metre on a steel plate. If the coefficient of restitution is 0.5, to what height will the ball rise after second bounce**
(1) 2 m
(2) 4 m
(3) 8 m
(4) 16 m

44. **A ball of mass 10 kg is moving with a velocity of 10 m/s. It strikes another ball of mass 5 kg which is moving in the same direction with a velocity of 4 m/s. If the collision is elastic, their velocities after the collision will be, respectively**
(1) 6 m/s, 12 m/s
(2) 12 m/s, 6 m/s
(3) 12 m/s, 10 m/s
(4) 12 m/s, 25 m/s

45. **A body of mass 2 kg moving with a velocity of 3 m/sec collides head on with a body of mass 1 kg moving in opposite direction with a velocity of 4 m/sec. After collision, two bodies stick together and move with a common velocity which in m/sec is equal to**
(1) 1/4
(2) 1/3
(3) 2/3
(4) 3/4

46. **The coefficient of restitution e for a perfectly inelastic collision is**
(1) 1
(2) 0
(3) ∞

	(4) – 1
47.	**A body of mass 4 kg moving with velocity 12 m/s collides with another body of mass 6 kg at rest. If two bodies stick together after collision, then the loss of kinetic energy of system is** (1) Zero (2) 288 J (3) 172.8 J (4) 144 J
48.	**The potential energy of a particle varies with distance x as shown in the graph. The force acting on the particle is zero at**  (1) C (2) B (3) B and C (4) A and D
49.	**If a 5 kg body falls to the ground from a height of 30 metres and if all its mechanical energy is converted into heat, the heat produced will be** (1) 350 cal (2) 150 cal (3) 60 cal (4) 6 cal
50.	**A train weighing 10^7 N is running on a level track with uniform speed of 36 km/h. The frictional cofficient is 0.5 . What is the power of the engine- (g = 10 m/sec²)** (1) 0.5 kw (2) 5 kw (3) 50 kw (4) 5×10^7 W

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PHYSICS

XI – WORK, ENERGY, POWER AND COLLISIONS

SECTION A

1.	1
2.	4
3.	4
4.	2
5.	2
6.	4
7.	4
8.	1
9.	2
10.	1
11.	1
12.	3
13.	3
14.	1
15.	4
16.	2
17.	4
18.	1
19.	2
20.	4
21.	1
22.	4
23.	3
24.	2
25.	4
26.	3
27.	2
28.	2
29.	1
30.	2
31.	1
32.	1
33.	4
34.	1
35.	3

SECTION B

36.	1
37.	2
38.	3
39.	4
40.	2
41.	1
42.	4
43.	1
44.	1
45.	3
46.	1
47.	4
48.	3
49.	1
50.	4