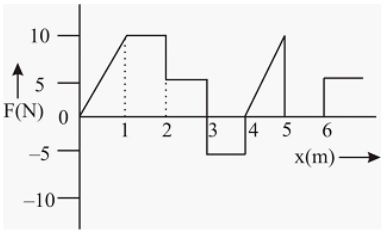
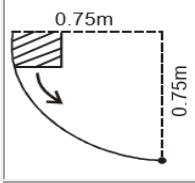
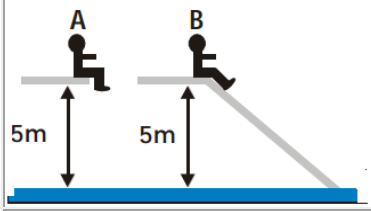
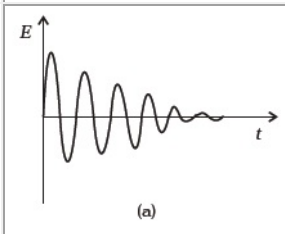
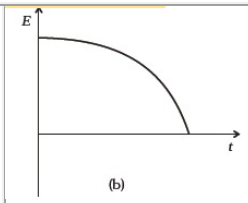
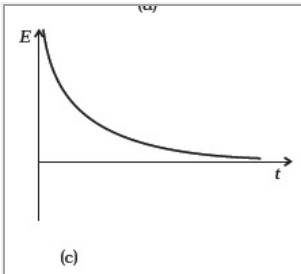
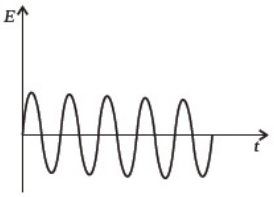
S.No.			Marks
	MCQ		
1.	The relationship between the force F and position x of a body is as shown in figure. The work done in displacing the body from x = 1 to x = 5m will be:  		**1**
	(a) 30 J	(b) 15 J	
	(c) 25 J	(d) 20 J	
2.	A body moves a distance of 10 m along a straight line under the action of 5 N force. If work done is 25 J, then angle between the force and direction of motion of the body will be:		**1**
	(a) 75°	(b) 60°	
	(c) 45°	(d) 30°	
3.	The potential energy of a body is given by $U = A - Bx^2$ (where x is displacement). The magnitude of force acting on the particle is		**1**
	(a) constant	(b) proportional to x	
	(c) proportional to x^2	(d) Inversely proportional to x	
4.	What happens to the total energy of a moving object if all the applied forces are conserved?		**1**
	(a) It increases	(b) It decreases	
	(c) It remains constant	(d)It becomes zero	

5.	If linear momentum of body is increased by 1.5%, its kinetic energy increases by		1
	(a) 0%	(b) 10%	
	(c) 2.25%	(d) 3%	
6.	Two bodies P and Q have masses 5 kg and 20 kg respectively. Each one is acted upon by a force of 4 N. If they acquire the same kinetic energy in times t_P and t_Q then the ratio $tp/t_{Q\ is}$		**1**
	(a) 1/2	(b) 2	
	(c) 2/5	(d) 5/6	
7.	A body is moved along a straight line by a machine delivering a constant power. The velocity gained by the body in time t is proportional to		**1**
	(a) $t^{3/4}$	(b) $t^{3/2}$	
	(c) $t^{1/4}$	(d) $t^{1/2}$	
8.	A body of mass m1 is moving with a velocity v. It collides with another stationary body of mass m1. They get embedded. At the point of collision, the velocity of the system		**1**
	(a)Increases	(b)Decreases but does not become zero	
	(c) Remains same	(d)become zero	
9	A body of mass 1.5 kg slide down a curved track which is quadrant of a circle of radius 0.75 meter. All the surfaces are frictionless. If the body starts from rest, its speed at the bottom of the track is (g = 10 m/s2)  		**1**
	(a) 3. 87 m/s	(b) 2 m/s	
	(c) 1.5 m/s	(d) 0.387 m/s	
10.	The force constant of a wire is K and that of another wire is 3k when both the wires are stretched through same distance, if work done are W1 and W2, then...		**1**
	(a) W2 = 3W12	(b) W2= 0.33W1	
	(c) W2 = W1	(d) W2= 3W1	
11.	A large and a small sphere are released at the same time from the same height above the ground. Which one of the following quantities associated with the spheres will be the same for both after 1 second, if frictional effects are ignored?		**1**

	(a) speed	(b) momentum	
	(c) potential energy	(d) kinetic energy	
12	Two children A and B of equal masses are at a swimming bath. Child A drops vertically from a diving board 5 m high. Child B slides from the same height down a slide into the water. The children start moving at the same instant. Which one of the following statements is true? (Ignore air resistance and friction on the slide.) The children hit the water 		**1**
	(a) at the same time with the same speed	(b) at the same time with different speeds	
	(c) at different times with the same speed	(d) at different times with different speeds	
13.	A man, of mass m, standing at the bottom of the staircase, of height L climbs it and stands at its top.		**1**
	(a) Work done by all forces on man is equal to the rise in potential energy mgL.	(b) Work done by all forces on man is zero.	
	(c) Work done by the gravitational force on man is mgL.	(d) The reaction force from a step does not do work because the point of application of the force does not move while the force exists.	
14.	Which of the diagrams shown in Fig. 6.7 represents variation of total mechanical energy of a pendulum oscillating in air as function of time?		**1**
			

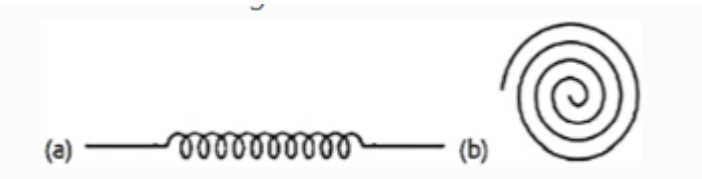
	 (c)	 (d)	
15.	During inelastic collision between two bodies, which of the following quantities always remain conserved?		**1**
	(a) Total kinetic energy.	(b) Total mechanical energy.	
	(c) Total linear momentum.	(d) Speed of each body.	
16	**Assertion :** A spring has potential energy, both when it is compressed or stretched. **Reason :** In compressing or stretching, work is done on the spring against the restoring force.		**1**
	a. Assertion is correct, reason is correct; reason is a correct explanation for assertion.	b. Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
	c. Assertion is correct, reason is incorrect	d. Assertion is incorrect, reason is correct.	
17	Assertion: The work done by a body against friction always causes a loss in the kinetic energy. Reason: In an inelastic collision of two bodies, the total energy of the system changes to some other form but the linear momentum and kinetic energy remain unchanged.		
	a. Assertion is correct, reason is correct; reason is a correct explanation for assertion.	b. Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
	c. Assertion is correct, reason is incorrect	d. Assertion is incorrect, reason is correct.	

18	Assertion: In an elastic collision of two billiard balls, the total kinetic energy is conserved during the short time of collision of the balls (i.e. when they are in contact). Reason: Energy spent against friction does not follow the law of conservation of energy.		
	a. Assertion is correct, reason is correct; reason is a correct explanation for assertion.	b. Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
	c. Assertion is correct, reason is incorrect	d. Assertion is incorrect, reason is correct.	
19	Assertion: No work is done when an electron completes a circular orbit around the nucleus of an atom. Reason: Work done by a centripetal force is always zero.		
	a. Assertion is correct, reason is correct; reason is a correct explanation for assertion.	b. Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
	c. Assertion is correct, reason is incorrect	d. Assertion is incorrect, reason is correct.	
20	Assertion (A): A work done by the gravitational force is zero in closed path. Reason (R) : Gravitational force is a conservative force.		
	a. Assertion is correct, reason is correct; reason is a correct explanation for assertion.	b. Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
	c. Assertion is correct, reason is incorrect	d. Assertion is incorrect, reason is correct.	
21.	Two bodies of masses m1 and m2 have equal kinetic energies. What is the ratio of their linear momenta?		**1**
22.	A ball is given a speed v on a rough horizontal surface. The ball travels through a distance x on the surface and stops. What are the initial and final kinetic energies of the ball?		**1**
23.	Is work-energy theorem valid in non-inertial frames?		**1**
24.	Can kinetic energy of a system be increased without applying any external force on the system?		**1**

25.	A particle is released from the top of an incline of height h. Does the kinetic energy of the particle at the bottom of the incline depend on the angle of incline?	**1**
26.	How much work is done by a coolie walking on a horizontal platform with a 10kg load on his head?	**1**
27.	A body of mass m is moving in a circle of radius r with a constant speed v. The force on the body is mv^2/r and is directed towards the centre. What is the work done by this force in moving the body over half the circumference of the circle?	**1**
28.	In one of the exercises to strengthen the wrist and fingers, a person squeezes and releases a soft rubber ball. Is the work done on the ball positive, negative or zero a) during compression? b) During expansion?	**1**
29.	When a gas filled balloon rises up it gains both K.E and P.E. How does the principle of conservation of energy apply in this case?	**1**
30.	A heavy stone is lowered to the ground. Is the work done positive or negative?	**1**
31.	Is work done by a non-conservative force always negative? Comment	**1**
32.	Does potential energy of a spring decrease/increase when it is compressed or stretched?	**1**
33.	Can a body have momentum without energy?	**1**
34	In which motion momentum changes but not Kinetic energy?	**1**
35	A tug of war team A is slowly being defeated by team B. Network is being done by – (a) team A (b) team B or (c) neither. Explain	**2**
36	(a)Two masses one n times heavier than the other are dropped from same height. How do their momentum compare just before they hit the ground? (b) Two masses one n times heavy as the other have equal kinetic energy. How do their momentum compare?	**2**
37	A truck and a car are moving with the same K.E on a straight road. Their engines are simultaneously switched off. Which one will stop at a lesser distance?	**2**
38	The momentum of a body is increased by 50%. What is the percentage	**2**

	change in its K.E?	
39	Two springs A and B are identical but A is harder than B (KA>KB). On which spring more work will be done if: (a) they are stretched through the same distance, (b) they are stretched by same force?	**2**
40	A force exerts an impulse J on a body changing its speed from u to v. The force and objects motion are along the same line. Show that the work done by the force is **J(u+v)/2.**	**2**
41	Two masses of 1 gm and 4 gm are moving with the same K.E. What is the ratio of their linear momenta?	**2**
42	Justify the law of conservation of energy from the vibrations of a simple pendulum.	**3**
43	A body of mass M is struck by a moving body of mass m. Prove that the fraction of the of the initial kinetic energy of mass m transferred to the struck body is $\{4Mm/ (M + m)^2\}$	**3**
44	A ball A of mass 2.5 Kg undergoes an elastic collision with another ball B that is at rest. After collision, ball A continues moving in its original direction with a speed 1/5 of its original speed. Determine the mass of ball B. **[Ans. 1.667 Kg]**	**3**
45	A steel ball of mass 0.1 Kg moving with a speed of 10m/s collides with an identical steel ball at rest. After the collision the direction of each ball makes an angle of 30^o with the original direction. Calculate the speed of each ball after the collision. Is this collision elastic **?[5.77m/s,5.77m/s,the collision is not elastic]**	**3**
46	A ball A of mass 2 Kg moving with a velocity of 25 m/s in the east direction collides with another body B of mass 3 Kg moving with a velocity of 15 m/s westwards. Calculate the velocity of each ball after the collision. **[Ans. -23 m/s, 17m/s]**	**3**
47	A ball is dropped vertically from rest at a height of 12m. After striking the ground, it bounces back to a height of 9m. What fraction of kinetic energy does it lose on striking the ground? **[Ans. ¼]**	**3**
48	The mass of a pendulum bob is 0.2 Kg, and it is suspended by a string 1m long. It is pulled aside until the thread is at 30° to the vertical. How much work is done? The ball is now released. Find the K.E at the lowest point? $g = 10m/s^2$ [**Ans. 0.268 J]**	**3**
49	When an automobile moving with a speed of 36 km/h reaches an upward inclined road of angle 30°, its engine is switched off. If the coefficient of friction is 0.1, how much distance will the automobile move before coming to rest? $g = 9.8m/s^2$ **[Ans. 8.5m]**	**3**

50.	A particle of mass m moving eastwards with a velocity 'V' collides with another particle of the same mass moving northwards with the same speed 'V'. The two particles coalesce on collision. After collision the new particle moves in north-east direction. Calculate the velocity and direction of new particle after collision? **(Ans: V/√2; Θ =45^0 north of east)**	**3**
51.	A block of mass m moving at a speed v collides with another block of mass 2m at rest. The lighter block come to rest after the collision. Find the coefficient of restitution? **(Ans:0.5)**	**3**
52.	A body A moving in a straight line with a velocity v makes a head on collision with a body B which is initially at rest .After collision B acquires a velocity of 1.6v .Assuming the bodies to be perfectly elastic what is the ratio of the mass A to that of What percentage of A's energy is transferred to B as a result of collision **?(Ans:m_1/m_2=4; 64%)**	**3**
53.	In a ballistics demonstration a police officer fires a bullet of mass 50g with a speed of 200m/s on soft plywood of thickness 2cm. The bullet emerges with only 10% of its initial kinetic energy. What is the emergent speed of the bullet? **(Ans:63.2m/s)**	**3**
54.	A force F=0.5x+10 acts on a particle. Here F is in Newton and x is in meter. Calculate the work done by the force during the displacement of the particle from x=0 to x= 2metre? (**Ans:21J)**	**3**
55.	A mass M kg is suspended by a weightless string. Calculate the horizontal force that is required to displace it until the string makes an angle of 45^0 with the initial vertical direction? **(Ans: Mg (√2-1))**	**3**
56.	Discuss elastic collision in one dimension. Obtain expressions for velocities of the two bodies after such a collision	**5**
57.	State and establish principle of conservation of energy	**5**
58	**Case Study-Read the text carefully and answer the questions:** The impact and deformation during collision may generate heat and sound. Part of the initial kinetic energy is transformed into other forms of energy. A useful way to visualize the deformation during collision is in terms of a 'compressed spring'. If the 'spring' connecting the two masses regains its original shape without loss in energy, then the initial kinetic energy is equal to the final kinetic energy but the kinetic energy during the collision time Δt is not constant. Such a collision is called an elastic collision. On the other hand, the deformation may not be relieved, and the two bodies could move together after the collision. A collision in which the two particles move together after the collision is called a completely inelastic collision. The intermediate case where the deformation is partly relieved and some of the initial kinetic energy is lost is more common and is appropriately called an inelastic collision. If the initial velocities and final velocities of both the bodies are along the same straight line, then it is called a one-dimensional collision, or head-on collision.	**4**

	(i)What is the coefficient of restitution? (ii)A 2 kg toy car with a velocity of 5 m/s collides elastically with a second toy car that has a velocity of -2 m/s. After the collision, the 2 kg toy car has a velocity of 3 m/s and the second car has a velocity of 2 m/s. Using the conservation of momentum, what is the mass of the second car? (iii)Two masses of 1g and 4g are moving with equal kinetic energy. Find the ratio of the magnitudes of their momenta. Or (iii)A 9 kg mass is moving to the right with a velocity of 14 m/s. A 12 kg mass is moving to the left with a velocity of 5 m/s. Assuming that these two balls have a head on collision and stick together, what will be the final velocity of the combination?	
59	**Case study-Read the text carefully and answer the questions:** There are many types of spring. Important among these are helical and spiral springs as shown in the figure.  Usually, we assume that the springs are massless. Therefore, work done is stored in the spring in the form of the elastic potential energy of the spring. Thus, the potential energy of a spring is the energy associated with the state of compression or expansion of an elastic spring. a) When the potential energy of a spring may be considered as zero? b) The ratio of spring constants of two springs is **2 :3**. What is the ratio of their potential energy, if they are stretched by the same force? c) The potential energy of a spring increases by 15 J when stretched by 3 cm. If it is stretched by 4 cm, what will be the increase in potential energy? Or c) The potential energy of a spring when stretched through a distance x is 10 J. What is the amount of work done on the same spring to stretch it through an additional distance x?	