



WORK AND ENERGY

Each question has four possible answers, encircled the correct answer:

1. Work is the product of:

(a) Force and distance	(b) Force and displacement
(c) Force and velocity	(d) Force and energy
2. Work is the product of:

(a) Two vectors	(b) Two scalars
(c) Vector and scalar	(d) None of these
3. The product of force and displacement represents:

(a) Torque	(b) Momentum
(c) Work	(d) Energy
4. Work done will be maximum when angle between \vec{F} and \vec{d} is:

(a) 180°	(b) 90°
(c) 60°	(d) 0°
5. The work done will be negative when force and displacement are:

(a) In opposite direction	(b) Same direction
(c) Perpendicular	(d) None of these
6. The work done will be zero when angle between \vec{F} and \vec{d} is:

(a) 180°	(b) 90°
(c) 60°	(d) 0°
7. The area under force displacement curve gives:

(a) Energy	(b) Work
(c) Momentum	(d) Torque
8. The dimensions of work are:

(a) $[MLT^{-2}]$	(b) $[ML^2T]$
(c) $[ML^2T^{-2}]$	(d) $[MLT]$
9. The SI units of work is:

(a) Newton	(b) $N \times m^2$
(c) Joule	(d) Kelvin

10. The unit of work is similar to that of:
- (a) Energy (b) Power
(c) Force (d) Weight
11. The space where gravitational force acts is called:
- (a) Electric field (b) Gravitational field
(c) Gravity (d) Conservative field
12. The work done is independent of:
- (a) Path followed by the body (b) Force
(c) Direction (d) None of these
13. The total work done in a closed path in gravitational field is:
- (a) Maximum (b) Zero
(c) Constant (d) None of these
14. Work is defined as _____ of force and displacement:
- (a) Vector product (b) Scalar product
(c) Both (a) and (b) (d) None of these
15. A field in which work done is independent of the path followed is called:
- (a) Electric field (b) Gravitational field
(c) Magnetic field (d) Conservative field
16. When a body is moved through a certain displacement \vec{d} by a force \vec{F} then work done is:
- (a) $\vec{F} \cdot \vec{d}$ (b) $\vec{F} \times \vec{d}$
(c) $\vec{F} \div \vec{d}$ (d) None of these
17. If a force \vec{F} makes an angle θ with the displacement \vec{d} along the direction of motion, the work done is:
- (a) $Fd \tan \theta$ (b) $Fd \cos \theta$
(c) $Fd \sin \theta$ (d) Fd
18. Work is a:
- (a) Scalar quantity (b) Vector quantity
(c) Both (a) and (b) (d) None of these
19. Which of the following force can do no work on the body when it acts:
- (a) Elastic force (b) Centripetal force
(c) Frictional force (d) Gravitational force

20. If a body of weight w is lifted through a height h then work done will be:
- (a) wh (b) Zero
(c) $wh \sin \theta$ (d) $-wh$
21. If a body of mass 5 kg raised vertically through a height of 1 m then work done will be:
- (a) 49.0 J (b) 4.9 J
(c) 490 J (d) None of these
22. A force acting at right angle to the displacement perform:
- (a) Negative work (b) No work
(c) Positive work (d) Maximum work
23. The component of the force in the direction of the displacement \vec{d} is:
- (a) $Fd \cos \theta$ (b) $Fd \sin \theta$
(c) $F \cos \theta$ (d) Zero
24. The rate of doing work is called:
- (a) Work (b) Force
(c) Momentum (d) Power
25. Power is the scalar product of:
- (a) Force and velocity (b) Force and distance
(c) Force and momentum (d) Force and energy
26. ¶ The S.I unit of power is:
- (a) Joule (b) Joule-sec
(c) Watt (d) Newton-m
27. One horse power is equal to:
- (a) 746 watt (b) 745 watt
(c) 750 watt (d) 775 watt
28. In British engineering system, the unit of power is:
- (a) Joule (b) Watt
(c) Horse power (d) Kilowatt horse
29. One Giga watt (Gw) is equal to:
- (a) 10^3 watt (b) 10^9 watt
(c) 10^{12} watt (d) 10^{18} watt
30. ¶ 1 kwh is equal to:
- (a) 3.6×10^5 J (b) 36×10^5 J
(c) 36×10^6 J (d) 3.5×10^6 J

31. Dimensions of power are:
- (a) $[MLT^{-3}]$ (b) $[M^2LT^{-2}]$
(c) $[ML^{-2}T]$ (d) $[ML^2T^{-3}]$
32. Commercial unit of electrical energy is:
- (a) Erg-sec (b) J/s
(c) kwh (d) J-s
33. Work is always on a body when:
- (a) It moves through a certain distance (b) It experiences a force while in motion
(c) A force is exerted on it (d) None of these
34. The power needed to lift a mass of 5 kg to a height of 1 m in 2 sec is:
- (a) 24.5 watt (b) 2.45 watt
(c) 0.245 watt (d) 245 watt
35. The average and instantaneous powers become equal if work is done at:
- (a) Constant rate (b) Variable rate
(c) Any rate (d) None of these
36. The power is one kilo-watt if work is done at the rate of:
- (a) 500 J/s (b) 1000 J/s
(c) 1000 J/min (d) 1500 J/s
37. The relation between horse power and watt is:
- (a) 1 hp = 546 watts (b) 1 hp = 846 watts
(c) 1 hp = 1000 watts (d) 1 hp = 746 watts
38. If an agent consumes a power of 1 kilo-watt in one hour, the work done is:
- (a) One watt (b) One kilo-watt
(c) One kilo-watt hour (d) None of these
39. The capacity to do work is called:
- (a) Work (b) Energy
(c) Power (d) Velocity
40. The energy possessed by the body due to its motion is:
- (a) Kinetic energy (b) Potential energy
(c) Chemical energy (d) None of these
41. The energy possessed by the body due to its position is:
- (a) Kinetic energy (b) Potential energy
(c) Chemical energy (d) None of these

42. The expression for kinetic energy is:
- (a) $K.E = \frac{1}{2} mv^2$ (b) $K.E = \frac{1}{2} m^2v$
- (c) $K.E = mv^2$ (d) $K.E = \frac{1}{2} mv$
43. The expression for potential energy is:
- (a) $P.E = mgh^2$ (b) $P.E = \frac{1}{2} mgh$
- (c) $P.E = mgh$ (d) $P.E = m^2gh$
44. The unit of potential energy is same as that:
- (a) Work (b) Force
- (c) Momentum (d) Power
45. Work done is equal to:
- (a) Change in K.E (b) Change in momentum
- (c) Change in force (d) None of these
46. The SI unit of energy is:
- (a) Watt (b) Newton
- (c) Joule (d) J-s
47. Energy stored in the spring of a watch is:
- (a) Kinetic energy (b) Elastic potential energy
- (c) Chemical energy (d) Magnetic energy
48. What is the kinetic energy of 50 kg mass moving with a speed of 5 m/s is:
- (a) 625 J (b) 526 J
- (c) 652 J (d) 256 J
49. When the speed of the moving body is doubled then its:
- (a) Kinetic energy is doubled (b) Potential energy is doubled
- (c) Both (a) and (b) (d) None of these
50. A body of mass 5 kg moving with a velocity of 2 m/s then its K.E is:
- (a) 20 J (b) 5 J
- (c) 10 J (d) 15 J
51. The potential energy of an object on the surface of earth is:
- (a) $\frac{1}{2} mv^2$ (b) mgh
- (c) $2mg$ (d) Zero

52. The work done on a body from earth surface to infinity appears as:
- (a) Elastic potential energy (b) Absolute P.E
(c) Zero P.E (d) Maximum P.E
53. The absolute P.E on the surface of earth is:
- (a) Zero (b) $\frac{GMm}{R}$
(c) Maximum (d) mgh
54. Kinetic and potential energies are:
- (a) Two forms of energies (b) Two forms of torque
(c) Not related with each other (d) None of these
55. The velocity of a body with which it goes out of the earth's gravitational field is called:
- (a) Average velocity (b) Escape velocity
(c) Instantaneous velocity (d) Maximum velocity
56. The expression for escape velocity is:
- (a) \sqrt{gR} (b) $2g\sqrt{R}$
(c) $2\sqrt{gR}$ (d) $\sqrt{2gR}$
57. The value of escape velocity is:
- (a) 1.1 km/s (b) 11 km/s
(c) 11 km/h (d) 1.1 km/h
58. When a body falls, its velocity increases due to action of:
- (a) Gravity (b) Force of friction
(c) Momentum (d) Rotation
59. The loss of potential energy is equal to gain of kinetic energy, is true only if there is no:
- (a) Net force (b) Friction
(c) Weight (d) Gravity
60. According to conservation of energy, the total amount of energy remains:
- (a) Change (b) Constant
(c) Increases (d) Decreases
61. The absolute potential energy is measured from the:
- (a) Centre of earth (b) Surface of earth
(c) Near to earth (d) Infinity
62. Formula of work-energy principle is of the form:
- (a) $\text{Work} = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$ (b) $\text{Work} = \frac{1}{2}mv_f^2 + \frac{1}{2}mv_i^2$
(c) $\text{Work} = \frac{1}{2}mv_f^2 \div \frac{1}{2}mv_i^2$ (d) None of these

63. Gravitational potential energy by convention is:
- (a) Positive (b) Negative
(c) Both (a) and (b) (d) None of these
64. The formula for escape velocity of a planet $v_{es} = \sqrt{2gR}$ gives only approximate value since:
- (a) Value of g is not constant (b) Mass of planet may also affect the escape velocity
(c) Radius of the planet (d) All of these
65. The value of g at the earth's centre is:
- (a) Minimum (b) Maximum
(c) Zero (d) None of these
66. Energy possessed by a body due to its special configuration is called:
- (a) Electrostatic energy (b) Gravitational P.E
(c) Elastic P.E (d) None of these
67. P.E of any form increases only when we get:
- (a) Against the force (b) In the direction of force
(c) Perpendicular to the force (d) None of these
68. Gravitational interaction between the earth and the moon serves as source of:
- (a) Tidal energy (b) Mechanical energy
(c) Thermal energy (d) Gravitational energy
69. The energy of waves can be used to generate:
- (a) Magnetic effect (b) Electricity
(c) Solar energy (d) Geothermal energy
70. The solar cells are also known as:
- (a) Dry cell (b) Chemical cell
(c) Photovoltaic cell (d) Wet cell
71. What is the work done in kilo joules in lifting a man of 10 kg through a vertical height of 10 m:
- (a) 9.8 kJ (b) 980 kJ
(c) 0.98 kJ (d) 98 kJ
72. Solar cells are made up from the material called:
- (a) Steel (b) Carbon
(c) Iron (d) Silicon
73. A solar cell is a device which converts solar energy into:
- (a) Mechanical energy (b) Heat energy
(c) Chemical energy (d) Electrical energy

74. The relation which takes place in nuclear reactor is a:
- (a) Fission reaction (b) Chemical reaction
(c) Fusion reaction (d) None of these
75. The tidal energy is due to the gravitational pull of:
- (a) Sun (b) Planet
(c) Mars (d) Moon
76. Absolute potential energy of the body at the earth's surface is equal to:
- (a) $U_m = \frac{GMe}{R_e}$ (b) $U_m = \frac{GMEm}{R_e}$
(c) $U_m = \frac{GmMe}{R_e}$ (d) None of these
77. The source of geothermal energy is:
- (a) The fusion in sun (b) The radioactive decay in the earth's interior
(c) The rotation of earth around sun (d) None of these
78. 25000 watts power is equal to:
- (a) 2.6 kilowatt (b) 25 h-p
(c) 50 h-p (d) 35.5 hp
79. Which one is the biggest unit of energy:
- (a) Erg (b) Joule
(c) Kilowatt hour (d) Watt hour
80. The power of a machine is one kilowatt when work is done by it at the rate:
- (a) 1000 J/min (b) 500 J/s
(c) 500 J/min (d) 1000 J/s
81. If a body of mass 5 kg is raised vertically through a distance of 1 m then the work done is:
- (a) 49.0 J (b) 4.9 J
(c) 0.49 J (d) 490 J
82. Geyser derives its energy from the:
- (a) Jupiter (b) Sun
(c) Snow (d) Earth
83. Geysers usually occur in:
- (a) Hot regions (b) Cold regions
(c) Volcanic regions (d) None of these
84. The energy stored in a dam is:
- (a) Kinetic energy (b) Potential energy
(c) Chemical energy (d) Electrical energy

85. Ethanol is the replacement of:
- (a) Kerosene oil (b) Gas oil
(c) Gasoline oil (d) Refinery oil
86. The process of getting energy by direct combustion method from the waste products is commonly known as:
- (a) Liquid waste (b) Solid waste
(c) Gaseous waste (d) All of these
87. Biomass is a potential source of:
- (a) Non-renewable energy source (b) Renewable energy source
(c) Both (a) and (b) (d) None of these
88. Earth receives huge amount of energy directly from:
- (a) Moon (b) Wind
(c) Water (d) Sun
89. Tidal energy and wind energy is used to generate:
- (a) Electric field (b) Magnetic field
(c) Friction (d) Electricity
90. The methods used to convert biomass into fuels are:
- (a) Direct combustion (b) Fermentation
(c) Both (a) and (b) (d) None of these
91. Which of the following is non-renewable source of energy:
- (a) Wind (b) Biomass
(c) Coal (d) None of these
92. Which of the following is renewable source of energy:
- (a) Sunlight (b) Natural gas
(c) Oil (d) None of these
93. One dyne is equal to:
- (a) 10^3 N (b) 10^5 N
(c) 10^{-5} N (d) 10^{-3} N
94. A body of mass 5 kg, initially at rest, is moved by a force of 2 N on smooth horizontal surface. The work done by the force in 10 s is:
- (a) 20 J (b) 30 J
(c) 40 J (d) 60 J
95. The kinetic energy of a body of mass m is E . Its momentum is:
- (a) $\sqrt{2mE}$ (b) $2mE$
(c) $\sqrt{\frac{mE}{2}}$ (d) $\frac{2E}{m}$

96. The time taken by an engine of power 10 kw to lift a mass of 200 kg to a height of 40 m is:
- (a) 2 sec. (b) 4 sec.
(c) 8 sec. (d) 16 sec.
97. The decrease in the potential energy of a ball of mass 20 kg which falls from a height of 50 cm is:
- (a) 968 J (b) 98 J
(c) 1980 J (d) None
98. A body of mass 2 kg is thrown up vertically with a K.E of 490 J. If $g = 9.8 \text{ ms}^{-2}$ the height at which the kinetic energy becomes half its original value.
- (a) 10 m (b) 12.5 m
(c) 25 m (d) 50 m
99. The K.E of a body of mass 2 kg and momentum 2 Ns is:
- (a) 1 J (b) 2 J
(c) 3 J (d) 4 J
100. The momentum of particle is numerically equal to its K.E. What is the velocity of the particle?
- (a) 9 ms^{-1} (b) 3 ms^{-1}
(c) 2 ms^{-1} (d) 1 ms^{-1}
101. Which of the following is not a conservative force?
- (a) Electric force (b) Elastic spring force
(c) Frictional force (d) Gravitational force
102. One erg is equal to:
- (a) 10^5 J (b) 10^7 J
(c) 10^{-5} J (d) 10^{-7} J
103. If moon's radius is 1600 km and 'g' on its surface is 1.6 ms^{-2} then the escape velocity on the moon is:
- (a) 1600 ms^{-1} (b) 50.6 ms^{-1}
(c) 50.8 ms^{-1} (d) 2263 ms^{-1}
104. A body of mass 3 kg lies on the surface of the table 2 m high. It is moved on the surface by 4 m. The change of P.E. will be:
- (a) Zero (b) 9.8 J
(c) 19.6 J (d) 329 J
105. The escape velocity of a body depends upon:
- (a) The mass of the body (b) The mass of the planet
(c) Density of the planet (d) Volume of the planet
106. If a power of 1 kw is maintained for 1 second then work done is equal to:
- (a) 10^3 J (b) 10^5 J
(c) $3.6 \times 10^6 \text{ J}$ (d) $3.6 \times 10^5 \text{ J}$

- 107.** Energy required to accelerate a car from 10 ms^{-1} to 20 ms^{-1} compared with that required to accelerate from 0 to 10 ms^{-1} is:
- (a) Twice (b) Three times
(c) Four times (d) Same
- 108.** Ratio of dimensions of power and K.E is:
- (a) 1 : 1 (b) T : 1
(c) 1 : T (d) M : T
- 109.** How large a force is required to accelerate a body of weight 5 N with 4 ms^{-2} is:
- (a) 10 N (b) 5 N
(c) 2 N (d) 1 N
- 110.** Which of the following is not a biomass?
- (a) Crop residue (b) Animal dung
(c) Coal (d) Sewage
- 111.** A child on a swing is 1 m above the ground at the lowest point and 6 m above the ground at the highest point. The horizontal speed of the child at the lowest point of the swing is approximately.
- (a) 8 ms^{-1} (b) 10 ms^{-1}
(c) 12 ms^{-1} (d) 14 ms^{-1}

ANSWERS

1.	(b)	2.	(a)	3.	(c)	4.	(d)
5.	(a)	6.	(b)	7.	(b)	8.	(c)
9.	(c)	10.	(a)	11.	(b)	12.	(a)
13.	(b)	14.	(b)	15.	(d)	16.	(a)
17.	(b)	18.	(a)	19.	(b)	20.	(d)
21.	(a)	22.	(b)	23.	(c)	24.	(d)
25.	(a)	26.	(c)	27.	(a)	28.	(c)
29.	(b)	30.	(a)	31.	(d)	32.	(c)
33.	(c)	34.	(a)	35.	(a)	36.	(b)
37.	(d)	38.	(c)	39.	(b)	40.	(a)
41.	(b)	42.	(a)	43.	(c)	44.	(a)
45.	(a)	46.	(c)	47.	(b)	48.	(a)
49.	(a)	50.	(c)	51.	(d)	52.	(b)
53.	(b)	54.	(a)	55.	(b)	56.	(d)
57.	(b)	58.	(a)	59.	(b)	60.	(b)
61.	(a)	62.	(a)	63.	(b)	64.	(d)
65.	(c)	66.	(c)	67.	(a)	68.	(a)
69.	(b)	70.	(c)	71.	(c)	72.	(d)
73.	(d)	74.	(a)	75.	(d)	76.	(b)
77.	(b)	78.	(d)	79.	(c)	80.	(d)
81.	(a)	82.	(d)	83.	(c)	84.	(b)
85.	(c)	86.	(b)	87.	(b)	88.	(d)
89.	(d)	90.	(c)	91.	(c)	92.	(a)
93.	(b)	94.	(c)	95.	(a)	96.	(c)
97.	(b)	98.	(c)	99.	(a)	100.	(c)
101.	(c)	102.	(d)	103.	(d)	104.	(a)
105.	(b)	106.	(c)	107.	(d)	108.	(c)
109.	(c)	110.	(c)	111.	(b)		