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 θ **(b)** Fd cos θ

(c) Fd sin θ **(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 θ **(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 θ **(b)** Fd sin θ

(c) F cos θ **(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) $\text{Work} = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_1^2$ **(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 earths 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 earths surface is equal to:

(a) $U_m = \frac{GMe}{Re}$ **(b)** $U_m = \frac{GMem}{Re}$

(c) $U_m = \frac{GmMe}{Re}$ **(d)** None of these

77. The source of geothermal energy is:

(a) The fusion in sun **(b)** The radioactive decay in the earths 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) Jupitter **(b)** Sun

(c) Snow **(d)** Earth

83. Geysers usually occurs 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 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) 3.6×10^6 J **(d)** 3.6×10^5 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 residuce **(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)		