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SET 3 – WORK, ENERGY AND POWER

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1. When work is done on a body, energy is:
(a) destroyed
(b) created
(c) transferred
(d) constant

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2. If F = 6 N, displacement = 3 m, and the angle between F and displacement = 60°, work done is:
(a) 9 J
(b) 18 J
(c) 12 J
(d) 6 J

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3. The work done by a man carrying a load on a level road is:
(a) positive
(b) zero
(c) negative
(d) infinite

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4. The power of an engine which lifts 200 kg of coal per second through 10 m is (g = 10 m/s^2):
(a) 2×10^4 W
(b) 2×10^3 W
(c) 10^3 W
(d) 10^5 W

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5. The potential energy of a body of mass m at a height h above the ground is:
(a) ½ mgh
(b) mgh
(c) 2mgh
(d) zero

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6. The unit of mechanical energy is the same as that of:
(a) power

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(b) work
(c) acceleration
(d) momentum

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7. Work done by a force on a body is positive when the angle between force and displacement is:
(a) 0°
(b) 90°
(c) 180°
(d) 120°

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8. A body moving with uniform velocity has:
(a) zero acceleration and non-zero work
(b) zero acceleration and zero work done by net force
(c) positive acceleration
(d) variable energy

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9. The SI unit of energy is equivalent to:
(a) N/m
(b) Nm
(c) N/s
(d) m/N

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10. When the net work done on a body is zero, its kinetic energy:
(a) increases
(b) decreases
(c) remains unchanged
(d) becomes infinite

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11. A 2 kg ball is dropped from a height of 5 m. Its kinetic energy just before hitting the ground ($g = 10\ m/s^2$) is:
(a) 50 J
(b) 25 J
(c) 75 J
(d) 100 J

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12. When a spring is stretched by 5 cm and the spring constant is 100 N/m, potential energy stored = ?
(a) 0.125 J
(b) 1.25 J
(c) 12.5 J
(d) 0.0125 J

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13. The work done by a force of 10 N through a distance of 0.5 m at 60° with displacement is:
(a) 2.5 J
(b) 5 J
(c) 3 J
(d) 10 J

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14. Which quantity remains conserved when only conservative forces act?
(a) kinetic energy
(b) potential energy
(c) mechanical energy
(d) thermal energy

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15. The dot product of vectors gives a:
(a) vector
(b) scalar
(c) tensor
(d) none

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16. The angle between force and displacement when no work is done is:
(a) 0°
(b) 90°
(c) 45°
(d) 180°

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17. The unit of work in CGS system is:
(a) erg
(b) joule
(c) dyne
(d) watt

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18. Work done by a variable force is calculated by:
(a) area under F–x curve
(b) slope of F–x curve
(c) height of the graph
(d) tangent to F–x curve

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19. In a circular motion, the work done by centripetal force is:
(a) positive
(b) negative
(c) zero
(d) maximum

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20. Kinetic energy is directly proportional to:
(a) mass only
(b) velocity only
(c) square of velocity
(d) cube of velocity

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21. A 1000 W motor lifts a mass of 100 kg. How high can it raise it in 5 s? ($g = 10\ m/s^2$)
(a) 1 m
(b) 5 m
(c) 10 m
(d) 20 m

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22. The total energy of a conservative system is:
(a) increasing
(b) constant
(c) decreasing
(d) zero

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23. The work done per unit time is:
(a) momentum
(b) power
(c) impulse
(d) energy

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24. When kinetic energy increases by 300%, velocity increases by:
(a) 2 times
(b) 3 times
(c) √3 times
(d) 4 times

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25. The graph of potential energy of a spring vs displacement is a:
(a) straight line
(b) circle
(c) parabola
(d) hyperbola

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26. 1 joule = ?
(a) 1 N/s
(b) 1 N/m
(c) 1 N × m
(d) 1 N/m²

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27. If the force is zero, work done is:
(a) zero
(b) maximum
(c) negative
(d) positive

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28. The unit of spring constant k is:
(a) N/m
(b) J/m
(c) m/N
(d) Nm

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29. A 200 W electric bulb works for 2 hours. Energy consumed = ?
(a) 400 J
(b) 0.4 kWh
(c) 4000 J
(d) 4 kWh

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30. The potential energy of a spring is ½ kx^2. When x doubles, PE becomes:
(a) 2 times
(b) 3 times
(c) 4 times
(d) ½ times

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31. The mechanical energy of a simple pendulum is:
(a) conserved
(b) increasing
(c) decreasing
(d) variable

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32. The area under a power-time graph gives:
(a) work
(b) energy
(c) both (a) and (b)
(d) velocity

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33. Work done by the frictional force is:
(a) always positive
(b) always negative
(c) always zero
(d) depends on situation

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34. When a car stops suddenly, kinetic energy is converted into:
(a) sound and heat energy
(b) gravitational energy
(c) potential energy
(d) mechanical energy

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35. The total mechanical energy of a body is the sum of:
(a) kinetic and potential energy
(b) kinetic and heat energy
(c) potential and thermal energy
(d) only potential energy

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36. The angle between vectors A = 3i and B = 2j is:
(a) 0°
(b) 90°
(c) 45°
(d) 180°

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37. The potential energy of a compressed spring is:
(a) positive
(b) negative
(c) zero
(d) infinite

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38. Work done in bringing a body from infinity to a point against gravity is called:
(a) potential energy
(b) kinetic energy
(c) mechanical energy
(d) binding energy

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39. When displacement and force are opposite, work is:
(a) zero
(b) negative
(c) positive
(d) maximum

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40. If a particle moves along x-axis under a force F(x), the work done from x_1 to x_2 is:
(a) $\int F\,dx$
(b) $F \times x$
(c) Fx^2
(d) F/x

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41. The potential energy of a system is minimum when:
(a) stable equilibrium
(b) unstable equilibrium
(c) neutral equilibrium
(d) metastable

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42. Work-energy theorem is applicable for:
(a) constant force only
(b) variable force also
(c) only non-conservative force
(d) only frictionless systems

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43. The unit of energy used by power companies is:
(a) joule
(b) watt
(c) kilowatt-hour
(d) horsepower

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44. If kinetic energy $K = \frac{1}{2} mv^2$, then $v = ?$
(a) $\sqrt{(K/m)}$
(b) $\sqrt{(2K/m)}$
(c) K/m
(d) $2K/m$

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45. When force and displacement are perpendicular, work done = ?
(a) zero
(b) minimum
(c) maximum
(d) infinite

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46. The change in kinetic energy of a body is equal to the:
(a) total energy
(b) power
(c) work done on it
(d) potential energy

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47. The mechanical energy of a freely falling body:
(a) increases
(b) decreases
(c) remains constant
(d) becomes zero

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48. If work is done against friction, mechanical energy is:
(a) conserved
(b) partly converted to heat
(c) lost completely
(d) constant

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49. The dot product of two opposite vectors is:
(a) positive
(b) negative
(c) zero
(d) undefined

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50. Work done by gravitational force on a satellite revolving around Earth in a circular orbit is:
(a) zero
(b) positive
(c) negative
(d) variable

✅ ANSWERS – SET 3

1 (c)	2 (a)	3 (b)	4 (a)	5 (b)	6 (b)	7 (a)	8 (b)	9 (b)	10 (c)
11 (a)	12 (a)	13 (a)	14 (c)	15 (b)	16 (b)	17 (a)	18 (a)	19 (c)	20 (c)
21 (b)	22 (b)	23 (b)	24 (a)	25 (c)	26 (c)	27 (a)	28 (a)	29 (b)	30 (c)
31 (a)	32 (c)	33 (b)	34 (a)	35 (a)	36 (b)	37 (a)	38 (a)	39 (b)	40 (a)
41 (a)	42 (b)	43 (c)	44 (b)	45 (a)	46 (c)	47 (c)	48 (b)	49 (b)	50 (a)