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SET 4 – WORK, ENERGY AND POWER

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1. The scalar product of two vectors is zero if the angle between them is:
(a) 0°
(b) 45°
(c) 90°
(d) 180°

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2. A constant force of 50 N moves a body through 2 m. The work done is:
(a) 25 J
(b) 100 J
(c) 75 J
(d) 50 J

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3. The work-energy theorem is a direct consequence of:
(a) Newton's first law
(b) Newton's second law
(c) Newton's third law
(d) Law of gravitation

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4. When force and displacement are opposite, the work done is:
(a) zero
(b) positive
(c) negative
(d) undefined

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5. Which of the following is **not** a conservative force?
(a) frictional force
(b) electrostatic force
(c) spring force
(d) gravitational force

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6. Power is defined as:
(a) work × time
(b) work/time

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(c) time/work
(d) work × force

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7. The slope of a work–time graph represents:
(a) energy
(b) power
(c) force
(d) momentum

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8. The energy associated with an object in motion is called:
(a) mechanical energy
(b) kinetic energy
(c) potential energy
(d) elastic energy

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9. The unit of work and energy is:
(a) joule
(b) watt
(c) newton
(d) pascal

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10. The SI unit of power is:
(a) watt
(b) joule
(c) erg
(d) eV

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11. 1 kilowatt-hour = ? joules
(a) 3.6×10^5
(b) 3.6×10^6
(c) 36×10^5
(d) 3.6×10^4

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12. Work done by the gravitational force on a satellite in a circular orbit is:
(a) positive
(b) negative

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(c) zero
(d) variable

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13. A spring is stretched by 0.1 m and has a spring constant of 50 N/m. The potential energy stored = ?
(a) 0.25 J
(b) 0.5 J
(c) 0.1 J
(d) 0.05 J

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14. The power developed when 400 J of work is done in 2 seconds is:
(a) 200 W
(b) 400 W
(c) 800 W
(d) 100 W

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15. If force and velocity are in opposite directions, power delivered is:
(a) positive
(b) negative
(c) zero
(d) infinite

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16. A ball of mass 0.5 kg is thrown upward with velocity 10 m/s. Maximum height = ? ($g = 10\ m/s^2$)
(a) 2.5 m
(b) 5 m
(c) 10 m
(d) 15 m

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17. The energy possessed by a stretched spring is:
(a) kinetic
(b) potential
(c) sound
(d) heat

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18. If kinetic energy of a body becomes 4 times, momentum becomes:
(a) 2 times

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(b) 4 times
(c) 8 times
(d) unchanged

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19. The work done by friction on a body sliding down an incline is:
(a) positive
(b) zero
(c) negative
(d) constant

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

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21. The dimensional formula of power is:
(a) $[MLT^{-2}]$
(b) $[ML^2T^{-3}]$
(c) $[ML^2T^{-2}]$
(d) $[M^0L^0T^0]$

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22. The potential energy of a spring is proportional to:
(a) x
(b) x^2
(c) 1/x
(d) $\sqrt{x}$

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23. The area under a power–time graph gives:
(a) velocity
(b) energy
(c) force
(d) acceleration

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24. The potential energy of a body at height h is:
(a) mgh
(b) ½ mgh

(c) 2mgh
(d) 0

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25. The work-energy theorem states that:
(a) work done = potential energy
(b) work done = change in kinetic energy
(c) power = energy × time
(d) energy = momentum × velocity

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26. If velocity doubles, kinetic energy becomes:
(a) 2 times
(b) 3 times
(c) 4 times
(d) ½ times

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27. A constant force of 10 N displaces a body by 3 m at 60° with direction of force. Work done = ?
(a) 30 J
(b) 15 J
(c) 5 J
(d) 10 J

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28. A body moving in a circle performs work equal to:
(a) zero
(b) πr^2
(c) Fr
(d) Fθ

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29. Which of the following is a scalar quantity?
(a) force
(b) acceleration
(c) work
(d) displacement

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30. When kinetic energy of a moving body becomes double, its velocity changes by a factor of:
(a) 2

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(b) √2
(c) 4
(d) ½

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31. The area under a force–displacement curve represents:
(a) work
(b) power
(c) energy
(d) velocity

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32. The potential energy and kinetic energy of a spring system are equal when:
(a) x = 0
(b) x = xm/√2
(c) x = xm
(d) x = 2xm

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33. The total mechanical energy of a body remains constant if:
(a) only conservative forces act
(b) non-conservative forces act
(c) friction acts
(d) energy is dissipated

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34. The unit of horsepower (hp) is approximately equal to:
(a) 500 W
(b) 746 W
(c) 1000 W
(d) 100 W

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35. The potential energy of a spring is given by:
(a) ½ kx^2
(b) kx^2
(c) $2kx^2$
(d) kx

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36. The kinetic energy of a moving body depends on:
(a) direction only
(b) mass and speed

(c) mass only
(d) speed only

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37. When θ = 180°, work done is:
(a) maximum
(b) zero
(c) negative
(d) positive

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38. Power can also be expressed as:
(a) F/a
(b) F × v
(c) F/v
(d) F × s

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39. The potential energy curve of a spring is of shape:
(a) straight line
(b) parabolic
(c) circular
(d) exponential

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40. Work done in lifting a 10 kg object to height 5 m is:
(a) 50 J
(b) 100 J
(c) 500 J
(d) 5 J

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41. When displacement is zero, work done is:
(a) zero
(b) maximum
(c) negative
(d) positive

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42. A 1200 W motor lifts a 200 kg object in 10 s. Height reached = ? (g = 10 m/s²)
(a) 5 m
(b) 6 m

(c) 8 m
(d) 4 m

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43. A block slides on a smooth horizontal surface. Work done by normal reaction = ?
(a) zero
(b) positive
(c) negative
(d) infinite

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44. The unit of energy used in electricity bills is:
(a) watt
(b) kilowatt-hour
(c) joule
(d) volt

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45. 1 eV = ? J
(a) 1.6×10^{-19}
(b) 3.6×10^{-6}
(c) 1.6×10^{-7}
(d) 3.6×10^{-19}

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46. The power of an engine which lifts 1000 kg through 10 m in 5 s ($g = 10\ m/s^2$):
(a) 10 kW
(b) 20 kW
(c) 1 kW
(d) 2 kW

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47. The quantity having same dimension as work is:
(a) energy
(b) momentum
(c) power
(d) velocity

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48. The kinetic energy of a car is 10^6 J. If its speed doubles, kinetic energy becomes:
(a) 2×10^6 J
(b) 4×10^6 J

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(c) 10^5 J
(d) 0.5×10^6 J

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49. When no net force acts on a body, the work done by all forces is:
(a) positive
(b) zero
(c) negative
(d) undefined

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

✅ ANSWERS – SET 4

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