JB 2 MR BATCH (SET A)
# PHYSICS : PART TEST
Topic: Work Energy Power

1.   A box of mass 25 kg starts from rest and slides down an inclined plane 8 metre long and 5 metre high. It is found to move at the bottom at 7 m/s. What is the force of friction?

    (a)   79.6 N   (b)   96.6 N   (c)   76.6 N   (d)   116.6 N

2.   Given that the position of the body in m is a function of time as follows: $x = 2t^4 + 5t + 4$

    The mass of the body is 2 kg. What is the increase in its kinetic energy one second after the start of motion?

    (a)   168 J   (b)   169 J   (c)   32 J   (d)   144 J
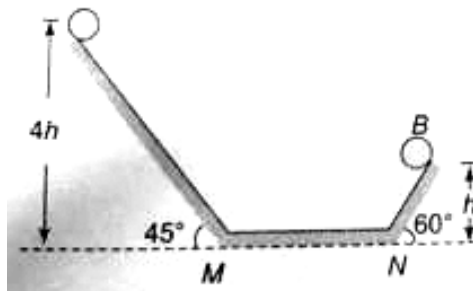

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3. Which of the following graphs is correct between kinetic energy (E), potential energy (U) and height (h) from the ground of the particle

(a)

(b)

(c)

(d)
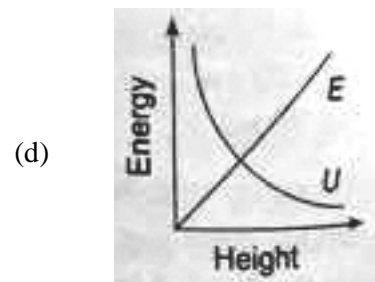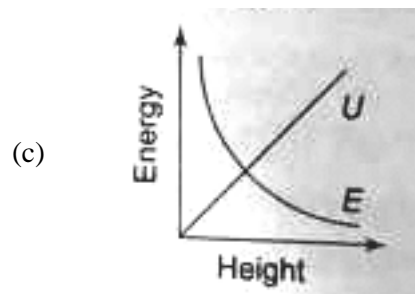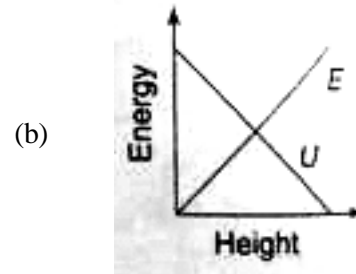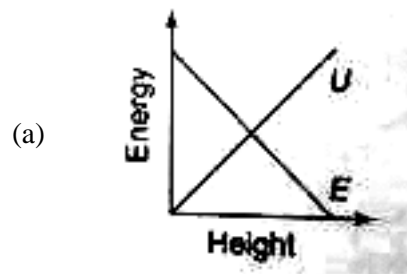
4. Two identical balls A and B are released from the positions shown in figure. They collide elasticity on horizontal position MN. The ratio of the heights attained by A and B after collision will be (neglect friction):

(a)   1 : 4   (b)   2 : 1   (c)   4 : 13   (d)   2 : 5


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5. A worker pushes a wheelbarrow with a horizontal force of 50 N on level ground over a distance of 5.0 m. If a friction force of 43 N acts on the wheelbarrow in a direction opposite that of the worker, what work is done on the wheelbarrow by the worker?

   (a) 250 J   (b) 215 J   (c) 35 J   (d) 10 J

6. A body is acted upon by a force which is proportional to the distance covered. If distance covered by denoted by x, then work done by the force will be proportional to:

   (a) x   (b) x^2 (c) $x^{3/2}$ (d) None of these

7. A force of $\vec{F} = 2x\hat{i} + 2\hat{j} + 3z^2k$ N is acting on particle. Find the work done by this force in displacing the body from (1, 2, 3) m to (3, 6, 1) m.

   (a) – 10 J   (b) 100 J   (c) 10 J   (d) 1 J

8. The work done in moving a body of mass 4 kg with uniform velocity of 5 ms^{-1} for 10 seconds on a surface of $\mu = 0.4$ is (take g = 9.8 m/s^2)

   (a) 584 J   (b) 784 J   (c) 684 J   (d) 484 J

9. A body of mass 6 kg is under a force which causes displacement in it given by $S = \dfrac{t^2}{4}$ metres where t is time. The work done by the force in 2 seconds is

   (a) 12 J   (b) 9 J   (c) 6 J   (d) 3 J

10. If the net work done by external forces on a particle is zero, which of the following statements about the particle must be true?

    (a) Its velocity is zero   (b) Its velocity is decreased

   (c) Its velocity is unchanged   (d) Its speed is unchanged

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11. A force acts on a 30 gm particle in such a way that the position of the particle as a function of time is given by $x = 3t - 4t^2 + t^3$, where x is in metres and t is in seconds. The work done during the first 4 seconds is

    (a)   5.28 J   (b)   450 mJ   (c)   490 mJ   (d)   530 mJ

12. A block is released from rest from a height h = 5 m. After travelling through the smooth curved surface it moves on the rough horizontal surface through a length l = 8 m and climbs onto the other smooth curved surface through a height h´. If μ = 0.5, find h´.
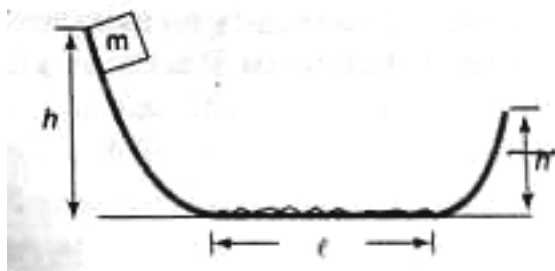
    (a)   2 m   (b)   3 m   (c)   1 m   (d)   zero

13. A block of mass m sliding down an incline at constant speed is initially at a height h above the ground, as shown in the figure above. The coefficient of kinetic friction between the mass and the incline is μ. If the mass continues to slide down the incline at a constant speed, how much energy is displaced by friction by the time the mass reaches the bottom of the incline?

    (a)   mgh/θ   (b)   mgh   (c)   μmgh/sin θ   (d)   mgh/sin θ
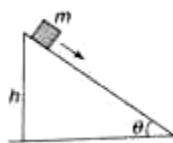
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14. A ring of mass m can slide over a smooth vertical rod as shown in figure. The ring is connected to a spring of force constant k = 4 mg/R, where 2R is the natural length of the spring. The other end of spring is fixed to the ground at a horizontal distance 2R from the base of the rod. If the mass is released at a height 1.5 R, then the velocity of the ring as it reaches the ground is
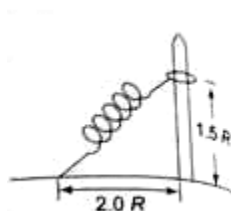

(a) $\sqrt{gR}$　　　　(b) $2\sqrt{gR}$　　　　(c) $\sqrt{2gR}$　　　　(d) $\sqrt{3gR}$

15. An 800 N marine in basic training climbs a 12.0 m vertical rope at a constant speed in 8.00 s. What is his power output?

(a) 1.8 kW　　　　(b) 1.2 kW　　　　(c) 2.2 kW　　　　(d) 2.8 kW

16. Power supplied to a particle of mass 2 kg varies with time as $P = \dfrac{3t^2}{2}$ watt. Here t is in second. If velocity of particle at t = 0 is v = 0, the velocity of particle at time t = 2 s will be:

(a) 1 m/s　　　　(b) 4 m/s　　　　(c) 2 m/s　　　　(d) $2\sqrt{2}$ m/s

17. A 30 m deep well is having water upto 15 m. An engine evacuates it in one hour. The power of the engine, if the diameter of the well is 4 m is

(a) 11.55 kW　　　　(b) 1155 kW　　　　(c) 23.10 kW　　　　(d) 2310 kW

18. Work done when a force $F = (\hat{i} + 2\hat{j} + 3k)$ N acting on a particle takes it from the point $r_1 = (\hat{i} + \hat{j} + k)$ to the point $r_2 = (\hat{i} - \hat{j} + 2k)$ is

(a) -3 J　　　　(b) -1 J　　　　(c) zero　　　　(d) 2 J

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19. A particle moves along the x-axis from x = 0 to x = 5 m under the influence of a force given by $F = 7 - 2x + 3x^2$. The work in the process is

   (a) 360 J   (b) 85 J   (c) 185 J   (d) 135 J

20. A body with mass 1 kg moves in one direction in the presence of a force which is described by the potential energy graph. If the body is released from rest at x = 2 m, than its speed when it crosses x = 5 m is (Neglect dissipative forces)
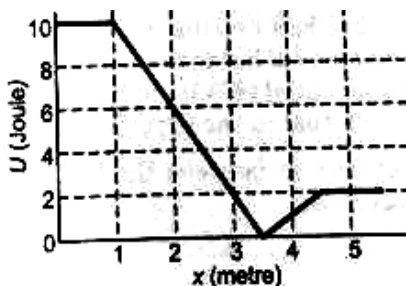
   (a) $2\sqrt{2}$ ms^{-1} (b) 1 ms^{-1} (c) 2 ms^{-1} (d) 3 ms^{-1}

21. A body has kinetic energy E when projected at angle of projection for maximum range. Its kinetic energy at the highest point of its path will be

   (a) E   (b) $\dfrac{E}{2}$ (c) $\dfrac{E}{\sqrt{2}}$ (d) zero

22. A projectile is fired from the origin with a velocity v_0 at an angle θ with the x-axis. The speed of the projectile at an altitude h is

   (a) $v_0 \cos\theta$ (b) $\sqrt{v_0^2 - 2gh}$ (c) $\sqrt{v_0^2 \sin^2\theta - 2gh}$ (d) None of these

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23. A spring of force constant k is cut in two parts at its one-third length. When both the parts are stretched by same amount. The work done in the two parts will be

    (a) equal in both
    (b) greater for the longer part
    (c) greater for the shorter part
    (d) data insufficient

24. A block of mass m is directly pulled up slowly on a smooth inclined plane of height h and inclination θ with the help of a string parallel to the incline. Which of the following statement is incorrect for the block when it moves up from the bottom to the top of the incline?
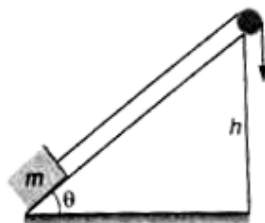
    (a) Work done by the normal reaction force is zero
    (b) Work done by the string is mgh
    (c) Work done by gravity is mgh
    (d) Net work done on the block is zero

25. A block of mass 10 kg is moving in x-direction with a constant speed of 10 m/s. It is subjected to a retarding force F = – 0.1 x J/m during its travel from x = 20 m to x = 30 m. Its final kinetic energy will be

    (a) 475 J
    (b) 450 J
    (c) 275 J
    (d) 250 J

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JB 2 MR BATCH
CHEMISTRY : PART TEST SET - A
Topic: Atomic Structure + Mole Concept + Periodic

26.   Which of the following is electronic configuration of Cu^{2+} (Z = 29)?

(a) $[Ar]4s^13d^8$ (b) $[Ar]4s^23d^{10}4p^1$ (c) $[Ar]4s^13d^{10}$ (d) $[Ar]3d^9$

27.   For given energy, E = 3.03×10^{-19} Joules corresponding wavelength is (h = 6.626×10^{-34} J sec, c = 3×10^8 m/sec)

(a)   65.6 nm   (b)   6.56 nm   (c)   3.4 nm   (d)   656 nm

28.   The magnetic quantum number for the outermost electron in sodium atom is

(a)   –2   (b)   0   (c)   +1   (d)   –1

29.   What will be the mass of a particle if uncertainty in its position is 10^{-8} m and velocity is 5.26×10^{-25} ms^{-1}

(a)   0.01 kg   (b)   0.1 kg   (c)   1 kg   (d)   10 kg

30.   The nitrogen atom has 7 protons and 7 electrons, the nitride ion (N^{3-}) will have

(a)   7 protons and 10 electrons   (b)   4 protons and 7 electrons

(c)   4 protons and 10 electrons   (d)   10 protons and 7 electrons

31.   The wavelength of a spectral line for an electronic transition is inversely related to

(a)   the number of electrons undergoing the transition

(b)   the nuclear charge of the atom

(c)   the difference in the energy of the energy levels involved in the transition

(d)   the velocity of the electron undergoing the transition

32.   The isotopes of atoms of an element differ in

(a)   Atomic number   (b)   Mass number

(c)   Number of electrons   (d)   Chemical properties

33.   Write the values of n and l quantum numbers for 5f

(a)   5, 3   (b)   3, 5   (c)   3, 4   (d)   4, 3

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34. Identify the correct statement regarding photoelectric effect.
    (a) K.E of emitted electron is independent on the frequency of incident photon
    (b) Number of photo electrons emitted is directly proportional to the intensity of incident light
    (c) The K.E of an emitted electron is greater than zero if incident energy is less than threshold energy of the metal
    (d) All

35. The sub-energy level having minimum energy is
    (a) 3d (b) 5p (c) 4s (d) 4p

36. The potential energy of an electron in the hydrogen atom is –6.8 eV. Indicate in which excited state, the electron is present?
    (a) first (b) second (c) third (d) fourth

37. The mass of an atom is constituted mainly by
    (a) neutron and neutrino (b) neutron and electron
    (c) neutron and proton (d) proton and electron

38. A photon of wavelength 5000 A° strikes a metal surface having work function of 2.20 eV. The kinetic energy of the emitted photo electron is
    (a) 4.4×10^{-20} J (b) 0.425 eV
    (c) 2.20 eV (d) No electrons will be emitted

39. The mass of 1.205×10^{22} molecules of ammonia is
    (a) 0.34 g (b) 3.4 g (c) 3.4 kg (d) 34 g

40. Neon has two isotopes Ne^{20} and Ne^{22}. If atomic weight of Neon is 20.2, the ratio of the relative abundances of the isotopes is
    (a) 1 : 9 (b) 9 : 1 (c) 70% (d) 80%

41. The oxide of an element possesses the formula MO_2. If the equivalent mass of the metal is 9, then the atomic mass of the metal will be
    (a) 9 (b) 18 (c) 27 (d) 36

42. A compound possesses 8% sulphur by mass. The least molecular mass is?
    (a) 200 (b) 400 (c) 155 (d) 355

43. Boron has two stable isotopes, ^{10}B (19%) and ^{11}B (81%). The atomic mass that should appear for boron in the periodic table is
    (a) 10.8 (b) 10.2 (c) 11.2 (d) 10.0

Space for Rough Work

44. The specific heat of metal is 0.16. Its approximate atomic weight would be

    (a)   40   (b)   16   (c)   32   (d)   64

45. Which among the following group of elements are smallest in size?

    (a)   I A group   (b)   II A group   (c)   VII A group   (d)   VI A group

46. Among the elements with the following electronic configurations, the one with the largest radius is

    (a) $[Ne]3s^2$ (b) $[Ne]3s^23p^1$ (c) $[Ne]3s^23p^3$ (d) $[Ne]3s^23p^5$

47. The ionization potential values of an element are in the following order $I_1 < I_2 <<<< I_3 < I_4 < I_5$. The element is

    (a)   Alkali metal   (b)   Chalcogen

    (c)   Halogen   (d)   Alkaline earth metal

48. The I_1, I_2, I_3 and I_4 values of an element M are 120 kJ/mole, 600 kJ/mole, 1000 kJ/mole and 8000 kJ/mole. The formula of its sulphate is

    (a) MSO_4 (b) $M_2(SO_4)_3$ (c) M_2SO_4 (d) $M_3(SO_4)_2$

49. The lP_1 of O, S, F and Cl are in the order

    (a) $F > O > Cl > S$ (b) $S > Cl > O > F$ (c) $Cl > S > O > F$ (d) $F > Cl > O > S$

50.

List-I (atomic number of element)	List-II (IUPAC name)
A) 105	P) Uun
B) 107	Q) Uns
C) 109	R) Unp
D) 110	S) Une

    (a)   A-R;B-Q;C-S;D-P   (b)   A-R;B-S;C-Q;D-P   (c)   A-Q;B-S;C-R;D-P   (d)   A-S;B-R;C-Q;D-P

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Max. Marks: 200   **Date: 17.10.2022**

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PHYSICS : PART TEST SET - A ANSWER KEY
Topic: Work Energy Power

1.	(c)	2.	(d)	3.	(a)	4.	(c)	5.	(a)
6.	(b)	7.	(a)	8.	(b)	9.	(d)	10.	(d)
11.	(a)	12.	(c)	13.	(b)	14.	(b)	15.	(b)
16.	(c)	17.	(a)	18.	(b)	19.	(d)	20.	(a)
21.	(b)	22.	(b)	23.	(c)	24.	(c)	25.	(a)

Date: 17.10.2022

JB 2 MR BATCH
CHEMISTRY : PART TEST SET - A ANSWER KEY
Topic: Atomic Structure + Mole Concept + Periodic

26.	(d)	27.	(d)	28.	(b)	29.	(a)	30.	(a)
31.	(c)	32.	(b)	33.	(a)	34.	(b)	35.	(c)
36.	(a)	37.	(c)	38.	(a)	39.	(a)	40.	(b)
41.	(d)	42.	(b)	43.	(a)	44.	(a)	45.	(c)
46.	(a)	47.	(d)	48.	(b)	49.	(a)	50.	(a)