JB 3 BATCH (SET A)
PHYSICS : PART TEST
Topics: Work Energy Power and Collision

1.   In the question number 15, the work done against force of friction is

(a)   8.7 J   (b)   10.7 J   (c)   7.81   (d)   12.7 J

2.   In the question number 15, the work done by applied force is

(a)   10 J   (b)   50 J   (c)   100 J   (d)   150 J

3.   Figure shows four situations in which a force is ʜ applied to a block. In all four cases, the force has the same magnitude, and the displacement of the block is to the right and of the same magnitude. Which of the following cases work done by the applied force on the block is zero?

(a)   (i)   (b)   (ii)   (c)   (iii)   (d)   (iv)

4.   The work done by a body against friction always results in

(a)   loss of kinetic energy   (b)   loss of potential energy

(c)   gain of kinetic energy   (d)   gain of potential energy

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Space for Rough Work

5. Which of the following statements is incorrect?

    (a)   Kinetic energy may be zero, positive or negative.

    (b)   Power, energy and work are all scalars.

    (c)   Potential energy may be zero, positive or negative.

    (d)   Ballistic pendulum is a device for measuring the speed of bullets.

6. If the lone acting on a body is inversely proportional to its speed, then its kinetic energy is

    (a)   linearly related to time   (b)   inversely proportional to time

    (c)   inversely proportional to the square of time   (d)   a constant.

7. A truck and a car moving with the same kinetic energy are brought to rest by the application of brakes which provide equal retarding forces. Which of them will come to rest in a shorter distance?

    (a)   The truck

    (b)   The car

    (c)   Both will travel the same distance before coming to rest

    (d)   Cannot be predicted

8. A bullet of mass m fired at 30° to the horizontal leaves the barrel of the gun with a velocity v. The bullet hits a soft target at a height h above the ground while it is moving downward and emerges out with half the kinetic energy it had before hitting the target. Which of the following statements is correct in respect of bullet after it emerges out of the target?

    (a)   The velocity of the bullet remains the same.

    (b)   The velocity of the bullet will be reduced to half its initial value.

    (c)   The velocity of the bullet will be more than half of its earlier velocity.

    (d)   The bullet will continue to move along the same parabolic path.

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9. A 120 g mass has a velocity $\vec{v} = 2\hat{i} + 5\hat{j}$ ms^{-1} at a certain instant. Its kinetic energy is

    (a) 3 J   (b) 4 J   (c) 5 J   (d) 1.74 J

10. The blades of a windmill sweep out a circle of area A. If the wind flows at a velocity v perpendicular to the circle, then the mass of the air of density ρ passing through it in time t is

    (a) $Av\rho t$ (b) $2Av\rho t$ (c) $Av^2\rho t$ (d) $\frac{1}{2}Av\rho t$

11. In the question number 10, the kinetic energy of the air is

    (a) $\frac{1}{2}A\rho vt$ (b) $\frac{1}{2}A\rho v^2 t$ (c) $\frac{1}{2}A\rho v^3 t$ (d) $2A\rho v^3 t$

12. For a moving particle (mass m, velocity v) having a p, which one oi the following correctly describes the kinetic energy of the particle?

    (a) $\frac{p^2}{2m}$ (b) $\frac{p}{2m}$ (c) $\frac{v^2}{2m}$ (d) $\frac{v}{2m}$

13. In the noo-rdatrvistic regime, if the momentum, is increased by 100%, the percentage increase in

    (a) 100   (b) 200   (c) 300   (d) 400

14. The momentum of a body is increased by 25%. The kinetic energy is increased by about

    (a) 25%   (b) 5%   (c) 56%   (d) 38%

15. In a ballistics demonstration a police officer fires a bullet of mass 50 g with speed 200 m s^{-1} on soft plywood of thickness 2 cm. The bullet emerges with only 10% of its initial kinetic energy. The emergent speed of the bullet is

    (a) $2\sqrt{10}$ ms^{-1} (b) $20\sqrt{10}$ ms^{-1} (c) $10\sqrt{2}$ ms^{-1} (d) $10\sqrt{20}$ ms^{-1}

Space for Rough Work

16. A running man has half the kinetic energy than a boy of half his mass has. The man speed up by 1.0 ms^{-1} and then he has the same energy as the boy. The original speeds of the man and boy respectively are

    (a) 2.4 ms^{-1}, 1.2 ms^{-1} (b) 1.2 m s^{-1}, 4.4 ms^{-1} (c) 2.4 ms^{-1},4^ms^{-1} (d) 4.8 m s^{-1}, 2.4 ms^{-1}

17. An electron and a proton are detected in a cosmic ray experiment, the first with kinetic energy 10 keV, and the second with 100 keV. The ratio of their speeds is

    (where m_e and m_p are masses of electron and proton respectively)

    (a) $\sqrt{\dfrac{1}{10}\dfrac{m_e}{m_p}}$
    (b) $\sqrt{\dfrac{1}{10}\dfrac{m_p}{m_e}}$
    (c) $\dfrac{1}{10}\dfrac{m_e}{m_p}$
    (d) $\dfrac{1}{10}\dfrac{m_p}{m_e}$

18. Two bodies A and B have masses 20 kg and 5 kg respectively. Each one is acted upon by a force of 4 kg wt. If they acquire the same kinetic energy in times t_A and t_B, then the ratio $\dfrac{t_A}{t_B}$ is

    (a) $\dfrac{1}{2}$
    (b) 2
    (c) $\dfrac{2}{5}$
    (d) $\dfrac{5}{6}$

19. The area under force-displacement curve represents

    (a) velocity (b) acceleration (c) impulse (d) work done

20. A force F acting on an object varies with distance x as shown in the figure. The work done by the force in moving the object from x = 0 to x = 20 m is
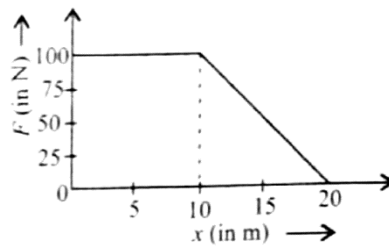
    (a) 500 J (b) 1000 J (c) 1500 J (d) 2000 J

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21.   A force F acting on an object varies with distance x as shown in the figure.
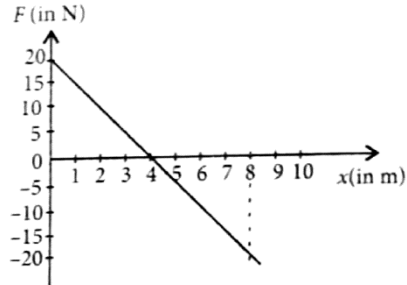
The work done by the force in moving the object from x = 0 to x = 8 m is

(a)   zero J   (b)   80 J   (c)   -40 J   (d)   40 J

22.   A particle is acted upon by a force F which varies with position x as shown in figure. If the particle at x = 0 has kinetic energy of 25 J, then the kineti^ energy of the particle at x = 16 m is
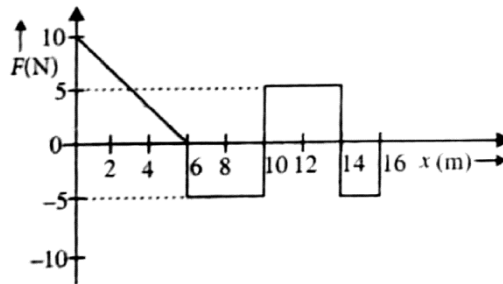
(a)   45 J   (b)   30 J   (c)   70 J   (d)   20 J

23.   A block of mass 10 kg is moving in x-direction with a constant speed of 10 ms^{-1}. It is subjected to a retarding force $F_r = - 0.1xJ$ m^{-1} during its travel from x = 20 m to x = 30 m. Its final kinetic energy will be

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

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24. A variable force, given by the 2-dimensional vector $\vec{F} = (3x^2\hat{i} + 4\hat{j})$, acts on a particle. The force is in newton and x is in metre. What is the change in the kinetic energy of the particle as it moves from the point with coordinates (2, 3) to (3, 0)? (The coordinates are in metres.)

    (a)   – 7 J   (b)   zero   (c)   +7 J   (d)   +19 J

25. The potential energy of a system increases if work is done

    (a)   upon the system by a non conservative force   (b)   by the system against a conservative force

    (c)   by the system against a non conservative force   (d)   upon the system by a conservative force

Space for Rough Work

Date: 17.10.2022

JB 3 MR BATCH
CHEMISTRY : PART TEST SET - A
Topic: Atomic Structure + Isomerism

26. Which is the correct order of increasing energy of the listed orbitals in the atom of titanium? (At. no. Z = 22)

    (a) 3s 3p 3d 4s   (b) 3s 3p 4s 3d   (c) 3s 4s 3p 3d   (d) 4s 3s 3p 3d

27. A particle 'A' moving with a certain velocity has a de Broglie wavelength of 1Å. If the particle B has mass 25% of that of A and velocity 75% of that of A then de-Broglie wavelength of B will be approximately.

    (a) 1.6 Å   (b) 5.3 Å   (c) 3.5 Å   (d) 5.9 Å

28. An oxide of nitrogen has a molecular weight of 30. Total number of electrons in one molecule of the compound is

    (a) 15   (b) 30   (c) 45   (d) 60

29. When Z is doubled in an atom, which of the following statements are consistent with Bohr's theory?

    (a) Energy of a state is doubled   (b) Radius of an orbit is doubled.

    (c) Velocity of electron in an orbit is doubled.   (d) Energy of a state is halved

30. In order to designate an orbital in an atom the number of quantum numbers are required

    (a) One   (b) Two   (c) Three   (d) Four

31. Number of protons in the nucleus of carbon atom is

    (a) 7   (b) 8   (c) 4   (d) 6

32. The orbital diagram in which the aufbau principle is violated is

    (a)
    (b)
    (c)
    (d)

33. The maximum probability of finding an electron in the d_{xy} orbital is

    (a) Along the x-axis   (b) Along the y-axis

    (c) At an angle of 45° from the x and y-axes   (d) At an angle of 90° from the x and y-axes

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Space for Rough Work

34. Magnetic moment 2.83 BM is given by which of the following ions? (Atomic number. Ti = 22, Cr = 24, Mn = 25, Ni = 28)

   (a) Ni^{+2} (b) Cr^{3+} (c) Mn^{2+} (d) Ti^{3+}

35. In Bohr's model of an atom, when an electron jumps from n = 1 to n = 3, how much energy will be emitted or absorbed?

   (a) 2.389×10^{-12} ergs   (b) 0.239×10^{-10} ergs   (c) 2.15×10^{-10} ergs   (d) 0.1936×10^{-10} ergs

36. If the threshold wavelength (λ^0) for the ejection of an electron from metal is 330 nm, then work function for the photoelectric emission is

   (a) 1.2×10^{-18} J   (b) 1.2×10^{-20} J   (c) 6×10^{-19} J   (d) 6×10^{-12} J

37. 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

38. The maximum number of electrons in p-orbital with n = 5, m = 1 is

   (a)   6   (b)   2   (c)   14   (d)   10

39. Which of the following is not the correct relationship?
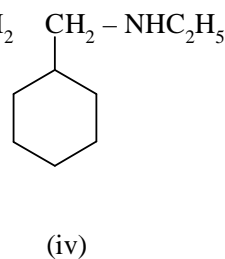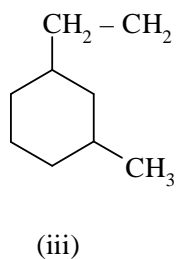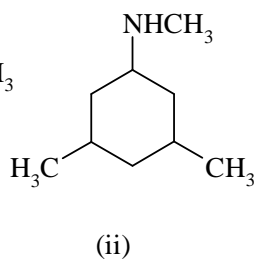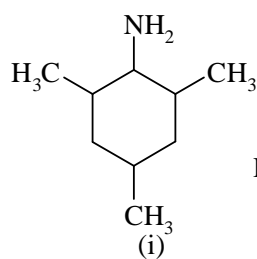
   (a)   (i) and (ii) are functional isomers   (b)   (ii) and (iv) are metamers
   (c)   (i) and (iv) are positional isomers   (d)   (i) and (iii) are chain isomers

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Space for Rough Work

40. Which of the following statements is not true about the following compounds?
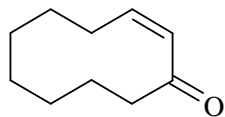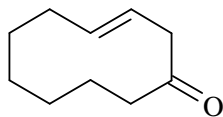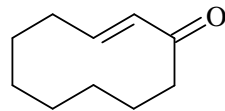
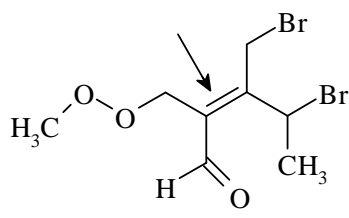|		
(i)	(ii)	(iii)

(a)   (i) and (iii) are identical

(b)   (i) and (iii) are geometrical diastereomers

(c)   (i) and (ii) are structural isomers

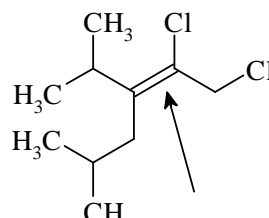(d)   (ii) and (iii) are structural isomers

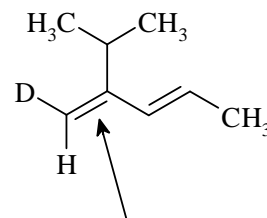41. Among the following structures, select E isomers (arrows indicate the bonds to be considered)?
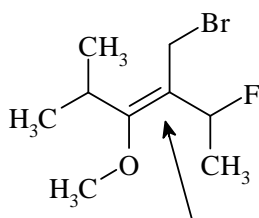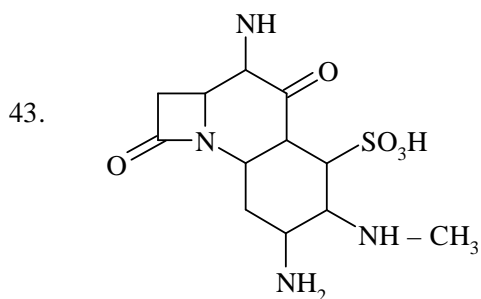

(1)	(2)	(3)	(4)

(a)   1 and 2

(b)   1 and 3

(c)   1 and 4

(d)   2 and 3

42. Double bond equivalent of C_8H_8 is :

(a)   4

(b)   5

(c)   6

(d)   7

43.

Which functional group is present in above compound?

(a)   Carboxylic acid

(b)   Aldehyde

(c)   Thiol
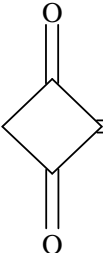
(d)   Alcohol
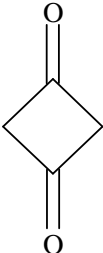
Space for Rough Work

44. Which functional group can be presented in compound having molecular formula $C_4H_{10}O$?

    (a)   Aldehyde   (b)   Ketone   (c)   Acid   (d)   Alcohol

45. Which of the following will not form an enolation?

    (a)   (b)

    (c)   (d)
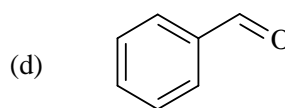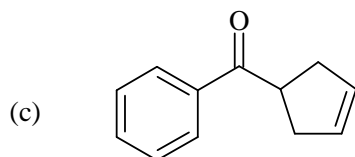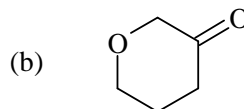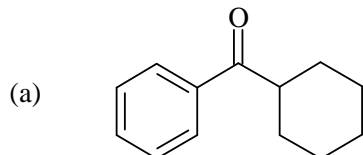
46. , Enol content of (A) and (B) is:

   (A)   (B)

    (a)   B > A   (b)   A > B   (c)   A = B   (d)   A >>> B

Multiple Correct Answers

47. The metamer and functional isomer of N, N-Diethylethanamine is/are

    (a)   N, N-Dimethylbutane-2-amine and N-propylbutan-1-amine respectively

    (b)   N-Ethyl-N-methylpropan-2-amine and N-methylpentan-2-amine respectively

    (c)   N-Ethyl-N-methylpropan-1-amine and N-isopropylpropan-1-amine and N-isopropyl propan-1-amine respectively

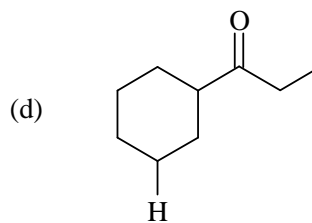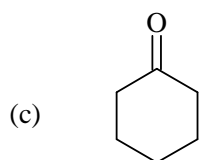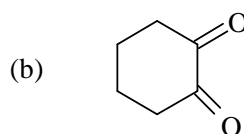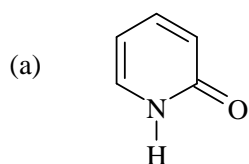   (d)   N, N-Dimethylpropan-2-amine and N-Ethylbutan-2-amine respectively
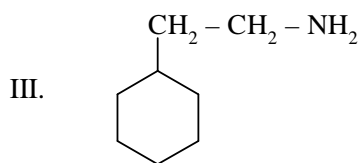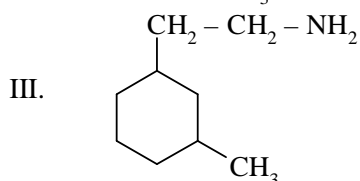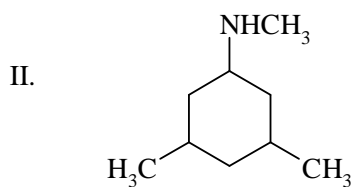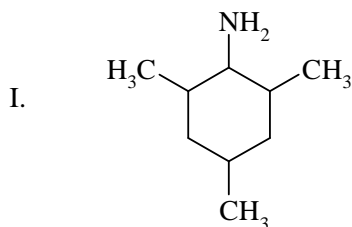
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48. Which of the following compound will not show geometrical isomerism?

(a)

(b)

(c)

(d)
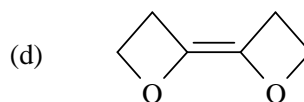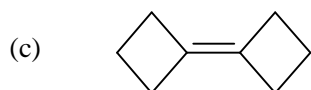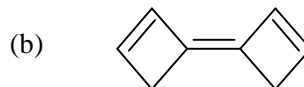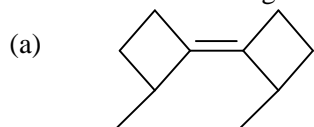
49. In which of the following the enol form is dominant over keto form?

(a)

(b)

(c)

(d)

50. Which of the following is the correct relationship?

I.

II.

III.

III.

(a)   I and II are functional isomers

(b)   II and IV are metamers

(c)   I and IV are position isomers

(d)   I and III are chain isomers

Space for Rough Work

JB 3 MR BATCH
PHYSICS : PART TEST SET - A ANSWER KEY
Topics: Work Energy Power and Collision

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

JB 3 MR BATCH
CHEMISTRY : PART TEST SET - A ANSWER KEY
Topic: Atomic Structure + Isomerism

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