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Date : 20/09/2015

Test No.: 0 6

Subject Code.: 2 2 2

Time : 3 Hrs.   **M.M. : 720**

HORIZON TEST SERIES
for
Medical
Entrance Exam.
2016

[Test No. 6_Batch 1]

INSTRUCTIONS FOR STUDENTS

1. Read each question carefully.

2. It is mandatory to use Blue/Black Ball Point Pen to darken the appropriate circle in the answer sheet.

3. Mark should be dark and should complete fill the circle.

4. Rough work must be done on the Question Paper, no additional sheet will be provided for this purpose.

5. Do not use white-fluid or any other rubbing material on answer sheet. No change in the answer once marked.

6. Student cannot use log tables and calculators or any other material in the examination hall.

7. Before attempting the question paper, student should ensure that the test paper contains all pages and no page is missing.

8. Each correct answer carries four **(4)** marks. One **(1)** mark will be deducted for each incorrect answer from the total score.

9. Before handing over the answer sheet to the invigilator, candidate should check the particulars have been filled and marked correctly.

10. Immediately after the prescribed examination time is over, the answer sheet to be returned to the invigilator.

11. Use of Calculator and other Electronic device is not permitted.

Test No. 6

Topics of The Test

Physics	Laws of Motion

Chemistry	Atomic Structure + Classifications + Chemical Bonding.

| **Biology**	Zoology : Respiration system in human. Botany : Plant Respiration.

Test No. 6

[PHYSICS]

1. A ball is travelling with uniform translatory motion. This means that
   - (A) it is at rest.
   - (B) the path can be a straight line or circular and the ball travels with uniform speed.
   - (C) all parts of the ball have the same velocity (magnitude and direction) and the velocity is constant.
   - (D) the centre of the ball moves with constant velocity and the ball spins about its centre uniformly.

2. Which one of the following statements is not true about Newton's second law of motion $\vec{F} = m\vec{a}$?
   - (A) The second law of motion is consistent with the first law.
   - (B) The second law of motion is a vector law.
   - (C) The second law of motion is applicable to a single point particle.
   - (D) The second law of motion is not a local law.

3. A ball of mass m strikes a rigid wall with speed u and rebounds with the same speed. The impulse imparted to the ball by the wall is
   - (A) $2mu$
   - (B) mu
   - (C) zero
   - (D) $-2mu$

4. A large force is acting on a body for a short time. The impulse imparted is equal to the change in
   - (A) acceleration
   - (B) momentum
   - (C) energy
   - (D) velocity

5. The motion of particle of mass m is given by $y = ut + \dfrac{1}{2}gt^2$. The force acting on the particle is

   - (A) mg
   - (B) $\dfrac{mu}{t}$
   - (C) $2mg$
   - (D) $\dfrac{2mu}{t}$

6. Figure shows the position-time $(x - t)$ graph of one dimensional motion of a body of mass 500 g. What is the time interval between two consecutive impulses received by the body ?
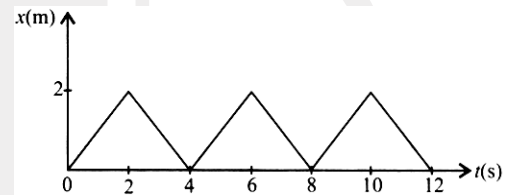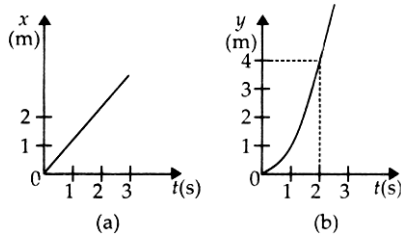

   - (A) 2 s
   - (B) 4 s
   - (C) 6 s
   - (D) 8 s

7. The position-time graph of a body of mass 2 kg is as shown in figure. What is the impulse on the body at $t = 4s$?
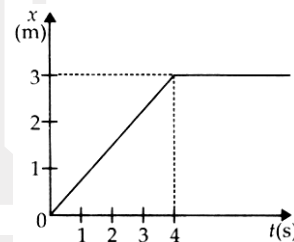
   - (A) $\dfrac{2}{3}$ kg ms^{-1}
   - (B) $-\dfrac{2}{3}$ kg ms^{-1}
   - (C) $\dfrac{3}{2}$ kg ms^{-1}
   - (D) $-\dfrac{3}{2}$ kg ms^{-1}

Space for Rough Work

8. Figure shows $(x,t),(y,t)$ diagram of a particle moving in 2-dimensions. If the particle has a mass of 500g, the force acting on the particle is


(a)   (b)

(A) 1 N along y-axis
(B) 1 N along x-axis
(C) 0.5 N along x-axis
(D) 0.5 N along y-axis

9. Figure shows the position-time graph of a particle of mass 4 kg. Let the force on the particle for $t<0, 0<t<4s, t>4s$ be F_1, F_2 and F_3 respectively. Then
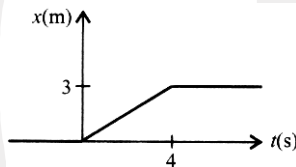
(A) $F_1 = F_2 = F_3 = 0$ (B) $F_1 > F_2 = F_3$

(C) $F_1 > F_2 > F_3$ (D) $F_1 < F_2 < F_3$

10. A rocket is going upwards with accelerated motion. A man sitting in it feels his weight increased 5 times his own weight. If the mass of the rocket including that of the man is 1.0×10^4 kg, how much force is being applied by rocket engine ? (Take g = 10 m s^{-2})

(A) 5×10^4 N   (B) 5×10^5 N
(C) 5×10^8 N   (D) 2×10^4 N

11. Ten one-rupee coins are put on top of each other on a table. Each coin has a mass m. The reaction of the 6th coin (counted from the bottom) on the 7th coin is

(A) $4mg$ (B) $6mg$
(C) $7mg$ (D) $3mg$

12. A block of mass 5 kg is suspended by a massless rope of length 2 m from the ceiling. A force of 50 N is applied in the horizontal direction at the midpoint P of the rope, as shown in the figure.
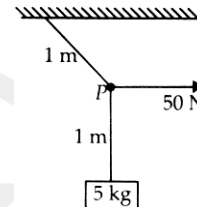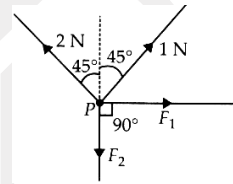

The angle made by the rope with the vertical in equilibrium is
(Take g = 10 m s^{-2})

(A) 30°   (B) 40°
(C) 60°   (D) 45°

13. A cork of mass 10 g is floating on water. The net force acting on the cork is

(A) 10 N   (B) 10^{-3} N
(C) 10^{-2} N   (D) zero

14. Which of the following statements is not true regarding the Newton's third law of motion ?

(A) To every action there is always an equal and opposite reaction.
(B) Action and reaction act on the same body.
(C) There is no cause-effect relation between action and reaction.
(D) Action and reaction forces are simultaneous forces.

15. A rocket with a lift-off mass 2×10^4 kg is blasted upwards with an initial acceleration of 5 ms^{-2}. The initial thrust of the blast is (Take g = 10 m s^{-2})

(A) 2×10^5 N   (B) 3×10^5 N
(C) 4×10^5 N   (D) 5×10^5 N

Space for Rough Work

16. A stone of mass 1 kg is lying on the floor of a train which is accelerating with 1 m s^{-2}. The net force acting on the stone is
    (A) zero   (B) 1 N
    (C) 5 N   (D) 10 N

17. Which of the following statements is incorrect ?
    (A) A cricketer moves his hands backwards while holding a catch.
    (B) A person falling from a certain height receives more injuries when he falls on a cemented floor than when he falls on a heap of sand.
    (C) It is easier to push a lawn mower than to pull it.
    (D) Mountain roads are generally made winding upwards rather than going straight up.

18. Which one of the following statements is not true ?
    (A) The same force for the same time causes the same change in momentum for different bodies.
    (B) The rate of change of momentum of a body is directly proportional to the applied force and takes place in the direction in which the force acts.
    (C) A greater opposing force is needed to stop a heavy body than a light body in the same time, if they are moving with the same speed.
    (D) The greater the change in the momentum in a given time, the lesser is the force that needs to be applied.

19. A body subjected to three concurrent forces is found to be in equilibrium. The resultant of any two forces
    (A) is equal to third force
    (B) is opposite to third force
    (C) is collinear with the third force
    (D) all of these

20. A body is moving under the action of two forces $\vec{F}_1 = 2\hat{i} - 5\hat{j}; \vec{F}_2 = 3\hat{i} - 4\hat{j}$. Its velocity will become uniform under a third force $\vec{F}_3$ given by
    (A) $5\hat{i} - \hat{j}$ (B) $-5\hat{i} - \hat{j}$
   (C) $5\hat{i} + \hat{j}$ (D) $-5\hat{i} + 9\hat{j}$

21. Three concurrent co-planar forces 1 N, 2 N and 3 N acting along different directions on a body
    (A) can keep the body in equilibrium if 2 N and 3 N act at right angle.
    (B) can keep the body in equilibrium if 1 N and 2 N act at right angle.
    (C) cannot keep the body in equilibrium.
    (D) can keep the body in equilibrium if 1 N and 3 N act at an acute angle.

22. There are four forces acting at a point P produced by strings as shown in figure, which is at rest. The forces F_1 and F_2 are

    (A) $\dfrac{1}{\sqrt{2}}N, \dfrac{3}{\sqrt{2}}N$ (B) $\dfrac{3}{\sqrt{2}}N, \dfrac{1}{\sqrt{2}}N$

    (C) $\dfrac{1}{\sqrt{2}}N, \dfrac{1}{\sqrt{2}}N$ (D) $\dfrac{3}{\sqrt{2}}N, \dfrac{3}{\sqrt{2}}N$

23. A block of mass 10 kg is placed on rough horizontal surface whose coefficient of friction is 0.5. If a horizontal force of 100 N is applied on it, then acceleration of the block will be
    [Take g = 10 m s^{-2}]
    (A) 10 m s^{-2} (B) 5 m s^{-2}
    (C) 15 m s^{-2} (D) 0.5 m s^{-2}

24. The coefficient of static friction between the box and the train's floor is 0.2. The maximum acceleration of the train in which a box lying on its floor will remain stationary is
    [Take g = 10 ms^{-2}]
    (A) 2 m s^{-2} (B) 4 m s^{-2}
    (C) 6 m s^{-2} (D) 8 m s^{-2}

Space for Rough Work

25. A trolley of mass 20 kg is attached to a block of mass 4 kg by a massless string passing over a frictionless pulley as shown in the figure. If the coefficient of kinetic friction between trolley and the surface is 0.02, then the acceleration of the trolley and block system is [Take g = 10 m s^{-2}]
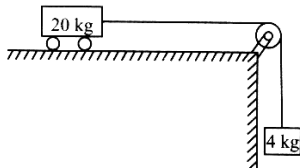

    (A)   1 m s^{-2} (B)   2 m s^{-2}
    (C)   1.5 m s^{-2} (D)   2.5 m s^{-2}

26. Which of the following statements is correct about friction ?
    (A)   The coefficient of friction between a given pair of substances is largely independent of the area of contact between them.
    (B)   The frictional force can never exceed the reaction force on the body from the support surface.
    (C)   Rolling friction is only slightly smaller than sliding friction.
    (D)   The main source of friction is the irregularity of the surfaces in contact.

27. A girl press her physics text book against a rough vertical wall with her hand. The direction of the frictional force on the book exerted by the wall is
    (A)   downwards   (B)   upwards
    (C)   out from the wall   (D)   into the wall

28. A car accelerates on a horizontal road due to the force exerted by
    (A)   the engine of the car
    (B)   the driver of the car
    (C)   the car on earth
    (D)   the road on the car

29. Which of the following is a self adjusting force ?
    (A)   Static friction   (B)   Rolling friction
    (C)   Sliding friction   (D)   Dynamic friction

30. A block of mass m rests on a rough inclined plane. The coefficient of friction between the surface and the block is μ. At what angle of inclination θ of the plane to the horizontal will the block just start to slide down the plane ?
    (A) $\theta = \tan^{-1} \mu$ (B) $\theta = \cos^{-1} \mu$
    (C) $\theta = \sin^{-1} \mu$ (D) $\theta = \sec^{-1} \mu$

31. Identify the correct statement.
    (A)   Static friction depends on the area of contact.
    (B)   Kinetic friction depends on the area of contact.
    (C)   Coefficient of static friction does not depend on the surfaces in contact.
    (D)   Coefficient of kinetic friction is less than the coefficient of static friction.

32. The rear side of a truck is open and a box of mass 40 kg is placed 5 m away from the open end. The coefficient of friction between the box and the surface below it is 0.15. The truck starts from rest with an acceleration of 2 ms^{-2} on a straight road. At what distance from the starting point does the box fall off the truck ?
    (A)   20 m   (B)   30 m
    (C)   40 m   (D)   50 m

33. In figure, the coefficient of friction between the floor and the block B is 0.1 The coefficient of friction between the blocks B and A is 0.2.
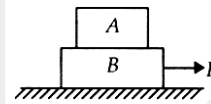

The mass of A is m/2 and of B is m. What is the maximum horizontal force F can be applied to the block B so that two blocks move together ?
    (A)   0.15mg   (B)   0.05mg
    (C)   0.1mg   (D)   0.45mg

Space for Rough Work

34. Two blocks A and B of masses 10 kg and 15 kg respectively are placed in contact with each other rest on a rough horizontal surface as shown in the figure. The coefficient of friction between the blocks and surface 0.2. A horizontal force of 200 N is applied to block A. The acceleration of the system is

(Take g = 10 m s^{-2})
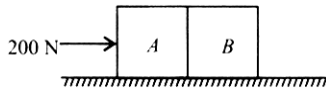
(A) 4 m s^{-2} (B) 6 m s^{-2}

(C) 8 m s^{-2} (D) 10 m s^{-2}

35. A person of mass 50 kg stands on a weighing scale on a lift. If the lift is ascending upwards with a uniform acceleration of 9 m s^{-2}, what would be the reading of the weighing scale ?

[Take g = 10 m s^{-2}]

(A) 50 kg   (B) 60 kg

(C) 95 kg   (D) 100 kg

36. A helicopter of mass 2000 kg rises with a vertical acceleration of 15 m s^{-2}. The total mass of the crew and passengers is 500 kg. Choose the correct statements from the following. (Take g = 10 m s^{-2})

(i)   The force on the floor of the helicopter by the crew and passengers is 1.25×10^{4}N vertically downwards.

(ii) The action of the rotor of the helicopter on the surrounding air is 6.25×10^4 N vertically downwards.

(iii) The force on the helicopter due to the surrounding air is 6.25×10^4 N vertically upwards.

(A) (i) and (ii)   (B) (ii) and (iii)

(C) (i) and (iii)   (D) All the three

37. Figure shows a man of mass 55 kg standing stationary with respect to a horizontal conveyor belt that is accelerating with 1 m s^{-2}. The net force acting on the man is
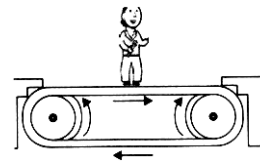
(A) 35 N   (B) 45 N

(C) 55 N   (D) 65 N

38. Two blocks of masses 8 kg and 12 kg are connected at the two ends of a light inextensible string. The string passes over a frictionless pulley. The acceleration of the system is

(A) $\dfrac{g}{4}$ (B) $\dfrac{g}{5}$

(C) $\dfrac{g}{8}$ (D) $\dfrac{g}{6}$

39. Block A of weight 100 N rests on a frictionless inclined plane of slope angle 30° as shown in the figure. A flexible cord attached to A passes over a frictionless pulley and is connected to block B of weight W.
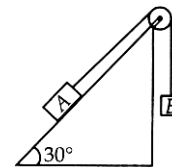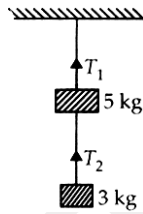

Find the weight W for which the system is in equilibrium.

(A) 25 N   (B) 50 N

(C) 75 N   (D) 100 N

Space for Rough Work

40. Two masses of 5 kg and 3 kg are suspended with the help of massless inextensible strings as shown in figure. The whole system is going upwards with an acceleration of 2 m s^{-2}. The tensions T_1 and T_2 are respectively.
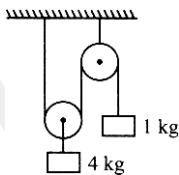
(Take g = 10 m s^{-2})

(A)   96 N, 36 N   (B)   36 N, 96 N

(C)   96 N, 96 N   (D)   36 N, 36 N

41. A person in an elevator accelerating upwards with an acceleration of 2 m s^{-2}, tosses an coin vertically upwards with a speed of 20 m s^{-1}. After how much time will the coin fall back into his hand ?

(Take g = 10 m s^{-2})

(A) $\dfrac{5}{3}s$ (B) $\dfrac{3}{10}s$

(C) $\dfrac{10}{3}s$ (D) $\dfrac{3}{5}s$

42. In the system shown in the figure, the acceleration of 1 kg mass is

(A) $\dfrac{g}{4}$ downwards   (B) $\dfrac{g}{2}$ downwards

(C) $\dfrac{g}{2}$ upwards   (D) $\dfrac{g}{4}$ upwards

Direction : (Only for Q. 43) In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

(A)   If both assertion and reason are true and reason is the correct explanation of assertion.

(B)   If both assertion and reason are true but reason is not the correct explanation of assertion.

(C)   If assertion is true but reason is false.

(B)   If both assertion and reason are false.

43. **Assertion :** If external force on a body is zero, its acceleration is zero.

Reason : This is the simple form of Newton's second law of motion.

44. A body of mass 2 kg travels according to the law $x(t) = pt + qt^2 + rt^3$ where p = 3 m s^{-1}, q = 4 m s^{-2} and r = 5 m s^{-3}. The force acting on the body at t = 2 seconds is

(A)   136 N   (B)   134 N

(C)   158 N   (D)   68 N

45. A car of mass m starts from rest acquires a velocity along east $\vec{v} = v\hat{i}\,(v > 0)$ in two seconds. Assuming the car moves with uniform acceleration, the force exerted on the car is

(A) $\dfrac{mv}{2}$ eastward and is exerted by the car engine.

(B) $\dfrac{mv}{2}$ eastward and is due to the friction on the tyres exerted by the road.

(C)   more than $\dfrac{mv}{2}$ eastward exerted due to the engine and overcomes the friction of the road.

(D) $\dfrac{mv}{2}$ exerted by the engine.

Space for Rough Work

[CHEMISTRY]

46. The ratio of charge to mass of an electron in coulombs per gram was determined by J.J. Thomson. He determined this ratio by measuring the deflection of cathode rays in electric and magnetic fields. What value did he find for this ratio?

    (A) -1.76×10^8 coulombs/g

    (B) 1.76×10^{-8} coulombs/g

    (C) -1.76×10^{10} coulombs/g

    (D) -1.76×10^{-10} coulombs/g

47. Which of the following conclusions regarding the structure of atom is based on Rutherford's α-particle scattering experiment?

    (A) The positive charge is concentrated in a very small volume of the atom.

    (B) The positive charge is scattered with the electrons throughout the atom.

    (C) The volume occupied by the nucleus is half of the volume of atom.

    (D) Most of the space in the atom is occupied by the neutrons.

48. The energy of a photon is given as 3.03×10^{-19} J/atom. The wavelength of the photon is

    (A) 6.56 nm   (B) 65.6 nm

    (C) 0.656 nm (D) 656 nm

49. The radius of the stationary state which is also called Bohr radius is given by the expression $r_n = n^2 a_0$ where the value of a_0 is

    (A) 52.9 pm   (B) 5.29 pm

    (C) 529 pm   (D) 0.529 pm

50. What is the trend of energy of Bohr's orbits?

    (A) Energy of the orbit increases as we move away from the nucleus.

    (B) Energy of the orbit decreases as we move away from the nucleus.

    (C) Energy remains same as we move away from the nucleus.

    (D) Energy of Bohr's orbit cannot be calculated.

51. The de-Broglie wavelength associated with a ball of mass 200 g and moving at a speed of 5 metres/hour, is of the order of ($h = 6.625 \times 10^{-34}$ J s) is

    (A) 10^{-15} m   (B) 10^{-20} m

    (C) 10^{-25} m   (D) 10^{-30} m

52. If the velocity of an electron in Bohr's first orbit is 2.19×10^6 m s^{-1}, what will be the de Broglie wavelength associated with it?

    (A) 2.19×10^{-6} m   (B) 4.38×10^{-6} m

    (C) 3.32×10^{-10} m (D) 3.32×10^{10} m

53. Which atom (X) is indicated by the following configuration?

    $$X \to [Ne]3s^2 3p^3$$

    (A) Nitrogen   (B) Chlorine

    (C) Phosphorus (D) Sulphur

54. The region where probability density function reduces to zero is called

    (A) probability density region

    (B) nodal surfaces

    (C) orientation surfaces

    (D) wave function

55. The probability of finding out an electron at a point within an atom is proportional to the

    (A) square of the orbital wave function *i.e.,* ψ^2

    (B) orbital wave function *i.e,* ψ

    (C) Hamiltonian operator *i.e.,* H

    (D) principal quantum number *i.e.,* n

56. Though the five *d*-orbitals are degenerate, the first four *d*-orbitals are similar to each other in shape whereas the fifth *d*-orbital is different from others. What is the name of the fifth orbital?

    (A) $d_{x^2-y^2}$ (B) d_{z^2}

    (C) d_{xz} (D) d_{xy}

Space for Rough Work

57. Which of the following configurations represents a noble gas ?

(A) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2$

(B) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4f^{14} 5s^2$

(C) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^6$

(D) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^3$

58. Two values of spin quantum numbers *i.e.,* + 1/2 and −1/2 represent

(A) up and down spin of the electrons respectively

(B) two quantum mechanic spin states which refer to the orientation of spin of the electron

(C) clockwise and anti-clockwise spin of the electrons respectively

(D) anti-clockwise and clockwise spin of the electrons respectively

59. Which of the following quantum numbers are correct for the outermost electron of sodium atom ?

(A) $n = 4, l = 0, m = 0, s = +1/2$

(B) $n = 3, l = 0, m = 0, s = -1/2$

(C) $n = 3, l = 1, m = +1, s = +1/2$

(D) $n = 3, l = 2, m = -1, s = -1/2$

60. Three elements 'X','Y' and 'Z' have atomic numbers 18, 19 and 20 respectively. How many electrons are present in the M shells of these elements ?

(A) 8, 9, 10   (B) 8, 10, 13

(C) 8, 8, 8   (D) 8, 9, 12

61. The periodic table of today owes its development to two chemists namely

(A) Rutherford and Moseley

(B) Alexander Newlands and Dobereiner

(C) Dmitri Mendeleev and Lothar Meyer

(D) de Broglie and Neil Bohr

62. The first periodic law stated by Mendeleev was

(A) there is no correlation in the properties and atomic weights of the elements

(B) the properties of the elements are a periodic function of their atomic numbers

(C) the properties of the elements are a periodic function of their atomic weights

(D) the properties of the elements are a periodic function of their empirical formula

63. What is the name and symbol of the element with atomic number 112 ?

(A) Ununbium, Uub   (B) Unnilbium, Unb

(C) Ununnillum, Uun (D) Ununtrium, Uut

64. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	$3d$-transition series	(i)	$Z = 58$ to $Z = 71$
(B)	Lanthanoid series	(ii)	$Z = 39$ to $Z = 48$
(C)	Actinoid series	(iii)	$Z = 21$ to $Z = 30$
(D)	$4d$-transition series	(iv)	$Z = 90$ to $Z = 103$

(A) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

(B) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)

(C) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)

(D) (A) → (iv), (B) → (iii), (C) → (i), (D) → (ii)

65. Predict the formulae of the binary compounds formed by combination of the following pairs of elements :

(i) Magnesium and nitrogen

(ii) Silicon and oxygen

(A) MgN_2, SiO_2 (B) Mg_3N_2, SiO_2

(C) Mg_2N_3, Si_2O_3 (D) MgN, SiO_2

66. Which block of the periodic table contains elements with the general electronic configuration

$(n-2)f^{1-14}(n-1)d^{0-1}ns^2$?

(A) s-block   (B) p-block

(C) d-block   (D) f-block

Space for Rough Work

67. An element has the electronic configuration

    $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$
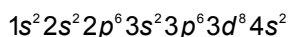
    What will be its position in the periodic table ?
    (A) Period 4, Group 10
    (B) Period 2, Group 2
    (C) Period 4, Group 2
    (D) Period 2, Group 8

68. Match the columns I, II and III and mark the appropriate choice.

	Column I		Column II		Column III
(A)	Bromine	(i)	Noble metal	(p)	Amalgam
(B)	Gold	(ii)	Crystalline non-metal	(q)	$4s^2 4p^5$
(C)	Mercury	(iii)	Liquid non-metal	(r)	Transition metal
(D)	Iodine	(iv)	Liquid metal	(s)	Violet

    (A) (A) → (iii, q); (B) → (i,r); (C) → (iv,p); (D) → (ii,s)
    (B) (A) → (ii, p); (B) → (i,s); (C) → (iii,q); (D) → (iv,r)
    (C) (A) → (i, s); (B) → (ii,p); (C) → (iv,r); (D) → (iii,q)
    (D) (A) → (iv, r); (B) → (iii,q); (C) → (ii,s); (D) → (i,p)

69. Among the elements with atomic numbers 9, 12, 16 and 36 which is highly electropositive ?
    (A) Element with atomic number 9
    (B) Element with atomic number 12
    (C) Element with atomic number 16
    (D) Element with atomic number 36

70. When we go from left to right in a period,
    (A) the basic nature of the oxides increases
    (B) the basic nature of the oxides decreases
    (C) there is no regular trend in the nature of oxides
    (D) oxides of only first two groups are basic in nature

71. Choose the incorrect statement.
    (A) Chemical reactivity tends to be high in group 1 metals, lower in elements in middle and increases to maximum in the group 17.
    (B) Halogens have very high negative electron gain enthalpy.
    (C) Noble gases have large positive electron gain enthalpy.
    (D) Decrease in electronegativities across a period is accompanied by an increase in non-metallic properties.

72. Why is the electron gain enthalpy of O or F less than that of S or Cl ?
    (A) O and F are more electronegative than S and Cl.
    (B) When an electron is added to O or F, it goes to a smaller ($n = 2$) level and suffers more repulsion than the electron in S or Cl in larger level ($n = 3$).
    (C) Adding an electron to 3p-orbital leads to more repulsion than 2p-orbital.
    (D) Electron gain enthalpy depends upon the electron affinity of the atom.

73. In the periodic table, the maximum chemical reactivity is at the extreme left (alkali metals) and extreme right (halogens). Which properties of these two groups are responsible for this ?
   (A) Least ionisation enthalpy on the left and highest negative electron gain enthalpy on the right.
    (B) Non-metallic character on the left and metallic character on the right.
    (C) High atomic radii on the left and small atomic radii on the right.
    (D) Highest electronegativity on the left and least electronegativity on the right.

74. What is common between given cations and anions,
    $O^{2-}, F^-, Na^+, Mg^{2+}, Al^{3+}$?
    (A) All have same ionic radii.
    (B) All are isoelectronic species having 10 electrons.
    (C) All of them belong to the third period.
   (D) The nature of oxides of all the ions is basic.

Space for Rough Work

75. Which of the following statements regarding an anion is not true ?
    (A) The gain of an electron leads to the formation of an anion.
    (B) The radius of the anion is larger than the atomic radius of its parent atom.
    (C) The effective nuclear charge increases when an anion is formed.
    (D) Electron cloud expands due to increased repulsion among the electrons.

76. Which of the following groups contains metals, non-metals and metalloids ?
    (A) Group 17　　　　　(B) Group 14
    (C) Group 13　　　　　(D) Group 12

77. K^+ and Cl^- ions are isoelectronic. Which of the statements is not correct ?
    (A) Both K^+ and Cl^- ions contain 18 electrons.
    (B) Both K^+ and Cl^- ions have same configuration.
    (C) K^+ ion is bigger than Cl^- ion in ionic size.
    (D) Cl^- ion is bigger than K^+ ion in size.

78. Which of the following statements is true about the variation of density of elements in the periodic table ?
    (A) In a period from left to right density first increases upto the middle and then starts decreasing.
    (B) In a group on moving down the density decreases from top to bottom.
    (C) A less closely packed solid has higher density.
    (D) Density of elements is not a periodic property.

79. What are the two radii shown as 'a' and 'b' in the figure known as ?
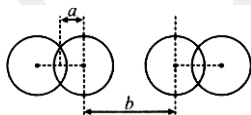
    (A) a = Atomic radius, b = Molecular radius
    (B) a = Covalent radius, b = van der Waals' radius
    (C) a = Ionic radius, b = Covalent radius
    (D) a = Covalent radius, b = Atomic radius

80. In the given graph, a periodic property (R) is plotted against atomic numbers (Z) of the elements. Which property is shown in the graph and how is it correlated with reactivity of the elements ?
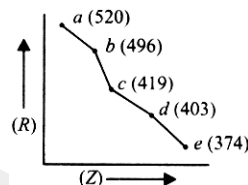
    (A) Ionisation enthalpy in a group, reactivity decreases from $a \rightarrow e$.
    (B) Ionisation enthalpy in a group, reactivity increases from $a \rightarrow e$.
    (C) Atomic radius in a group, reactivity decreases from $a \rightarrow e$.
    (D) Metallic character in a group, reactivity increases from $a \rightarrow e$.

81. In a covalent bond formation,
    (A) transfer of electrons takes place
    (B) equal sharing of electrons between two atoms takes place
    (C) electrons are shared by one atom only
    (D) electrons are donated by one atom and shared by both atoms.

82. Two elements X and Y combine to form a compound XY. Under what conditions the bond formed between them will be ionic ?
    (A) If the difference in electronegativities of X and Y is 1.7.
    (B) If the difference in electronegativities of X and Y is more than 1.7.
    (C) If the difference in electronegativities of X and Y is less than 1.7.
   (D) If both X and Y are highly electronegative.

Space for Rough Work

83. The canonical or resonating structures of a molecule required to describe the structure of a molecule follow which of the rules following ?

    (A) The relative position of all atoms can differ.
    (B) The same number of unpaired and paired electrons in all structures.
    (C) The energy of each structure is different.
    (D) Like charges are present on adjacent atoms.

84. Few examples of the compounds formed by chemical bonding are given below. Mark the incorrect example.

    (A) A molecule with central atom devoid of octet – BF_3
    (B) A molecule with linear shape – CO_2
    (C) A non-polar covalent compound between two different atoms – CH_4
    (D) A molecule which is V-shaped with a bond angle $104.5°$ – NH_3

85. Which type of overlapping is shown by $p(p_x, p_y$ and $p_z)$ - orbitals ?

    (A) Two end to end and one sidewise overlap
    (B) Two sidewise and one end to end overlap
    (C) Three sidewise overlaps
    (D) Three end to end overlaps

86. In formation of ethene, the bond formation between s and p-orbitals takes place in the following manner.

    (A) sp^2 hybridised orbitals form sigma bond while the unhybridised $(p_x$ or $p_y)$ overlaps sidewise to form π-bond
    (B) sp^2 hybridised orbitals form π-bond while the unhybridised (p_z) overlaps to form σ-bond.
    (C) sp^2 hybridised orbitals overlap with s-orbitals of H atoms while unhybridised orbitals form C–C bond.
    (D) sp^2 hybridised orbitals form sigma bonds with H atoms while unhybridised orbitals form π-bonds between C atoms.

87. The electronic configuration of carbon is $1s^2 2s^2 2p^2$. There are 12 electrons in C_2. The correct electronic configuration of C_2 molecule is

    (A) $(\sigma 1s^2)(\sigma^* 1s^2)(\sigma 2s^2)(\sigma^* 2s^2)(\sigma 2p_z^2)(\pi 2p_x^2)$
    (B) $(\sigma 1s^2)(\sigma^* 1s^2)(\sigma 2s^2)(\sigma^* 2s^2)(\pi 2p_x^2 = \pi 2p_y^2)$
    (C) $(\sigma 1s^2)(\sigma^* 1s^2)(\sigma 2s^2)(\sigma^* 2s^2)(\sigma 2p_z^2)(\pi 2p_x^1 = \pi 2p_y^1)$
    (D) $(\sigma 1s^2)(\sigma^* 1s^2)(\sigma 2s^2)(\sigma^* 2s^2)(\pi 2p_x^2 = \pi 2p_y^1)$

88. Oxygen molecule is paramagnetic because

    (A) no. of bonding electrons > no. of antibonding electrons
    (B) no. of bonding electrons < no. of antibonding electrons
    (C) no. of bonding electrons = no. of antibonding electrons
    (D) presence of unpaired electrons in molecular orbitals.

89. Though covalent in nature, methanol is soluble in water, why ?

    (A) Methanol is transparent like water.
    (B) Due to hydrogen bonding between methanol and water molecules.
    (C) Due to van der Waals' forces between methanol and water.
    (D) Due to covalent attraction forces.

90. Hydrogen bond between two atoms is formed due to

    (A) displacement of electrons towards more electronegative atom resulting in fractional positive charge on hydrogen
    (B) displacement of electrons towards hydrogen atom resulting in a polar molecule
    (C) formation of a bond between hydrogen atoms of one molecule and the other
    (D) existence of an attractive force which binds hydrogen atoms together.

Space for Rough Work

[ZOOLOGY]

91. Respiration in Annelida occurs through
    (A) Lungs
    (B) General body surface
    (C) Buccal cavity
    (D) All of these

92. Which of the following equations is correct ?

    (A) $CO_2 \longrightarrow H_2CO_3 \longrightarrow HCO_3^- + H^+$

    (B) $CO_2 + H_2O \underset{\text{Carbonic anhydrase}}{\overset{\text{Carbonic anhydrase}}{\rightleftharpoons}} H_2CO_3 \underset{}{\overset{}{\rightleftharpoons}} H^+ + HCO_3^-$

    (C) $CO_2 + H_2O \longrightarrow CH_4 + 2O_2$

    (D) $CO_2 + H_2O \rightleftharpoons CO + H_2O_2$

93. Respiratory coefficient is the
    (A) Amount of carbon dioxide produced to oxygen absorbed
    (B) Amount of ATP used to burn complex substance
    (C) Carbon dioxide released
    (D) Amount of oxygen absorbed

94. The graph given shows an oxygen dissociation curve for haemoglobin
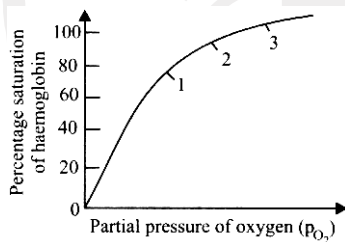
    Where in the body will haemoglobin be saturated at the percentages shown at points 1, 2 and 3 on the graph?

 | | Left ventricle | Pulmonary vein | Vena cava |
    |---|---|---|---|
    | (A) | 1 | 2 | 3 |
    | (B) | 2 | 1 | 3 |
    | (C) | 2 | 3 | 1 |
    | (D) | 3 | 2 | 1 |

95. If a man from sea coast, goes to Everest mountain peak, his
    (A) Breathing and heart beat will increase
    (B) Breathing and heart beat will decrease
    (C) Respiratory rate will decrease
    (D) Heart beat will decrease

96. Which of the following statements correctly defines Bohr's effect ?
    (A) Rise in P_{50} with a decrease in CO_2 concentration
    (B) Rise in P_{50} with decrease in pH
    (C) Rise in P_{50} with a increase in pH
    (D) Fall in P_{50} with a decrease in pH

97. How much amount of air can be inspired or expired during normal breathing ?
    (A) 0.5 *l*
    (B) 1.5 *l*
    (C) 3.5 *l*
    (D) 4.5 *l*

98. What is incorrect about oxygen binding with haemoglobin ?
    (A) The bond between oxygen and Hb is a very loose bond
    (B) Oxygen becomes ionic when it binds to Hb
    (C) Hb and oxygen is readily reversible combination
    (D) None of the above

99. Foetal haemoglobin has x affinity for oxygen than that of mother's haemoglobin during gestation. X is
    (A) same
    (B) higher
    (C) lower
    (D) lower affinity earlier but higher later

100. During normal respiration, without any effort, the volume of air inspired or expired is called
    (A) Tidal volume
    (B) Reserve volume
    (C) Residual volume
    (D) None of these

Space for Rough Work

101. Match Column-I with Column-II and select the correct option from the codes given below.

Column-I		Column-II	
A.	Tidal volume	(i)	2500-3000 mL of air
B.	Inspiratory reserve volume	(ii)	1000 mL of air
C.	Expiratory reserve volume	(iii)	500 mL of air
D.	Residual volume	(iv)	3400-4800 mL of air
E.	Vital capacity	(v)	1200 mL of air

    (A) A-(iii), B-(iv), C-(ii), D-(i), E-(v)
    (B) A-(iii), B-(i), C-(ii), D-(v), E-(iv)
    (C) A-(iii), B-(i), C-(iv), D-(v), E-(ii)
    (D) A-(v), B-(i), C-(ii), D-(iii), E-(iv)

102. When the oxygen supply to the tissue is inadequate, the condition is
    (A) Hypoxia   (B) Asphyxia
    (C) Pleurisy   (D) Anoxia

103. The serous membrane in contact with the lungs is the
    (A) Parietal pleura
    (B) Pulmonary mesentery
    (C) Pulmonary peritoneum
    (D) Visceral pleura

104. Expiratory muscles contract at the time of
    (A) Deep inspiration
    (B) Normal inspiration and expiration
    (C) Forceful expiration
    (D) Normal expiration

105. Neither the trachea nor the bronchi contain
    (A) Hyaline cartilage
    (B) Ciliated columnar epithelium
    (C) Goblet cells
    (D) simple squamous epithelium

106. The narrowest and most numerous tubes of lungs are termed as
    (A) Hilum   (B) Bronchus
    (C) Alveoli   (D) Bronchioles

107. Division of mammalian lungs into a very large number of tiny alveoli around alveolar ducts opening into bronchioles, is
    (A) An inefficient system of ventilation of alveoli with very little residual air
    (B) An inefficient system of ventilation of alveoli resulting in a very high percentage of residual air in the lungs
    (C) A very efficient system of ventilation of alveoli with no residual air
    (D) An efficient system of ventilation of alveoli with little or no residual air

108. In man and mammals, air passes from outside into the lungs through
    (A) Nasal cavity, larynx, pharynx, trachea, bronchi, alveoli
    (B) Nasal cavity, larynx, pharynx, trachea, bronchioles, alveoli
    (C) Nasal cavity, pharynx, larynx, trachea, bronchioles, bronchi, alveoli
    (D) Nasal cavity, pharynx, larynx, trachea, bronchi bronchioles, alveoli

109. Type of cartilage seen in tracheal wall is
    (A) Hyaline cartilage (B) Fibro-cartilage
    (C) Elastic cartilage   (D) None of these

110. Cyanosis is
    (A) Lack of oxygen in body fluid
    (B) Difficult or heavy breathing
    (C) Excess of carbon dioxide in the body fluids
    (D) 'Skin turning blue' due to excessive amount of deoxygenated haemoglobin in the blood vessels

Space for Rough Work

111. In which one of the following conditions does the oxygen dissociation curve of haemoglobin shift to the right side ?
   (A) Decrease in pH
   (B) Decrease in CO_2 concentration
   (C) Decrease in acidity
   (D) Decrease in temperature

112. The diagram shows organs associated with breathing in humans.
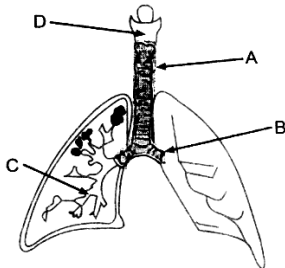
What are the numbered structures ?

|	a	b	c	d
(A)	Bronchus	Bronchiole	Larynx	Trachea
(B)	Bronchiole	Bronchus	Larynx	Trachea
(C)	Larynx	Trachea	Bronchus	Bronchiole
(D)	Trachea	Bronchus	Bronchiole	Larynx

113. The given figures are of human larynx, front view (i) and vertical section (ii).
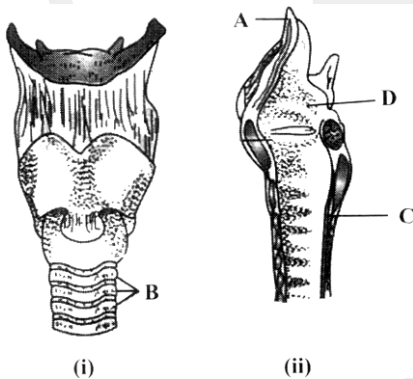
Identify the labelled parts A to D.

	A	B	C	D
(A)	Glottis	Larynx	Vocal cord	Cartilaginous rings of trachea
(B)	Epiglottis	Cartilaginous rings of trachea	Trachea	Larynx
(C)	Glottis	Cartilaginous rings of trachea	Larynx	Trachea
(D)	Epiglottis	Bony rings of trachea	Larynx	Trachea

114. The given figure illustrates the changes in lung volume during the process of breathing.
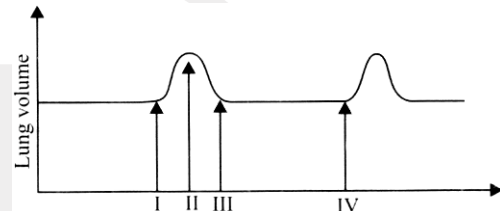
The change from II to III indicates the
   (A) movement of diaphragm away from the lungs
   (B) expansion of the thoracic cavity
   (C) movement of air out of the lungs
   (D) expansion of ribs

115. Chemosensitive area of respiratory centre in medulla is affected by
   (A) less CO_2 and H^+ ions
   (B) less O_2 and H^+ ions
   (C) excess CO_2 and H^+ ions
   (D) excess O_2 and H^+ ions

116. The correct match for kind of respiration

Example		Respiration
A.	Earthworm	1.	Pulmonary
B.	Human	2.	Bronchial
C.	Prawn	3.	Tracheal
D.	Insects	4.	Cutaneous

	A	B	C	D		A	B	C	D
(A)	1	2	3	4	(B)	4	2	1	3
(C)	4	1	2	3	(D)	3	2	4	1

Space for Rough Work

117. The air that enters our lungs is characterised such that

   I.   It is warm

   II.   It is filtered

   III. Some oxygen is extracted from it

   IV. Some carbon dioxide is added to it

The correct answers are

(A) I, II, III and IV   (B) I and II

(C) II and IV   (D) III and IV

118. Emphysema is a condition resulting from

(A) cigarette smoking

(B) liquor consumption

(C) drug addiction

(D) reduced oxygen carrying capacity of blood.

119. Arrange the following in the order of increasing volume.

   I.   Tidal volume

   II.   Residual volume

   III. Expiratory reserve volume

   IV. Vital capacity

(A) I<II<III<IV   (B) I<III<II<IV

(C) I<IV<III<II   (D) I<IV<II<III

120. Refer the given diagrammatic representation of the transportation of oxygen and carbon dioxide in the blood. P,Q,R,S and T represent percentage of both gases in different forms. Select the correct option for P to T
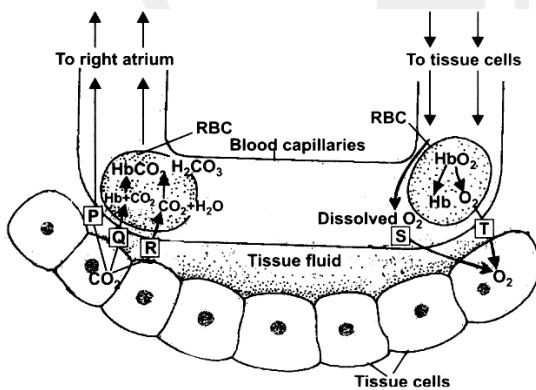
	P	Q	R	S	T
(A)	23%	70%	7%	93%	7%
(B)	7%	23%	70%	3%	97%
(C)	7%	23%	70%	97%	3%
(D)	70%	7%	23%	97%	3%

Direction : In the following questions **(121-124)**, more than one of the answers given may be correct. Select the correct answers and mark them according to the codes given below.

   Codes:

(A) 1, 2 and 3 are correct

(B) 1 and 2 are correct

(C) 2 and 4 are correct

(D) 1 and 3 are correct

121. The diffusion of bicarbonate ions from RBC into plasma is known as

(1) Henry's law

(2) Chloride shift

(3) Charle's law

(4) Hamburger's phenomenon

122. The mucus produced by the goblet cells

(1) Moistens the incoming air

(2) Traps the finest dust particles

(3) Filters out largest dust particles

(4) Warms the incoming air

123. When blood is mixed with cyanide (to stop carbonic anhydrase activity) the rate of .... and .... will show ..... .

(1) Absorption

(2) Adsorption

(3) Dissociation of CO_2

(4) Association of CO_2

124. Certain bacteria that cause bronchitis are

(1) Streptococus pneumoniae

(2) Haemophilus influenzae

(3) Yersinia pestis

(4) Clostridium tetani

Space for Rough Work

125. The shape of a mature human RBC resembles:
    (A) A sphere   (B) A dumble
    (C) A biconcave disc (D) A pavement tile

126. Adult males normally have more RBC per cc than adult females loose because :
    (A) Females lose blood during menstrual flow
    (B) Males work much harder than females
    (C) Testosterone has a favourable effect on RBC production
    (D) The statement is incorrect; both males and females have equal number of RBC per cc

127. The percentage of blood that is cells is called as _____ and it is about _____ %
    (A) Hematocrit; 40 – 45
    (B) ESR; 9 – 15
    (C) Mean corpuscular volume; 80 – 90
    (D) MCHC; 10 – 15

128. The earliest site for the production of RBCs in the human foetus is :
    (A) Bone marrow   (B) Liver
    (C) Spleen   (D) Yolk sac

129. Consider the following leucocytes:
    I.   Basophils
    II. Neutrophils
    III. Monocytes
    IV. Eosinophils
    Phagocytic property is present in :
    (A) I, II, III, IV   (B) I, II, III
    (C) II and III   (D) II, III, IV

130. Blood monocytes migrate into the tissues of the body and there differentiate (evolve) into :
    (A) Plasma cells   (B) Macrophages
    (C) Granulocytes   (D) Mast cells

131. The blood cells that release histamine and heparin are:
    (A) Basophils   (B) Neutrophils
    (C) Eosinophils   (D) Lymphocytes

132. Which of the following is a polymorphonuclear granulocyte that has 2 to 7 lobed nucleus ?
    (A) Basophils   (B) Neutrophils
    (C) Eosinophils   (D) Lymphocyte

133. Regarding eosinophils :
    I.   They are granulocytes
    II. They have bilobed nucleus
    III. They are increased in parasitic infestations
    (A) I and II are correct
    (B) Only I is correct
    (C) I, II, III are correct
    (D) All are incorrect

134. An increase of which of the following is the hallmark of acute inflammation ?
    (A) Basophils   (B) Neutrophils
    (C) Eosinophils   (D) Lymphocytes

135. The antibodies associated with the ABO system are usually of the class
    (A) $I_g E$ (B) $I_g M$
    (C) $I_g G$ (D) $I_g A$

[BOTANY]

136. Respiratory substrates are the organic substances which are _____ during respiration to liberate energy.
    (A) oxidized   (B) reduced
    (C) synthesized   (D) both (A) and (B)

137. If volume of CO_2 liberated during respiration is more than the volume of O_2 used, the respiratory substrate will be :
    (A) Carbohydrate   (B) Fats
    (C) Proteins   (D) Organic acid

138. Value of RQ in succulents is
    (A) unity   (B) infinite
    (C) less than unity (D) zero

Space for Rough Work

139. Instantaneous source of energy is

    (A) proteins   (B) fats

    (C) nucleic acids   (D) glucose

140. Refer the given equation

    $$2(C_{51}H_{98}O_6) + 145O_2 \rightarrow 102CO_2 + 98H_2O + Energy$$
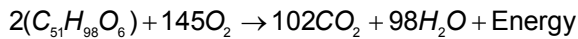
    The RQ in this case is

    (A) 1   (B) 0.7

    (C) 1.45   (D) 1.62

141. Match Column-I with Column-II and select the correct option from the codes given below.

Column-I	Column-II
A. Wine	(i) Apples
B. Cider	(ii) Grapes
C. Beer	(iii) Molasses
D. Rum	(iv) Cereals

    (A) A-(ii), B-(iv), C-(iii), D-(i)

    (B) A-(ii), B-(i), C-(iv), D-(iii)

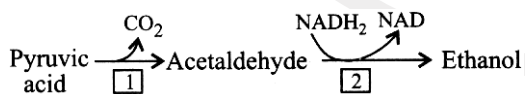   (C) A-(iv), B-(iii), C-(ii), D-(i)

    (D) A-(iv), B-(ii), C-(iii), D-(i)

142. R.Q. of proteins, carbohydrates, fats and organic acids are in order

    (A) <1, 1, <1, >1   (B) >1, <1, 1, 1

    (C) 1, 1, 0, –1   (D) 0, <1, 1, >1

143. _____ is a facultative anaerobe

    (A) Clostridium tetani

    (B) Saccharomyces cerevisiae

    (C) Azotobacter

    (D) Beijerinckia

144. Identify the enzymes 1 and 2 in the given reaction and select the correct option.

|	1	2
(A)	Ethanol dehydrogenase	Pyruvate decarboxylase
(B)	Ethanol decarboxylase	Pyruvate dehydrogenase
(C)	Pyruvate decarboxylase	Ethanol dehydrogenase
(D)	Pyruvate dehydrogenase	Ethanol dehydrogenase

145. Select the incorrectly matched pair.

    (A) End product of alcoholic fermentation   –   Ethanol + CO_2

    (B) End products of lactic acid fermentation   –   Lactic acid + CO_2

    (C) Obligate anaerobe   –   Clostridium tetani

    (D) RQ of carbohydrates   –   One

146. Which of the following describes significance of fermentation ?

    (i) Production of alcohol in brewing industry.

    (ii) Making of dough in baking industry.

    (iii) Curing of tea and tobacco.

    (iv) Production of vinegar by acetic acid bacteria.

    (A) (i), (ii) and (iii)   (B) (i), (ii) and (iv)

   (C) (ii), (iii) and (iv)   (D) (i), (ii), (iii) and (iv)

147. Identify A, B and C in the given reaction and select the correct option.

$$\text{Pyruvic acid} + A \underset{\text{FMN, Zn}^{2+}}{\overset{\text{Lactate dehydrogenase}}{\rightleftharpoons}} B + C$$
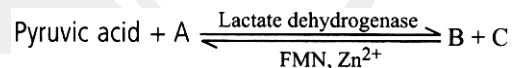
|	A	B	C
(A)	NADH	Lactic acid+CO_2	NAD^+
(B)	NADH	Lactic acid	NAD^+
(C)	NAD^+	Lactic acid	NADH
(D)	NAD^+	Lactic acid+CO_2	NADH

Space for Rough Work

148. The flowchart given below shows the steps in glycolysis. Select the option that correctly fills in the missing steps A, B, C and D.
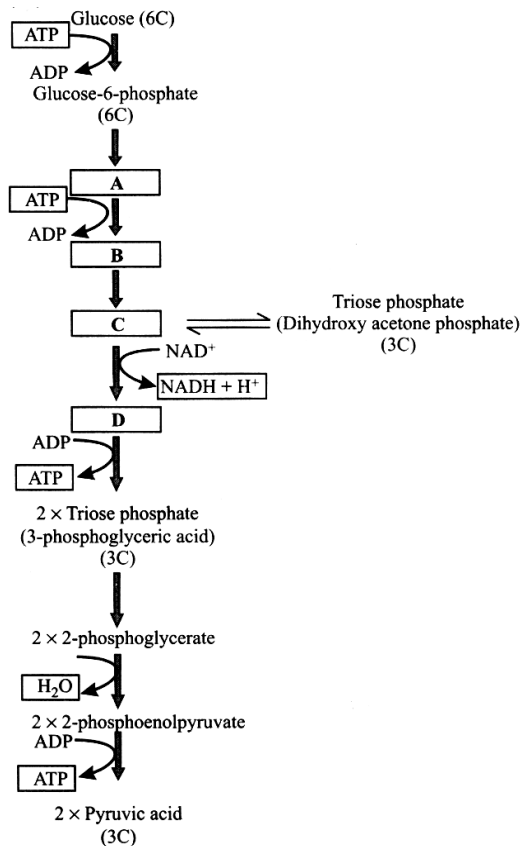
	A	B	C	D
(A)	Fructose-6-phosphate	Fructose -1, 6-biphosphate	3-PGAL	1,3-biphospho-glyceric acid
(B)	Fructose-1, 6-biphosphate	3-PGAL	1, 3-biphospho-glyceric acid	3 PGA
(C)	3-PGA	1, 3-biphospho-glyceric acid	3-PGAL	Fructose-1, 6-biphosphate
(D)	Fructose-1, 6-biphosphate	Fructose -6-phosphate	3-PGAL	1,3-biphospho-glyceric acid

149. Substrate, level phosphorylation occurs during which step of Krebs' cycle ?
   (A) Succinyl - CoA $\rightarrow$ Succinic acid
   (B) Isocitric acid $\rightarrow$ Oxalosuccinic acid
   (C) Oxalosuccinic acid $\rightarrow$ α-keto glutaric acid
   (D) Malic acid $\rightarrow$ OAA

150. The first 5-C dicarboxylic acid in Krebs' cycle which is used in nitrogen metabolism is
   (A) OAA
   (B) citric acid
   (C) α-ketoglutaric acid
   (D) acetyl coenzyme A

151. Seeds respire in
   (A) presence of O_2 (B) presence of CO_2
   (C) absence of O_2 (D) both (A) and (C)

152. Which of the following are isomers ?
   (A) 3PGA and 2PGA
   (B) PGAL and DHAP
   (C) Glucose and Fructose
   (D) All of these

153. Alternate name of Krebs' cycle is
   (A) TCA cycle   (B) citric acid cycle
   (C) both (A) and (B)   (D) none of these

154. Select the correct option for A, B, C and D
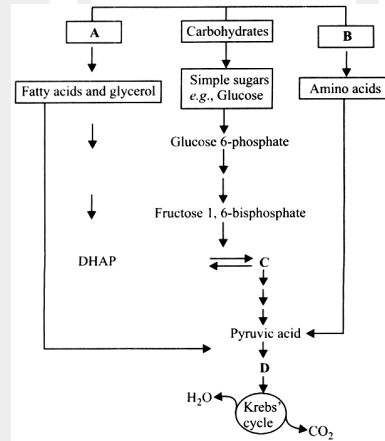
	A	B	C	D
(A)	Fats	Proteins	3-PGAL	Acetyl CoA
(B)	Fats	Proteins	3-PGAL	CO_2
(C)	Proteins	Fats	Acetyl CoA	PEP
(D)	Proteins	Fats	PEP	Acetyl CoA

Space for Rough Work

155. Match Column-I with Column-II and select the correct option from the codes given below.

	Column-I		Column-II
A.	Fats made of three fatty-acid chains attached to glycerol	(i)	Glycogen
B.	Glycolysis metabolite made from glycerol	(ii)	Glyceraldehyde
C.	Storage form of glucose	(iii)	Triglycerides
D.	Result of running reactions of glycolysis in reverse	(iv)	Glucose

(A) A-(iv), B-(ii), C-(i), D-(iii)

(B) A-(iii), B-(ii), C-(i), D-(iv)

(C) A-(iv), B-(iii), C-(i), D-(ii)

(D) A-(i), B-(ii), C-(iii), D-(iv)

156. In Krebs' cycle, OAA accepts acetyl CoA to form

(A) citric acid　　　(B) oxalosuccinate

(C) fumarate　　　(D) succinyl CoA

157. All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membranes in eukaryotes and in cytosol in prokaryotes. This enzyme is

(A) isocitrate dehydrogenase

(B) ketoglutarate dehydrogenase
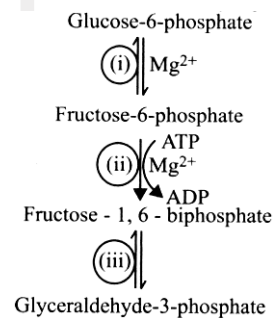
(C) succinate dehydrogenase

(D) lactate dehydrogenase

158. At the end of glycolysis, X is the net energy gain from one molecule of glucose *via* Y, but there is also energy stored in the form of Z. Identify X, Y and Z.

	X	Y	Z
(A)	1 ATP	Oxidative phosphorylation	$NADH+H^+$
(B)	2 ATPs	Oxidative phosphorylation	$NADH+H^+$
(C)	1 ATP	Substrate level phosphorylation	$FADH_2$
(D)	2 ATPs	Substrate level phosphorylation	$NADH+H^+$

159. Select the correct sequence of formation of given intermediates of Krebs' cycle.
(A) Succinate → Malate → Fumarate → OAA
(B) Fumarate → Succinate → Malate → OAA
(C) Succinate → Fumarate → Malate → OAA
(D) Malate → Fumarate → Succinate → OAA

160. Study the given steps of glycolysis and identify the enzymes (i), (ii) and (iii) responsible for carrying out these steps.

Glucose-6-phosphate

(ii) Mg^{2+}

Fructose-6-phosphate

(ii) ATP Mg^{2+} ADP

Fructose - 1, 6 - biphosphate

(iii)

Glyceraldehyde-3-phosphate

	(i)	(ii)	(iii)
(A)	Phosphohexose isomerase	Phospho-fructokinase	Aldolase
(B)	Hexokinase	Phospho-fructokinase	Aldolase
(C)	Phosphohexose isomerase	Hexokinase	Phosphofructo-kinase
(D)	Aldolase	Phospho-fructokinase	Phosphohexose isomerase

Space for Rough Work

161. Rise in the water level from X to Y in the given experimental set-up demonstrates
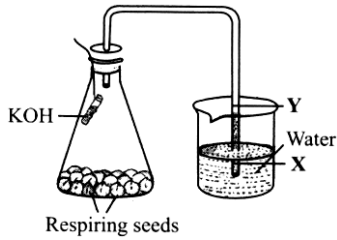
(A) aerobic respiration

(B) anaerobic respiration

(C) photosynthesis

(D) transpiration pull

162. Identify the correct terms for the given statements and select the correct answer.

(i) Sudden increase in the rate of respiration during ripening of fruits.

(ii) Reduction in the consumption of respiratory substrate when mode of respiration is changed from anaerobic to aerobic.

(iii) Respiratory oxidation of carbohydrate and fats.

	Pasteur effect	Floating respiration	Climacteric respiration
(A)	(i)	(ii)	(iii)
(B)	(ii)	(iii)	(i)
(C)	(iii)	(ii)	(i)
(D)	(ii)	(i)	(iii)

163. Select the wrong statement.

(A) Oxidative decarboxylation of pyruvic acid requires the presence of enzyme pyruvate dehydrogenase.

(B) All living cells whether aerobic or anaerobic, perform glycolysis.

(C) Cyanide does not stop chemiosmosis.

(D) Respiratory chain uses O_2 as final hydrogen acceptor.

164. Identify A and B in the given diagram showing ATP synthesis in oxysomes.
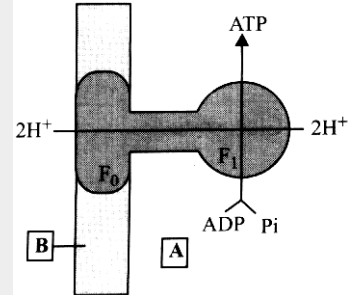
(A) A = Mitochondrial matrix

B = Outer mitochondrial membrane

(B) A = Mitochondrial matrix

B = Inner mitochondrial membrane

(C) A = Cell cytoplasm

B = Inner mitochondrial membrane

(D) A = Cell cytoplasm

B = Outer mitochondrial membrane

Space for Rough Work

165. Study the following statements regarding chemiosmotic hypothesis in mitochondria and select the correct ones.

(i) F_1 headpiece contains the site for the synthesis of ATP from ADP + Pi.

(ii) F_0 part forms the channel through which protons cross the inner membrane.

(iii) For each ATP produced, $2H^+$ pass through F_0 from the intermembrane space to the matrix down the electrochemical proton gradient.

(A) (i) and (ii)   (B) (ii) and (iii)

(C) (i) and (iii)   (D) (i), (ii) and (iii)

166. Oxidation of one $NADH_2$ and one $FADH_2$ respectively gives rise to _____ and _____ ATP molecules.

(A) 3 and 2   (B) 2 and 1

(C) 2 and 3   (D) 1 and 2

167. Read the given statements and select the correct option.

Statement 1 : During photophosphorylation (of photosynthesis), light energy is utilized for the production of proton gradient during ATP synthesis.

Statement 2 : In respiration, energy of oxidation reduction is utilized for the phosphorylation and thus the process is called oxidative phosphorylation.

(A) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.

(B) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.

(C) Statement 1 is correct and statement 2 is incorrect.

(D) Both statements 1 and 2 are incorrect.

168. Electron transport chain (ETC) is a set of _____ electron carriers present in a specific sequence along _____ mitochondrial membrane.

(A) seven, inner   (B) six, inner

(C) seven, outer   (D) six, outer

169. Identify P, Q, R, S and T in the given diagram of mitochondrial electron transport chain.
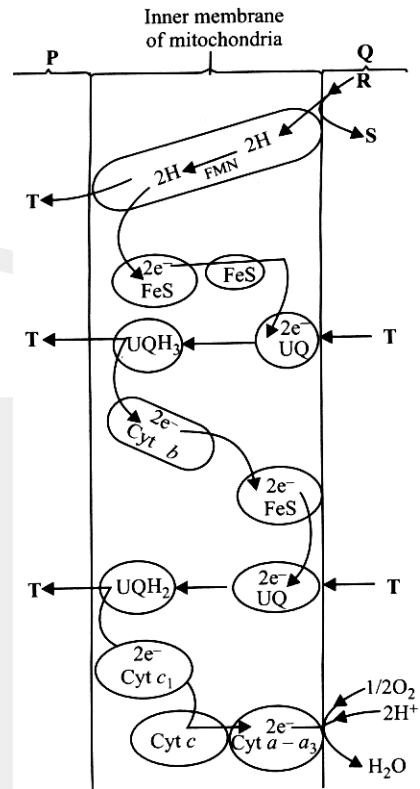
	P	Q	R	S	T
(A)	Matrix	Outer chamber	$FMNH_2$	$NADH_2$	$2H^+$
(B)	Outer chamber	Matrix	$NADH+H^+$	NAD^+	$2H^+$
(C)	Outer chamber	Cristae	NAD^+	$NADH+H^+$	H_2
(D)	Cristae	Outer chamber	$NADH+H^+$	NAD^+	$2H^+$

Space for Rough Work

170. Last e^- acceptor during ETS is
   (A) O_2 (B) cyt a
   (C) cyt a_2 (D) cyt a_3

171. Amount of energy released during hydrolysis of a high energy bond of ATP is
   (A) 73 kcal mol^{-1} (B) 0.73 kcal mol^{-1}
   (C) 3.4 kcal mol^{-1} (D) 7.3 kcal mol^{-1}

172. Match Column-I with Column-II and select the correct option from the codes given below.

Column-I	Column-II
A. R.Q	(i) Chemiosmotic ATP synthesis
B. Mitchel	(ii) Muscle fatigue
C. Cytochoromes	(iii) Inner mitochondrial membrane
D. Lactic acid	(iv) Alcoholic fermentation
E. Yeast	(v) Respirometer

   (A) A-(v), B-(i), C-(iii), D-(ii), E-(iv)
   (B) A-(v), B-(i), C-(iii), D-(iv), E-(ii)
   (C) A-(i), B-(v), C-(ii), D-(iii), E-(iv)
   (D) A-(v), B-(ii), C-(iv), D-(iii), E-(i)

173. How many ATP molecules will be generated in a plant system during complete oxidation of 40 molecules of glucose ?
   (A) 180 (B) 360
   (C) 1440 (D) 3040

174. Select the wrong statement.
   (A) When tripalmitin is used as a substrate in respiration, the R.Q. is 0.7.
   (B) The intermediate compound which links glycolysis with Krebs' cycle is malic acid.
   (C) One glucose molecule yields a net gain of 36 ATP molecule during aerobic respiration
   (D) One glucose molecule yields a net gain of 2 ATP molecules during glycolysis.

175. In the electron transport system present in the inner mitochondrial membrane, complexes I and IV are respectively
   (A) NADH dehydrogenase and FADH$_2$
   (B) FADH$_2$ and NADH dehydrogenase
   (C) NADH dehydrogenase and cytochrome oxidase complex
   (D) NADH dehydrogenase and ATP synthase

176. Which out of the following statements is incorrect ?
   (A) The breakdown product of glucose which enters into mitochondrion during aerobic respiration is pyruvic acid generated in the cytosol.
   (B) When the electrons pass from one carrier to another *via* complex I to IV in the electron transport chain, they are coupled to ATP synthase (complex V) for the production of ATP from ADP and Pi.
   (C) The ratio of volume of O_2 consumed in respiration to the volume of CO_2 evolved is called as the respiratory quotient (RQ).
   (D) Compensation point is the point reached in a plant when the rate of photosynthesis is equal to the rate of respiration.

177. Which of the following statements is correct with respect to the effect of temperature on rate of respiration ?
   (A) Rate of respiration increases with an increase in temperature from 0°C to 30°C.
   (B) Rate of respiration doubles for every 10°C rise in temperature, thus temperature co-efficient (Q_{10}) for respiration is 2.
   (C) At very high temperatures such as 50°C or more, rate of respiration decreases due to enzymatic degradation.
   (D) All of these.

Space for Rough Work

178. During electron transport system (ETS), electron transport proceeds from carriers that have _____ redox potential to those having _____ redox potential. This electron transport down to the energy gradient leads to the formation of ATP from ADP and Pi, which is referred to as _____ .

   (A) Low, high, oxidative phosphorylation

   (B) Low, high, oxidative decarboxylation

   (C) High, low, oxidative phosphorylation

   (D) High, low, oxidative decarboxylation

179. Animal cells are suspended in a culture medium that contains excess glucose. The graph below shows glucose utilization under different growth conditions. (A), (B), and (C) in the graph indicate
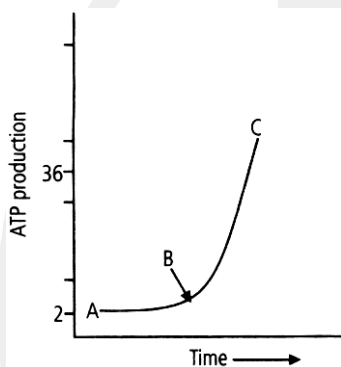
   (A) A - Anaerobic respiration

   B - Introduction of O_2 to culture medium

   C - Aerobic respiration

   (B) A - Aerobic respiration

   B - Introduction of CO_2 to culture medium

   C - Anaerobic respiration

   (C) A - Aerobic respiration

   B - Supply of organic triphosphate

   C - Aerobic respiration

   (D) A - Aerobic respiration

   B - Introduction of CO to culture medium

   C - Anaerobic respiration

180. Mechanism of phosphorylation is depicted in the diagram below. Study it carefully and mark the correct option.
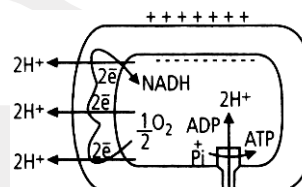
   (A) The diagram depicts photosynthetic phosphorylation taking place in the chloroplast. The incident light should be shown in the diagram.

   (B) The diagram depicts oxidative phosphorylation taking place in mitochondria. However, the flow of electrons should be shown in reverse direction.

   (C) Diagram depicts the basic process of both oxidative as well as photosynthetic phosphorylation. However, the proton concentration should be high, inside and low outside.

   (D) The diagram correctly depicts the oxidative phosphorylation occurring in all heterotrophic organisms.

❑   ❑   ❑

Space for Rough Work