HORIZON ACADEMY®

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Name.: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Date : 27/09/2015

Test No.: 07

Subject Code.: 222

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

HORIZON TEST SERIES

for

Medical Entrance Exam. 2016

[Test No. 7 Batch II]

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 not 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 marks. One 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. 7

Topics of The Test

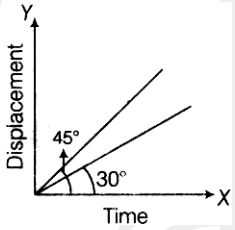
Physics	Motion in 1D and 2D + Vectors and Projectile Motion.
Chemistry	Some basic concepts of chemistry + Redox reaction
Biology	Zoology : Circulation. Botany : Photosynthesis, Respiration and Molecular Biology.

Test No. 7

[PHYSICS]

1. The area under velocity-time graph for a particle in a given interval of time represents
   (A) velocity (B) acceleration
   (C) work done (D) displacement

2. The displacement-time graph of two moving particles make angles of 30° and 45° with the X-axis. The ratio of their velocities is



   (A) $\sqrt{3}:2$ (B) $1:1$
   (C) $1:2$ (D) $1:\sqrt{3}$

3. The displacement of a particle starting from rest (at t = 0) is

$$s = 6t^2 - t^3$$

   The time in second at which the particle will obtain zero velocity again is
   (A) 2 (B) 4
   (C) 6 (D) 8

4. A car moves from X to Y with a uniform speed v_u and returns to X with a uniform speed v_d. The average speed for this round trip is
   (A) $\frac{2v_b v_u}{v_d + v_u}$ (B) $\sqrt{v_u v_d}$
   (C) $\frac{v_d v_u}{v_d + v_u}$ (D) $\frac{v_u + v_d}{2}$

5. A stone falls under gravity. It covers distances h_1, h_2 and h_3 in the first 5 s, the next 5 s and the further next 5s, respectively. The relation between h_1, h_2 and h_3 is
   (A) $h_1 = 2h_2 = 3h_3$
   (B) $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$
   (C) $h_2 = 3h_1$ and $h_3 = 3h_2$
   (D) $h_1 = h_2 = h_3$

6. A ball is projected upwards from a height *h* above the surface of the earth with velocity v. The time at which the ball strikes the ground is
   (A) $\frac{v}{g} + \frac{2hg}{\sqrt{2}}$ (B) $\frac{v}{g}\left(1 - \sqrt{1 + \frac{2h}{g}}\right)$
   (C) $\frac{v}{g}\left(1 + \sqrt{1 + \frac{2gh}{v^2}}\right)$ (D) $\frac{v}{g}\left(1 + \sqrt{v^2 + \frac{2g}{h}}\right)$

7. The displacement x of a particle varies with time *t* as $x = ae^{-\alpha t} + be^{\beta t}$, where a, b, α and β are positive constants. The velocity of the particle will
   (A) go on decreasing with time
   (B) be independent of α and β
   (C) drop to zero whe $\alpha = \beta$
   (D) go on increasing with time

Space for Rough Work

8. A particle moves along X-axis as

$$x = 4(t-2) + a(t-2)^2$$

Which of the following is true ?

(A) The initial velocity of particle is 4
(B) The acceleration of particle is 2a
(C) The particle is at origin at $t = 0$
(D) None of the above

9. A car starts from rest, moves with an acceleration a and then decelerates at a constant rate b for sometime to come to rest. If the total time taken is t. The maximum velocity of car is given by

(A) $\frac{abt}{(a+b)}$ (B) $\frac{a^2t}{(a+b)}$

(C) $\frac{at}{(a+b)}$ (D) $\frac{b^2t}{(a+b)}$

10. Fig (I) and (II) show the displacement-time graphs of two particles moving along the X-axis. We can say that

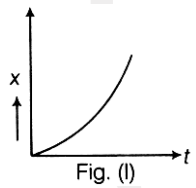


Fig. (I)

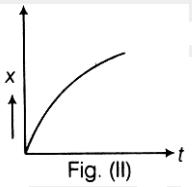


Fig. (II)

(A) both the particles are having an uniformly accelerated motion
(B) both the particles are having an uniformly retarded motion
(C) particle (I) is having an uniformly accelerated motion while particle (II) is having an uniformly retarded motion
(D) particle (I) is having an uniformly retarded motion while particle (II) is having an uniformly accelerated motion

11. The area of the acceleration-displacement curve of a body gives

(A) impulse
(B) change in momentum per unit mass
(C) change in kinetic energy per unit mass
(D) total change in energy

12. A car is travelling with linear velocity v on a circular road of radius R. If its speed is increasing at the rate of a m/s^2, then the net acceleration will be

(A) $\frac{v^2}{R} + a$ (B) $\frac{v^2}{R} - a$

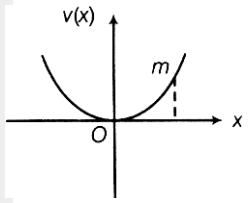
(C) $\sqrt{\left(\frac{v^2}{R}\right)^2 + a^2}$ (D) $\sqrt{\left(\frac{v^2}{R}\right)^2 - a^2}$

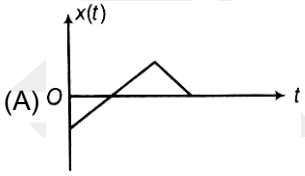
13. A particle moves in a circular orbit of radius r under a central attractive force $F = -\frac{k}{r}, k$ is constant. The time period of its motion will be proportional to

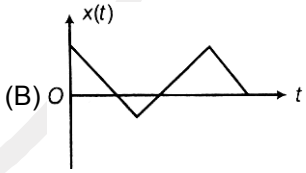
(A) $r^{1/2}$ (B) r

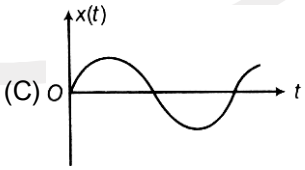
(C) $r^{3/2}$ (D) $r^{2/3}$

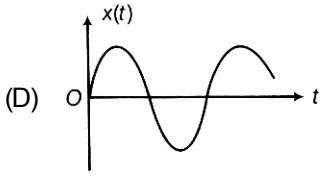
14. A particle of mass m is released from rest and follows a parabolic path as shown. Assuming that the displacement of the mass from the origin is small, which graph correctly depitcts the position of the particle as a function of time ?



(A) 

(B) 

(C) 

(D) 

Space for Rough Work

15. A wheel is rotating at 900 rpm about its axis. When the power is cut off, it comes to rest in 1 min. The angular retardation (in rad/s^2) is

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$

(C) $\frac{\pi}{6}$ (D) $\frac{\pi}{8}$

16. The centre of a wheel rolling on a plane surface moves with a speed v_0. A particle on the rim of the wheel at the same level as the centre will be moving at speed

(A) zero (B) v_0

(C) $\sqrt{2}v_0$ (D) $2v_0$

17. A stone of mass *m* is tied to a string and is moved in a vertical circle of radius *r* making *n* rev/min. The total tension in the string when the stone is at the lowest point is

(A) mg (B) $m(g+\pi nr^2)$

(C) $m(g+nr)$ (D) $m\left(g+\frac{\pi^2n^2r}{900}\right)$

18. **Assertion** (A) A body of mass 1 kg is making 1 rps in a circle of radius 1 m. Centrifugal force acting on it is $4\pi^2$ N.

Reason (R) Centrifugal force is given by $F=\frac{mv^2}{r}$.

(A) Both A and R are correct and R is the correct explanation of A
(B) Both A and R are correct but R is not the correct explanation of A
(C) A is correct but R is incorrect
(D) Both A and R are incorrect

19. A cyclist is travelling with velocity v on a banked curved road of radius R. The angle θ through which the cyclist leans inwards is given by

(A) $\tan\theta=\frac{Rg}{v^2}$ (B) $\tan\theta=v^2Rg$

(C) $\tan\theta=\frac{v^2R}{g}$ (D) $\tan\theta=\frac{v^2}{Rg}$

20. **Assertion** (A) A ball connected to a string is in circular motion on a frictionless horizontal table and is in equilibrium.

Reason (R) Magnitude of the centripetal force is equal to the magnitude of the tension in the string.

(A) Both A and R are correct and R is the correct explanation of A
(B) Both A and R are correct but R is not the correct explanation of A
(C) A is correct but R is incorrect
(D) A is incorrect but R is correct

21. A 500 kg car takes a round turn of radius 50 m with a velocity of 36 kmh^{-1}. The centripetal force is

(A) 250 N (B) 750 N
(C) 1000 N (D) 1200 N

22. A particle is moving in a vertical circle. The tensions in the string when passing through two positions at angle 30° and 60° from vertical (lowest position) are T_1 and T_2 respectively, then

(A) $T_1=T_2$
(B) $T_2>T_1$
(C) $T_1>T_2$
(D) tension in the string always remains the same

23. The angular velocity of second hand of a clock is

(A) $\left(\frac{\pi}{6}\right)$ rad s^{-1} (B) $\left(\frac{\pi}{60}\right)$ rad s^{-1}

(C) $\left(\frac{\pi}{30}\right)$ rad s^{-1} (D) $\left(\frac{\pi}{15}\right)$ rad s^{-1}

24. Angle of banking for a vehicle speed of 10 ms^{-1} for a radius of curvature 10 m is (assume, g =10 ms^{-2})

(A) 30° (B) $\tan^{-1}\left(\frac{1}{2}\right)$

(C) 60° (D) 45°

Space for Rough Work

25. The work done by the centripetal force R when the body completes on rotation around the circle of radius R is

(A) $2\pi RF$ (B) $2RF$

(C) RF (D) zero

26. A cricket ball thrown across a field is at height h_1 and h_2 from the point of projection at times t_1 and t_2 respectively after the throw. The ball is caught by a fielder at the same height as that of projection.

The time of flight of the ball in this journey is

(A) $\left(\frac{h_1t_2^2 - h_2t_1^2}{h_1t_2 - h_2t_1}\right)$ (B) $\left(\frac{h_1t_2^2 - h_2t_1^2}{h_1t_1 - h_2t_2}\right)$

(C) $\left(\frac{h_1t_2^2 + h_2t_1^2}{h_1t_2 + h_2t_1}\right)$ (D) None of these

27. The equation of trajectory of a projectile is

$y = 10x - \left(\frac{5}{9}\right)x^2$.

If we assume g = 10 ms^{-2} then the range of projectile (in metre) is

(A) 36 (B) 24

(C) 18 (D) 9

28. If a person can throw a stone to maximum height of h metre vertically, then the maximum distance through which it can be thrown horizontally be the same person is

(A) $\frac{h}{2}$ (B) h

(C) $2h$ (D) $3h$

29. A ball is projected horizontally with a velocity of 5 m/s from the top of a building 19.6 m high. How long will the ball take to hit the ground ?

(A) $\sqrt{2}s$ (B) $2s$

(C) $\sqrt{3}s$ (D) $3s$

30. A projectile can have the same range R for two angles of projection. If t_1 and t_2 be the times of flights in the two cases, then the product of the two times of flights is proportional to

(A) R^2 (B) $\frac{1}{R^2}$

(C) $\frac{1}{R}$ (D) R

31. The maximum height attained by a projectile is increased by 5%. Keeping the angle of projection constant, what is the percentage increase in horizontal range ?

(A) 5% (B) 10%

(C) 15% (D) 20%

32. The angle θ between the vector $\mathbf{p} = \hat{\mathbf{i}} + \hat{\mathbf{j}} + \hat{\mathbf{k}}$ and unit vector along X-axis is

(A) $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$ (B) $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$

(C) $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (D) $\cos^{-1}\left(\frac{1}{2}\right)$

33. Three vectors satisfy the relation $\mathbf{A}\cdot\mathbf{B} = 0$ and $\mathbf{A}\cdot\mathbf{C} = 0$, then $\mathbf{A}$ is parallel to

(A) $\mathbf{C}$ (B) $\mathbf{B}$

(C) $\mathbf{B}\times\mathbf{C}$ (D) $\mathbf{B}\cdot\mathbf{C}$

34. Which of the following is correct relation between an arbitrary vector $\mathbf{A}$ and vector $\mathbf{O}$? Where $\mathbf{O}$ is a null vector.

(A) $\mathbf{A} + \mathbf{O} + \mathbf{A}\times\mathbf{O} = \mathbf{A}$

(B) $\mathbf{A} + \mathbf{O} + \mathbf{A}\times\mathbf{O} \neq \mathbf{A}$

(C) $\mathbf{A} + \mathbf{O} + \mathbf{A}\times\mathbf{O} = \mathbf{O}$

(D) None of these

Space for Rough Work

35. For any two vectors **A** and **B**, if $\mathbf{A}\cdot\mathbf{B} = |\mathbf{A}\times\mathbf{B}|$, the magnitude of $\mathbf{C} = \mathbf{A} + \mathbf{B}$ is equal to

(A) $\sqrt{A^2 + B^2}$ (B) $A + B$

(C) $\sqrt{A^2 + B^2 + \frac{AB}{\sqrt{2}}}$ (D) $\sqrt{A^2 + B^2 + \sqrt{2}AB}$

36. A variable force given by the two-dimensional vector $\mathbf{F} = (3x^2\hat{\mathbf{i}} + 4\hat{\mathbf{j}})$ 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 co-ordinates are in metres)

(A) – 7 J (B) Zero

(C) + 7 J (D) 19 J

37. There are N coplanar vectors each of magnitude V. Each vector is inclined to the preceding vector at angle $\frac{2\pi}{N}$. What is the magnitude of their resultant ?

(A) $\frac{V}{N}$ (B) V

(C) Zero (D) $\frac{N}{V}$

38. If $\mathbf{a}_1$ and $\mathbf{a}_2$ are two non-collinear unit vectors and if $|\mathbf{a}_1 + \mathbf{a}_2| = \sqrt{3}$, then the value of $(\mathbf{a}_1 - \mathbf{a}_2)\cdot(2\mathbf{a}_1 + \mathbf{a}_2)$ is

(A) 2 (B) $\frac{3}{2}$

(C) $\frac{1}{2}$ (D) 1

39. A train of 150 m length is going towards North direction at a speed of 10 ms^{-1}. A parrot flies at a speed of 5 ms^{-1} towards South direction parallel to the railway track. The time taken by parrot to cross the train is equal to

(A) 12 s (B) 8 s

(C) 15 s (D) 10 s

40. A proton in a cyclotron changes its velocity from 30 kmh^{-1} the north of 45 kmh^{-1} the east in 20s. What is the magnitude of average acceleration during this time?

(A) 2.5 kms^{-2} (B) 12.5 kms^{-2}

(C) 20.5 kms^{-2} (D) 32.5 kms^{-2}

41. Given, two vectors $\mathbf{A} = -4\hat{\mathbf{i}} + 4\hat{\mathbf{j}} + 2\hat{\mathbf{k}}$ and $\mathbf{B} = 2\hat{\mathbf{i}} - \hat{\mathbf{j}} - \hat{\mathbf{k}}$

The angle made by $(\mathbf{A} + \mathbf{B})$ with $\hat{\mathbf{i}} + 2\hat{\mathbf{j}} - 4\hat{\mathbf{k}}$ is

(A) 30° (B) 45°

(C) 60° (D) 90°

42. A man is walking due east at the rate of 2 kmh^{-1}. The rain appears to him to come down vertically at the rate of 2 kmh^{-1}. The actual velocity and direction of rainfall with the vertical, respectively are

(A) $2\sqrt{2}$ kmh^{-1}, 45° (B) $\frac{1}{\sqrt{2}}$ kmh^{-1}, 30°

(C) 2 kmh^{-1}, 0° (D) 1 kmh^{-1}, 90°

43. Police is chasing the thief 50 m ahead. In 10 s, distance between them reduces by 6 m. What is distance between them in 25 s ?

(A) 10 m (B) 25 m

(C) 35 m (D) 20 m

44. Which of the following statement is true ?

(A) When the co-ordinates axes are translated the components of a vector in a plane change.

(B) When the co-ordinate axes are roated through some angle, components of the vector change but the vector's magnitude remains constant.

(C) Sum of **a** and **b** is **R**, if the magnitude of **a** alone is increased, angle between **b** and **R** decreases.

(D) The cross product of $3\hat{\mathbf{i}}$ and $4\hat{\mathbf{j}}$ is 12.

45. If, a vector $2\hat{\mathbf{i}} + 3\hat{\mathbf{j}} + 8\hat{\mathbf{k}}$ is perpendicular to the vector $4\hat{\mathbf{j}} - 4\hat{\mathbf{i}} + \alpha\hat{\mathbf{k}}$, then the value of α is

(A) –1 (B) $\frac{1}{2}$

(C) $-\frac{1}{2}$ (D) 1

Space for Rough Work

[CHEMISTRY]

46. 10^{21}molecules are removed from 200 mg of CO_2. The moles of CO_2 left are
(A) 2.88×10^{-3} (B) 28.8×10^{-3}
(C) 288×10^{-3} (D) 28.8×10^{3}

47. The oxygen obtained from 72 kg of water is
(A) 72 kg (B) 46 kg
(C) 50 kg (D) 64 kg

48. The equivalent weight of $K_2Cr_2O_7$ in acidic medium is expressed in terms of its molecular weight (M) as
(A) M/3 (B) M/4
(C) M/6 (D) M/7

49. The number of atoms in 0.1 mole of a triatomic gas is
($N_A = 6.02\times10^{23}$ mol^{-1})
(A) 6.026×10^{22} (B) 1.806×10^{23}
(C) 1.800×10^{22} (D) 3.600×10^{23}

50. In the reaction of sodium thiosulphate with I_2 in aqueous medium, the equivalent weight of sodium thiosulphate is equal to
(A) molar mass of sodium thiosulphate
(B) the average of molar masses of $Na_2S_2O_3$ and I_2
(C) half the molar mass of sodium thiosulphate
(D) molar mass of sodium thiosulphate × 2

51. The number of molecules in 18 mg of water in terms of Avogadro number, N_A is
(A) $10^{-3}N_A$ (B) $10^{-2}N_A$
(C) $10^{-1}N_A$ (D) $10N_A$

52. **Assertion** (A) Equivalent weight of a base
$$= \frac{\text{molecular weight}}{\text{acidity}}$$
Reason (R) Acidity is the number of replaceable hydrogen atom in one molecule of the base.
(A) Both A and R are correct and R is the correct explanation of A
(B) Both A and R are correct but R is not the correct explanation of A.
(C) A is correct but R is incorrect
(D) Both A and R are incorrect

53. The largest number of molecules is in
(A) 34 g of H_2O (B) 28 g of CO_2
(C) 46 g of CH_3OH (D) 54 g of N_2O_5

54. The equivalent weight of phosphoric acid (H_3PO_4) in the reaction,
$$NaOH + H_3PO_4 \longrightarrow NaH_2PO_4 + H_2O$$ is
(A) 59 (B) 49
(C) 25 (D) 98

55. Law of multiple proportions is illustrated by one of the following pairs.
(A) H_2S and SO_2 (B) NH_3 and NO_2
(C) Na_2S and Na_2O (D) N_2O and NO

56. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reactant is left in excess and how much?
(Atomic weight, Mg = 24, O = 16)
(A) Mg, 0.16 g (B) O_2, 0.16 g
(C) Mg, 0.44 g (D) O_2, 0.28 g

57. 10 g of a mixture of BaO and CaO requires 100 cm^3 of 2.5 M HCl to react completely. The percentage of calcium oxide in the mixture is approximately
(given, molar mass of BaO = 153)
(A) 52.6 (B) 55.1
(C) 44.9 (D) 47.4

58. A metal oxide has the formula A_2O_3. It can be reduced by hydrogen to give free metal and water. 0.1596 g of this metal oxide requires 6 mg of hydrogen for complete reduction. What is the atomic weight of metal ?
(A) 52.3 (B) 57.3
(C) 55.8 (D) 59.3

59. If 1 mL of water contains 20 drops then number of molecules in one drop of water is
(A) 6.023×10^{23}molecules
(B) 1.376×10^{26}molecules
(C) 1.344×10^{18}molecules
(D) 4.346×10^{20}molecules

Space for Rough Work

60. A mixture of $CaCl_2$ and NaCl weighing 4.44 g is treated with sodium carbonate solution to precipitate all the Ca^{2+} ions as calcium carbonate. The calcium carbonate, so obtained is heated strongly to get 0.56g of CaO. The percentage of NaCl in the mixture (atomic mass of Ca = 40) is
(A) 75 (B) 30.6
(C) 25 (D) 69.4

61. 10 g of hydrogen and 64 g of oxygen were filled in a steel vessel and exploded. Amount of water produced in this reaction will be
(A) 3 mol (B) 4 mol
(C) 1 mol (D) 2 mol

62. What volume of oxygen gas (O_2) measured at 0°C and 1 atm, is needed to burn completely 1 L of propane gas (C_3H_8) measured under the same conditions ?
(A) 7 L (B) 6 L
(C) 5 L (D) 10 L

63. For the reaction, $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$, the volume of carbon monoxide required to reduce one mole of ferric oxide is
(A) 22.4 dm^3 (B) 44.8 dm^3
(C) 67.2 dm^3 (D) 11.2 dm^3

64. What is the stoichiometric coefficient of Ca in the reaction ?

$$Ca + Al^{3+} \longrightarrow Ca^{2+} + Al$$

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

65. If equal volumes of 1M $KMnO_4$ and 1M $K_2Cr_2O_7$ solutions are allowed to oxidise Fe(II) to Fe (III) in acidic medium then Fe (II) oxidised will be
(A) more by $KMnO_4$
(B) more by $K_2Cr_2O_7$
(C) equal in both the cases
(D) cannot be determined

66. Given the reaction for the discharge of a cobalt-cadmium battery

$$2Co(OH)_3 + Cd + 2H_2O \longrightarrow 2Co(OH)_2 + Cd(OH)_2$$

What species is oxidised during the discharge of the battery ?
(A) Co^{3+} (B) Co^{2+}
(C) Cd (D) Cd^{2+}

67. Observe the following reaction,

$$2NO_2(g) + 2OH^-(aq) \longrightarrow NO_3^-(aq) + H_2O(l) + NO_2^-(aq)$$

in this reaction,
(A) OH^- is oxidised to H_2O
(B) HO^- is reduced to H_2O
(C) NO_2(g) is reduced to $NO_2^-(aq)$ and oxidised to $NO_3^-(aq)$
(D) $NO_2(g)$ is reduced to $NO_3^-(aq)$ and oxidised to $NO_2^-(aq)$

68. Both oxidation and reduction takes place in
(A) $NaBr + HCl \longrightarrow NaCl + HBr$
(B) $HBr + AgNO_3 \longrightarrow AgBr + HNO_3$
(C) $H_2 + Br_2 \longrightarrow 2HBr$
(D) $CaO + H_2SO_4 \longrightarrow CaSO_4 + H_2O$

69. The equivalent mass of $KMnO_4$ in the following reaction is $MnO_4^- + 5Fe^{2+} + 8H^+ \longrightarrow Mn^{2+} + 5Fe^{2+} + 4H_2O$
(M= Molecular mass)
(A) $\frac{M}{2}$ (B) $\frac{M}{3}$
(C) $\frac{M}{4}$ (D) $\frac{M}{5}$

70. Which of the following substances acts as an oxidising as well as reducing agent ?
(A) Na_2O (B) $SnCl_2$
(C) $NaNO_3$ (D) $NaNO_2$

71. In acidic medium, H_2O_2 changes $Cr_2O_7^{2-}$ to CrO_5 which has two (— O — O —) bonds. Oxidation state of Cr in CrO_5 is
(A) + 5 (B) +3
(C) + 6 (D) – 10

72. Oxidation number of nitrogen in which among the oxides of nitrogen is the lowest ?
(A) Nitric oxide (B) Nitrous oxide
(C) Nitrogen dioxide (D) Nitrogen trioxide

Space for Rough Work

73. The oxidation number of Cr in $K_2Cr_2O_7$ is

(A) + 2 (B) + 4

(C) + 6 (D) + 7

74. The oxidation number of sulphur in $Na_2S_2O_3$ is

(A) + 1 (B) + 2

(C) + 3 (D) – 3

75. A mixture of potassium chlorate, oxalic acid and sulphuric acid is heated. During the reaction which element undergoes maximum change in oxidation number ?

(A) S (B) H

(C) Cl (D) C

76. In chromite ore, the oxidation number of iron and chromium respectively, are

(A) + 3, + 2 (B) + 3, + 6

(C) + 2, + 6 (D) + 2, + 3

77. Oxidation states of P in $H_4P_2O_5$, $H_4P_2O_6$, $H_4P_2O_7$, respectively are

(A) +3,+4,+5 (B) +3,+5,+4

(C) +5,+3,+4 (D) +5,+4,+3

78. Highest oxidation state of Mn is present in

(A) $KMnO_4$ (B) K_2MnO_4

(C) Mn_2O_3 (D) MnO_2

79. When a manganous salt is fused with a mixture of KNO_3 and solid NaOH, the oxidation number of Mn changes from + 2 to

(A) + 4 (B) + 3

(C) + 6 (D) + 7

80. Which of the following have been arranged in the decreasing order of oxidation number of sulphur ?

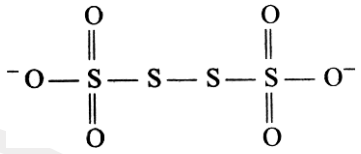
(A) $Na_2S_4O_6 > H_2S_2O_7 > Na_2S_2O_3 > S_8$

(B) $H_2SO_4 > SO_2 > H_2S > H_2S_2O_8$

(C) $SO_2^{2+} > SO_4^{2+} > SO_3^{2-} > HSO_4^-$

(D) $H_2SO_5 > H_2SO_3 > SCl_2 > H_2S$

81. The oxidation states of S-atoms in $S_4O_6^{2-}$ from left to right respectively, are



(A) +6,0,0,+6 (B) +3,1,+1,+3

(C) +5,0,0,+5 (D) +4,+1,+1,+4

82. In which of the following compounds, iron has an oxidation number of +3 ?

(A) $Fe(NO_3)_2$

(B) FeC_2O_4

(C) $[Fe(H_2O)_6]Cl_3$

(D) $(NH_4)_2SO_4 \cdot FeSO_4 \cdot H_2O$

83. The oxidation states of iodine in HIO_4, H_3IO_5 and H_5IO_6 respectively, are

(A) +1,+3,+7 (B) +7,+7,+3

(C) +7,+7,+7 (D) +7,+5,+3

84. Which of the following oxidation states are the most characteristics for lead and tin respectively ?

(A) +4,+2 (B) +2,+4

(C) +4,+4 (D) +2,+2

85. Oxidation state of nitrogen is correctly given for

	Compound	Oxidation state
(A)	Mg_3N_2	–3
(B)	NH_2OH	+1
(C)	$(N_2H_5)_2SO_4$	+2
(D)	$[Co(NH_3)_5Cl]Cl_2$	0

Space for Rough Work

86. For the redox reaction,

$$MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow Mn^{2+} + CO_2 + H_2O$$

the correct coefficient for the balanced reaction are

	MnO_4^-	$C_2O_4^{2-}$	H^+
(A)	2	5	16
(B)	16	5	2
(C)	5	16	2
(D)	2	16	5

87. In the following redox reaction,

$$xUO^{2+} + Cr_2O_7^{2-} + yH^+ \longrightarrow aUO_2^{2+} + zCr^{3+} + bH_2O$$

the values of coefficients x, y and z respectively, are

(A) 3,8,2 (B) 3,8,7
(C) 3,2,4 (D) 3,1,8

88. For the redox reaction,

$$Zn + NO_3^- \longrightarrow Zn^{2+} + NH_4^+$$

In basic medium, coefficients of Zn, NO_3^- and OH^- in the balanced reaction respectively, are

(A) 4,1,7 (B) 7,4,1
(C) 4,1,10 (D) 1,4,10

89. The equivalent mass of potassium permanganate in strong alkaline medium is its

(A) $\frac{\text{Molar mass}}{5}$ (B) $\frac{\text{Molar mass}}{3}$

(C) $\frac{\text{Molar mass}}{2}$ (D) Molar mass itself

90. In alkaline medium ClO_2 oxidises H_2O_2 to O_2 and reduced itself to Cl^-, then how many moles of H_2O_2 will oxidise by one mole of ClO_2 ?

(A) 1.0 (B) 1.5
(C) 2.5 (D) 3.5

[ZOOLOGY]

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

	Column-I		Column-II
A.	Factor II	(i)	Thromboplastin
B.	Factor III	(ii)	Prothrombin
C.	Factor VIII	(iii)	Hageman factor
D.	Factor XII	(iv)	Antihaemophilic globulin

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

92. Human blood maintains homeostasis in the internal environment of the body by

(1) replenishment of nutrients and oxygen and elimination of metabolic wastes from the extracellular fluid
(2) replenishment of oxygen and elimination of CO_2
(3) increasing the blood sugar level and conversion of urea into amino acids and destruction of wornout RBCs
(4) maintenance of ion concentration in the blood and body fluids by eliminating nitrogenous wastes.

Which of the above statements are correct.

(A) 1 only (B) 1 and 2
(C) 1, 2 and 4 (D) 2 and 4

93. Match the types of WBC listed under Column-I with the shape of nucleus given under Column-II and select the correct option from codes given below :

	Column-I		Column-II
A.	Neutrophils	(i)	Kidney-shaped
B.	Eosinophils	(ii)	S-shaped
C.	Basophils	(iii)	3 to 5 lobes
D.	Monocytes	(iv)	2 lobes
		(v)	Disc-shaped

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

Space for Rough Work

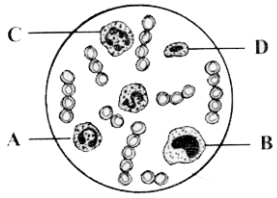
94. Which one of the following statements is correct with regard to the principle of safe blood transfusion ?
(A) The donor's red blood corpuscles should not contain antibodies against the recipient's serum.
(B) The recipients serum should not contain antigens against the donor's antibodies.
(C) The recipient's serum should not contain the antibodies against the red blood corpuscle of the donor.
(D) The recipient's red blood corpuscles should not contain antibodies against the donor's antigen.

95. In the clotting mechanism pathway, thrombin activates the factors
(A) XI, VIII, V (B) XI, IX, X
(C) VIII, X, V (D) IX, VIII, X

96. A drop of each of the following is placed separately on four slides. Which of them will not coagulate ?
(A) Blood serum
(B) Blood from pulmonary artery
(C) Whole blood from pulmonary vein
(D) Blood plasma

97. In which of the following situations, there is a risk factor for children acquiring erythroblastosis foetalis ?
(A) Mother is Rh – ve and father is Rh – ve
(B) Mother is Rh – ve and father is Rh + ve
(C) Mother is Rh + ve and father is Rh + ve
(D) Mother is Rh + ve and father is Rh – ve

98. Study the given figure and identify the cells labelled as A, B, C and D.



(A) A–Eosinophil, B–Erythrocyte, C–Neutrophil, D–Basophil
(B) A–Eosinophil, B–Lymphocyte, C–Neutrophil, D–Monocyte
(C) A–Erythrocyte, B–Basophil, C–Neutrophil, D–Lymphocyte
(D) A–Eosinophil, B–Monocyte, C–Neutrophil, D–Lymphocyte

99. Consider the following four statements and select the correct option stating which ones are true (T) and which ones are false (F) ?
(i) Proteins contribute 6–8% of the blood plasma
(ii) Plasma contains very high amount of minerals
(iii) Plasma without the clotting factors is called serum
(iv) Glucose, amino acids, lipids, etc, are also present in the plasma as they are always in transit in the body

	(i)	(ii)	(iii)	(iv)
(A)	F	F	T	T
(B)	T	F	T	T
(C)	T	T	F	F
(D)	F	F	F	T

100. In the following table of human ABO blood groups, fill up the blanks (i), (ii), (iii) and (iv) from the options given below :

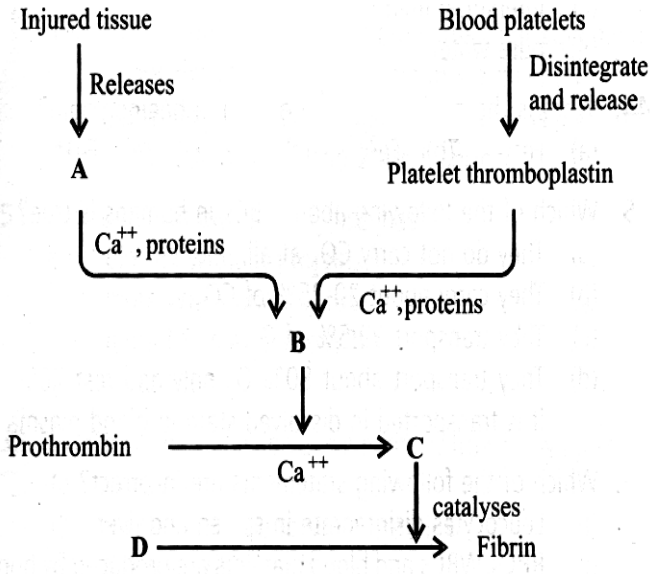
Blood group	Antigens on RBCs	Antibody in Plasma	Donor groups
A	A	Anti – B	A, O
B	B	Anti – A	B, O
AB	AB	(ii)	A, B, AB, O
O	(i)	(iii)	(iv)

	(i)	(ii)	(iii)	(iv)
(A)	Nil	Nil	Nil	0
(B)	Nil	Nil	Anti-A, B	AB
(C)	Nil	Anti-A,B	Nil	0
(D)	Nil	Nil	Anti-A, B	0

101. Find the correct descending order of percentage proportion of leucocytes in human blood.
(A) Neutrophils → Basophils → Lymphocytes → Acidophils (Eosinophils) → Monocytes
(B) Monocytes → Neutrophils → Lymphocytes → Acidophils → Basophils
(C) Neutrophils → Lymphocytes → Monocytes → Acidophils → Basophils
(D) Lymphocytes → Acidophils → Basophils → Neutrophils → Monocytes

Space for Rough Work

102. Identify the components labelled (A–D) in the given flow chart of the blood clotting process.



	A	B	C	D
(A)	Thrombo-plastin	Prothrom-binase	Thrombin	Fibrinogen
(B)	Fibrinogen	Thrombin	Prothrom-binase	Thrombo-plastin
(C)	Prothrom-binase	Fibrinogen	Thrombo-plastin	Thrombin
(D)	Thrombin	Thrombo-plastin	Fibrinogen	Prothrom-binase

103. The life span of human granulocytic WBC is approximately
(A) between 2 to 3 months
(B) more than 4 months
(C) less than 10 days
(D) between 20 to 30 days

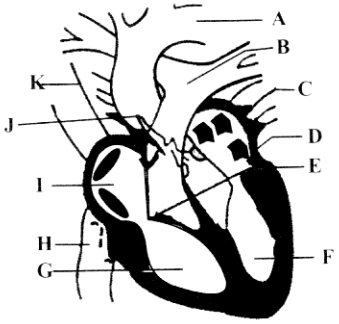
104. Which proteolytic enzyme induces lysis of fibrin during fibrinolysis ?
(A) Fibrin (B) Thrombin
(C) Plasmin (D) Platelet factor VIII

105. Rh factor was discovered by
(A) Landsteiner and Weiner
(B) William Harvey
(C) Malpighi
(D) none of these

106. Read the following statements and select the correct option.
Statement 1 : Lymph capillaries are free and bind at one end.
Statement 2 : Lymph does not flow in a circular manner.
(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.

107. Which of the following statements is true for lymph ?
(A) WBCs + serum
(B) Blood–RBCs and some proteins
(C) RBCs + WBCs + Plasma
(D) RBCs + Proteins + Platelets

108. The given figure shows the vertical section of human heart. Identify the parts labelled as A to K.



Space for Rough Work

(A) A–Aorta, B–Pulmonary vein, C–Pulmonary arteries, D–left ventricle, E–Semilunar valves, F–Left auricle, G–Right auricle, H–Superior vena cava, I–Right ventricle, J–Tricuspid valves, K–Inferior vena cava

(B) A–Aorta, B–Pulmonary artery, C–Pulmonary veins, D–Left auricle, E–Tricuspid valves, F–Left ventricle, G–Right ventricle, H–Inferior vena cava, I–Right auricle, J–Semilunar valves, K–Superior vena cava.

(C) A–Aorta, B–Superior vena cava, C–Inferior vena cava, D–Right ventricle, E–Tricuspid valves, F–Right auricle, G–Left auricle, H–Pulmonary vein, I–Right ventricle, J–Semilunar valves,K–Pulmonary artery.

(D) A–Aorta, B–Superior vena cava, C–Inferior vena cava, D–Left ventricle,E-Semilunar valves, F-Left auricle,G-Right auricle, H– Pulmonary artery, I–Rightventricle,J-Tricuspidvalves, K–Pulmonary vein.

109. Which of the following is correct about human heart?

(A) The volume of both atria > the volume of both ventricles

(B) The volume of both ventricles > the volume of both atria.

(C) The volume of both atria = the volume of both ventricles

(D) Ventricles are upper chambers and atria are lower chambers in our heart.

110. Read the following statements and select the correct option.

Statement 1 : The SA node acts as pacemaker.

Statement 2 : The SA node is located in the wall of the right atrium near the interatrial septum.

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

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

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

(D) Both statement 1 and 2 are incorrect.

111. In thrombocytes, Sydersomes are

(A) 2-3 mitochondria in groups.

(B) Granules containing serotonin.

(C) Iron containing vesicles.

(D) Glycogen granules.

112. Read the following statements and select the correct ones.

(i) Nodal tissue is specialized cardiac musculature in human heart which has the ability to generate action.

(ii) Position of SAN - right corner of right atrium

(iii) Position of AVN - right corner of Ventricle

(iv) AV bundle continues from AVN

(v) Purkinje fibres are modified cardiac muscle fibres that originate from the atrioventricular node and spread into the two ventricles.

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

(C) (ii), (iv) and (v) (D) All of these

113. Chordae tendineae are found in

(A) ventricles of brain

(B) joints of legs

(C) ventricles of heart

(D) atria of heart

114. During ventricular systole

(A) Oxygenated blood is pumped into the pulmonary artery and deoxygenated blood is pumped into the artery

(B) Oxygenated blood is pumped into the aorta and deoxygenated blood is pumped into the pulmonary vein

(C) Oxygenated blood is pumped into the pulmonary vein and deoxygenated blood is pumped into the pulmonary artery

(D) Oxygenated blood is pumped into the aorta and deoxygenated blood is pumped into the pulmonary artery.

Space for Rough Work

115. Which of the following statements(s) regarding the cardiac system is/are correct ?
(i) Human heart is an ectodermal derivative.
(ii) Mitral valve, guards the opening between the right atrium and left ventricle
(iii) SAN is located on the left upper corner of the right atrium
(iv) Stroke volume × Heart rate = Cardiac output
(A) (i) only (B) (i) and (iv)
(C) (ii) and (iii) (D) (iv) only

116. The problem of electrical discontinuity caused in the normal heart by the connective tissue separating the atria from the ventricles is solved by
(A) coordinating electrical activity in the atria with electrical activity in the ventricles by connecting them via the bundle of His
(B) having the A–V node function as a secondary pacemaker
(C) having an ectopic pacemaker
(D) coordinating electrical activity in the atria with electrical activity in the ventricles by connecting them via the vagus nerve.

117. Which one of the following is a matching pair ?
(A) Lubb-sharp closure of AV valves at the beginning of ventricular systole
(B) Dup - sudden opening of semilunar valves at the beginning of ventricular diastole
(C) Pulsation of the radial artery - valves in the blood vessels
(D) Initiation of the heart beat - Purkinje fibres

118. In humans, blood passes from the post caval to the diastolic right atrium of heart due to
(A) stimulation of the sino auricular node
(B) pressure difference between the post caval and atrium
(C) pushing open of the venous valves
(D) suction pull

119. Haemoglobin contains
(A) 70% globin + 30%haematin
(B) 80% globin + 20%haematin
(C) 96% globin + 04%haematin
(D) 89% globin + 11%haematin

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

	Column I	Column II
(A)	Superior vena cava	(i) Carries deoxygenated blood to lungs
(B)	Inferior vena cava	(ii) Carries oxygenated blood from lungs
(C)	Pulmonary artery	(iii) Brings deoxygenated blood from lower part of body to right atrium
(D)	Pulmonary vein	(iv) Bring deoxygenated blood from upper part of body to right atrium

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

121. The figure given below shows three stages in the cardiac cycle.

Which of the following sequences is correct regarding this ?
(A) 2, 3, 1 (B) 1, 2, 3
(C) 2, 1, 3 (D) 3, 1, 2

Space for Rough Work

122. A red blood cell, entering the right side of the heart passes by or through the following structures.
1. Atrioventricular valves
2. Semilunar valves
3. Right atrium
4. Right ventricle
5. SAN

Which of the following options represents the correct sequence ?

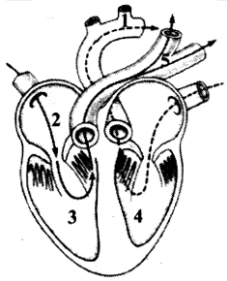
(A) $2 \rightarrow 3 \rightarrow 1 \rightarrow 4 \rightarrow 5$
(B) $3 \rightarrow 1 \rightarrow 5 \rightarrow 2 \rightarrow 4$
(C) $3 \rightarrow 5 \rightarrow 1 \rightarrow 2 \rightarrow 4$
(D) $5 \rightarrow 3 \rightarrow 1 \rightarrow 4 \rightarrow 2$

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

	Column-I		Column-II
A.	RBC	(i)	Coagulation
B.	Antibody	(ii)	Immunity
C.	Platelets	(iii)	Contraction
D.	Systole	(iv)	Gas transport
		(v)	Hypertension

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

124. In the given figure of the heart which of the labelled part (1, 2, 3, 4, 5) carries oxygenated blood ?



(A) 1, 2, 3 and 4 (B) 1 and 5
(C) 1 and 4 (D) 3 and 5

125. Choose the schematic diagram which properly represents pulmonary circulation in humans.

(A) Left auricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Right ventricle

(B) Left auricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Right ventricle

(C) Right ventricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Left auricle

(D) Right ventricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Left auricle

126. Which of the following sequences is truly a systemic circulation pathway ?

(A) Right ventricle → Pulmonary aorta → Tissues → Pulmonary veins → Left auricle
(B) Right auricle → Left ventricle → Aorta → Tissues → Veins → Right auricle
(C) Left auricle → Left ventricle → Pulmonary aorta → Tissues → Right auricle
(D) Left auricle → Left ventricle → Aorta → Arteries → Tissues → Veins → Right atrium.

127. The given figure is of circulatory system. Identify the labelled parts (A–D) from the list (i–vii).

(i) Pulmonary circulation
(ii) Systemic circulation
(iii) Superior vena cava
(iv) Inferior vena cava

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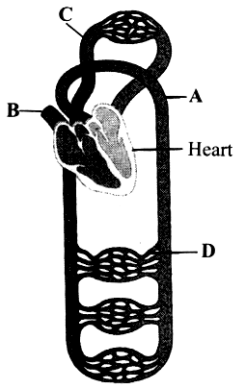
(v) Aorta

(vi) Veins and venules

(vii) Arterioles and capillaries.



	A	B	C	D
(A)	(v)	(iii)	(i)	(vii)
(B)	(vii)	(iv)	(i)	(vi)
(C)	(v)	(iii)	(ii)	(vii)
(D)	(vii)	(v)	(i)	(vi)

128. Read the following statements and select the correct option.

Statement 1 : The 4-chambered heart of birds is superior to the 4-chambered heart of crocodiles.

Statement 2 : Crocodilian heart retains both systemic arches that join, causing mixing of blood in the dorsal aorta while avian heart has lost left systemic arch.

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

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

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

(D) Both statement 1 and 2 are incorrect.

129. Consider the following four statements (i) - (iv) and select the correct option.

(i) Fish heart contains only oxygenated blood.

(ii) Closure of A-V valves produces the second heart sound.

(iii) Columnae carneae occur in the auricles.

(iv) Purkinje fibres are nerve fibres present in the heart wall.

	(i)	(ii)	(iii)	(iv)
(A)	F	F	T	F
(B)	F	F	F	T
(C)	T	T	F	T
(D)	T	F	T	F

130. Systemic heart refers to

(A) the heart that contracts under stimulation from nervous system.

(B) left auricle and left ventricle in higher vertebrates

(C) entire heart in lower vertebrates.

(D) the two ventricles together in humans.

131. Which of the following parts of heart first receives deoxygenated blood ?

(A) Right ventricle (B) Left auricle

(C) Right auricle (D) Left ventricle

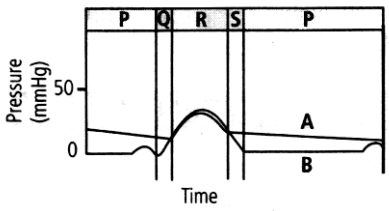
132. Refer to the given figure in which A refers to pulmonary artery pressure and B refers to right ventricular pressure. Identify P, Q, R and S in the figure and match with the list (i – iv) given below :

(i) Isovolumetric ventricular contraction

(ii) ventricular ejection

(iii) Isovolumetric ventricular relaxation

(iv) Ventricular filling



(A) P–(iv), Q–(iii), R–(ii), S–(i)

(B) P–(ii), Q–(iii), R–(i), S–(iv)

(C) P–(iv), Q–(i), R–(ii), S–(iii)

(D) P–(i), Q–(ii), R–(iii), S–(iv)

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133. Rapidity of conduction is greatest in the
(A) Atrial muscle
(B) Purkinje fibres
(C) AV nodal region
(D) Ventricular muscle.

134. The myocardial depressant is
(A) Ca^{++} (B) Mg^{++}
(C) Digitatis (D) Na^{+}

135. Erythropoietin is stimulated by all except
(A) Low blood volume
(B) Polycythemia
(C) Poor blood flow
(D) Pulmonary disease.

[BOTANY]

136. Which one of the following correctly depicts the biochemical reaction for photosynthesis ?

(A) $C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{Enzymes}} 6CO_2 + 6H_2O + \text{energy}$

(B) $C_6H_{12}O_6 + 6O_2 + 6H_2O \longrightarrow 6CO_2 + 12H_2O + \text{energy}$

(C) $6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$

(D) $6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$

137. Ingenhousz in an experiment showed that in bright sunlight, small bubbles were formed around the green parts of the plant, while in the dark, they did not. He identified these bubbles to be of
(A) CO_2 (B) H_2O
(C) O_2 (D) H_2

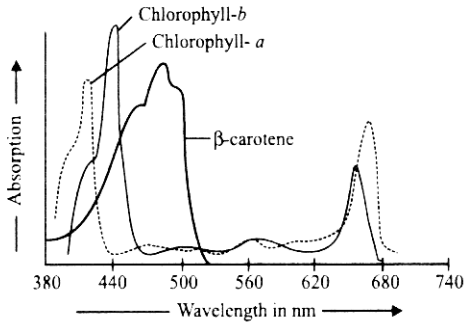
138. Who used prism, green alga *Cladophora*, and aerobic bacteria and plotted the first action spectrum for photosynthesis ?
(A) Sachs (B) Arnon
(C) Arnold (D) Engelmann

139. Photosynthetic pigments such as chl a, chl b, xanthophyll and carotene can be separated by which of the following techniques ?
(A) Paper chromatography
(B) Gel Electrophoresis
(C) X-ray diffusion
(D) ELISA test

140. Which range of wavelength (in nm) is called as photosynthetically active radiation (PAR) ?
(A) 100 – 390 (B) 390 – 430
(C) 400 – 700 (D) 760 – 100

141. Study the following statements regarding chl a molecule.
(i) Molecular formula of chl *a* is $C_{55}H_{72}O_5N_4Mg$
(ii) It is the primary photosynthetic pigment.
(iii) In pure state, it is red in colour and thus it absorbs more blue wavelength of light than the red wavelength.
(iv) It is soluble in water as well as petroleum ether.
Which of the above statements is/are not correct ?
(A) (i) and (iii) (B) (iii) and (iv)
(C) (iii) only (D) (iv) only

142. Given graph represents the absorption spectra of three photosynthetic pigments, chl a, chl b and β-carotene. Select the correct statement regarding this.



Space for Rough Work

(A) The curve showing the amount of absorption of different wavelengths of light by a photosynthetic pigment is called as absorption spectrum.
(B) Chl a and chl b absorb maximum light in blue and red wavelength of light
(C) Rate of photosynthesis is maximum in blue and red wavelength of light.
(D) All of these

143. Which of the following serves as the source of energy for chemosynthetic bacteria ?
(A) Sun
(B) Infra-red rays
(C) Organic substances
(D) Inorganic chemicals

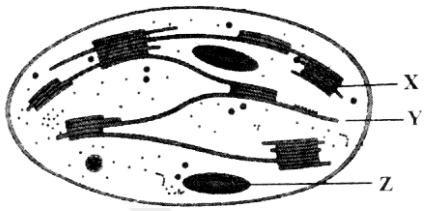
144. Which of the following is produced during the light phase of photosynthesis ?
(A) ATP
(B) $NADPH_2$
(C) Both ATP and $NADPH_2$
(D) Carbohydrates

145. In cyclic photophosphorylation, the electron released by reaction centre (P_{700}) is ultimately accepted by
(A) ferrodoxin
(B) $NADP^+$
(C) reaction centre (P_{700})
(D) Plastocyanin

146. Which of the following statements about dark reactions is correct ?
(A) They occur in darkness
(B) They are not light dependent
(C) They are dependent upon the products synthesized during light reactions.
(D) All of these.

147. Reaction centre of PS I is _____ and reaction centre of PS II is _____ .
(A) P_{680}, P_{700} (B) P_{700}, P_{680}
(C) P_{800}, P_{600} (D) P_{700}, P_{900}

Direction : Refer the given diagramatic representation of an electron micrograph of a section of chloroplast to answer the Q. Nos. 148 and 149



148. Select the option that correctly identifies X, Y and Z.

	X	Y	Z
(A)	Stroma	Grana	Chloroplast DNA
(B)	Stroma	Grana	Starch granule
(C)	Grana	Stroma	Starch granule
(D)	Grana	Stroma	Chloroplast DNA

149. Select the option which correctly depicts the functions of parts X, Y and Z.

	X	Y	Z
(A)	Dark reaction	Light reaction	Cytoplasmic inheritance
(B)	Light reaction	Carbohydrate synthesis	Carbohydrate storage
(C)	Light reaction	Carbohydrate storage	Carbohydrate synthesis
(D)	Carbohydrate synthesis	Carbohydrate storage	Cytoplasmic inheritance

150. Which one is involved in Z-scheme of photosynthesis?
(A) PS I (B) PS II
(C) e^- Carriers (D) All of these

151. Yellowish colour of autumn foliage is due to the presence of a type of xanthophyll pigment called as
(A) lutein (B) lycopene
(C) fucoxanthin (D) zeaxanthin

152. Which of these is a type of phycobilin pigments ?
(A) Phycocyanin (B) Allophycocyanin
(C) Phycoerythrin (D) All of these

Space for Rough Work

153. Consider following statements with respect to the C_4 pathway and select the correct ones.
(i) Mesophyll cells possesses both RuBisCO and PEPcase enzymes.
(ii) Initial CO_2 fixation occurs in mesophyll cells.
(iii) Final CO_2 fixation occurs in bundle sheath cells.
(A) (i) and (ii) (B) (ii) and (iii)
(C) (i) and (iii) (D) (i), (ii) and (iii)

154. Which of the following conversions involve ATP synthesis during glycolysis ?
(A) Glucose → Glucose–6–phosphate
(B) Fructose-6-phosphate → Fructose-1,6 biphosphate
(C) 1,3-bisphosphoglyceric acid (BPGA) → 3-phosphoglyceric acid (PGA)
(D) All of these.

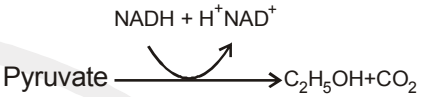
155. Select the wrong statement.
(A) Oxidative decarboxylation of pyruvic acid requires the presence of enzyme pyruvate dehydrogenase.
(B) All living cells whether aerobic or anaerobic, perform glycolysis.
(C) Cyanide does not stop chemiosmosis.
(D) Respiratory chain uses O_2 as final hydrogen acceptor.

156. Pyruvic acid, the key product of glycolysis can have many metabolic fates. Under aerobic condition it forms
(A) lactic acid (B) $CO_2 + H_2O$
(C) Acetyl CoA+CO_2 (D) Ethanol + CO_2

157. Mitochondria are called powerhouses of the cell. Which of the following observations support this statement ?
(A) Mitochondria synthesize ATP.
(B) Mitochondria have a double membrane.
(C) The enzymes of the Krebs' cycle and the cytochromes are found in mitochondria
(D) Mitochondria are found in almost all plant and animal cells.

158. Site of Krebs' cycle in mitochondria is
(A) outer membrane (B) matrix
(C) oxysomes (D) inner membrane

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

160. Categorise the given summary equations under respective phases and select the correct option.
I. $C_6H_{12}O_6 + NAD^+ + 2ADP + 2Pi \rightarrow 2C_3H_4O_3 + 2ATP + 2NADH + 2H^+$
II. Pyruvic acid + $4NAD^+ + FAD^+ + 2H_2O + ADP + Pi \rightarrow 3CO_2 + 4NADH + 4H^+ + ATP + FADH_2$
III. 

III.

	I	II	III
(A)	Glycolysis	Fermentation	Krebs' cycle
(B)	Krebs' cycle	Fermentation	Glycolysis
(C)	Krebs' cycle	Glycolysis	Fermentation
(D)	Glycolysis	Krebs' cycle	Fermentations

161. Which of the following steps of respiration is amphibolic ?
(A) Glycolysis
(B) Oxidative decarboxylation of pyruvate
(C) TCA cycle
(D) Oxidative phosphorylation

162. 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

163. Read the given statements and select the correct option.
Statement 1 : Mitochondria are known as powerhouse of the cell.
Statement 2 : ATP synthesis occurs in mitochondria.
(A) Both statement 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
(B) Both statement 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 statement 1 and 2 are incorrect.

Space for Rough Work

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

165. Which of the following statements regarding metabolic pathway is incorrect ?
(A) Many of the steps of glycolysis can run in reverse.
(B) Starch, sucrose or glycogen must be hydrolysed before it can enter the glycolysis.
(C) After fats are digested, glycerol enters glycolysis by forming DHAP
(D) After fat digestion, fatty acids can no longer participate in cellular respiration.

166. 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	$FADH + H^+$
(D)	2ATPs	Substrate level phosphorylation	$NADH + H^+$

167. Consider the first reaction of TCA cycle.

$$\text{Acetyl CoA + OAA + } H_2O \xrightarrow[\text{synthase}]{\text{Citrate}} (A) + \text{CoA}$$

What is true about compound A ?
(A) First product of TCA cycle
(B) Tricarboxylic acid and six carbon compound
(C) It undergoes reorganisation in the presence of enzyme aconitase to form *cis*-aconitate
(D) All of these.

168. Select the correct combinations of the respiratory substrates and their respective RQs.

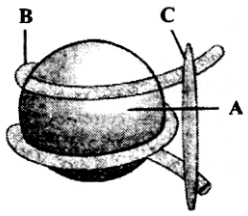
	Organic acids	Fats	Succulents
(A)	1.3	0.7	Zero
(B)	Infinity	0.7	Zero
(C)	Zero	1.3	0.7
(D)	Zero	0.7	1.3

169. 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)	Cytochromes	(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)

170. Refer the given figure of nucleosome and select the option that correctly identifies the parts A, B and C.



	A	B	C
(A)	DNA	Histone octamer	H_1 histone
(B)	Histone octamer	H_1 histone	DNA
(C)	Histone octamer	DNA	H_1 histone
(D)	DNA	H_1 histone	Histone octamer

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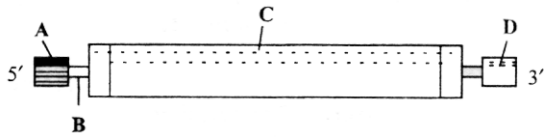
171. Match Column-I with Column-II and select the correct option from the codes given below.

	Column-I		Column-II
(A)	Griffith	(i)	Lac operon
(B)	Hershey and Chase	(ii)	Semi-conservative DNA replication
(C)	Messelson and Stahl	(iii)	Transduction
(D)	Jacob and Monod.	(iv)	Transformation.

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

172. Idenfity A, B, C and D in the given diagram of mRNA



	A	B	C	D
(A)	Methylated cap	Initiation codon	Termination codon	Poly A tail
(B)	Poly A tail	Termination codon	Initiation codon	Methylated cap
(C)	Methylated cap	Non-coding region	Coding region	Poly A tail
(D)	Methylated cap	Coding region	Non-coding region	Poly A tail

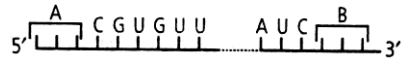
173. Histone proteins are
(A) basic, negatively charged
(B) basic, positively charged
(C) acidic positively charged
(D) acidic, negatively charged

174. Refer the given sequence of steps and select the correct option

$$DNA \xrightarrow{(i)} hnRNA \xrightarrow{(ii)} mRNA \xrightarrow{(iii)} Proteins$$

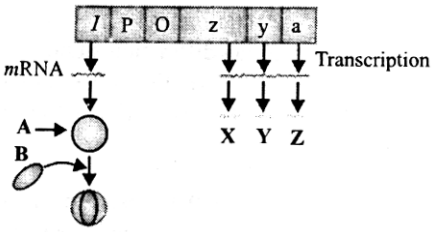
	(i)	(ii)	(iii)
(A)	Replication	Transcription	Translation
(B)	Replication	Processing	Translation
(C)	Transcription	Splicing	Translation
(D)	Transcription	Replication	Translation

175. Refer the given mRNA segment



It can be translated completely into a polypeptide. Which of the following codons may correspond with A and B ?
(A) A–AUG, GUG; B–UAA, UAG or UGA
(B) A–UAA, UGA; B – AUG, GUG or UAG
(C) A–AUG, UGA; B–GUG, UAA or UGA
(D) A–AUG, GAG; B–UAA, UUU or UGA

176. The given figure shows *lac* operon and its functioning. Select the option which correctly labels A, B, X, Y and Z.



	A	B	X	Y	Z
(A)	Repressor	Inducer	β-Galactosidase	Permease	Trans-acetylase
(B)	Repressor	Inducer	Permease	β-Galacto-sidase	Trans acetylase
(C)	Inducer	Repressor	β-Galactosidase	Permease	Trans-acetylase
(D)	Inducer	Repressor	β-Galactosidase	Trans-acetylase	Permease

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

	Column-I (Codons)		Column-II (Translated amino acid)
(A)	UUU	(i)	Serine
(B)	GGG	(ii)	Methionine
(C)	UCU	(iii)	Phenylalanine
(D)	CCC	(iv)	Glycine
(E)	AUG	(v)	Proline

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

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

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

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

Direction : Read the sequence of nucleotides in the given segment of mRNA and the respective amino acid sequence in the polypeptide chain to answer the Q.Nos. 178 & 179.

*m*RNA $\xrightarrow{\text{AUGUUU AUG CCU GUU UCU UAA}}$

Polypeptide Met —Phe—Met—Pro—Val—Ser

178. Nucleotide sequence of the DNA strand from which this mRNA was transcribed is

(A) TAC AAA TAC GGA CAA AGA ATT

(B) AUG UUU AUG CCU GUU UCU UAA

(C) UAC AAA UAC GGA CAA AGA AUU

(D) ATG TTT ATG CCT GTT TCT TAA

❑ ❑ ❑

179. Which codons respectively code for proline and valine amino acids in the given polypeptide chain, respectively?

(A) CCU and GUU (B) GUU and UCU

(C) UCU and UAA (D) GUU and CCU

180. Select the incorrect statement regarding DNA replication.

(A) Leading strand is formed in 5' –3' direction.

(B) Okazaki fragments are formed in 5' –3' direction.

(C) DNA polymerase catalyses polymerisation in 5'–3' direction.

(D) DNA polymerase catalyses polymerisation in 3'–5' direction.

Space for Rough Work

Space for Rough Work