HORIZON ACADEMY®

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Name.: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Date : 04/10/2015

Test No.: 0 8

Subject Code.: 2 2 2

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

HORIZON TEST SERIES

for

Medical Entrance Exam. 2016

[Test No. (8)_Batch 2]

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 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. 8

Topics of The Test

Physics	Vectors and Projectile + Laws of Motion
Chemistry	Some basic concepts of chemistry + Redox reaction.
Biology	Zoology : Circulation Botany : Photosynthesis

Test No. 8

[PHYSICS]

1. The resultant of $\vec{A}$ and $\vec{B}$ makes an angle α with $\vec{A}$ and β with $\vec{B}$

   (A) $\alpha < \beta$ (B) $\alpha < \beta$ if $\vec{A} < \vec{B}$

   (C) $\alpha < \beta$ if $\vec{A} > \vec{B}$ (D) $\alpha < \beta$ if $\vec{A} = \vec{B}$

2. Let the angle between two non-zero vectors $\vec{A}$ and $\vec{B}$ be 120° and its resultant be $\vec{C}$

   (A) C must be equal to $|\vec{A} - \vec{B}|$

   (B) C must be less than $|\vec{A} - \vec{B}|$

   (C) C must be greater than $|\vec{A} - \vec{B}|$

   (D) C may be equal to $|\vec{A} - \vec{B}|$

3. The resultant of two forces 3P and 2P is R. If the first force is doubled then the resultant is also doubled. The angle between the two forces is

   (A) 60° (B) 70°

   (C) 120° (D) 180°

4. The resultant of two forces, one double then other in magnitude, is perpendicular to the smaller of the two forces. The angle between the two forces is

   (A) 60° (B) 90°

   (C) 120° (D) 150°

5. A stone is projected upwards and it returns to ground on a parabolic path. Which of the following remains constant ?

   (A) Speed of the stone

   (B) Horizontal component of velocity

   (C) Vertical component of velocity

   (D) Kinetic energy of stone

6. In case of a projectile, what is the angle between the instantaneous velocity and acceleration at the highest point ?

   (A) zero (B) 45°

   (C) 90° (D) 18°

7. A projectile is thrown upward with a velocity v_0 at an angle α to the horizontal. The change in velocity of the projectile when it strikes the same horizontal plane is

   (A) $v_0 \sin\alpha$ vertically downward

   (B) $2v_0 \sin\alpha$ vertically downward

   (C) $2v_0 \sin\alpha$ vertically upward

   (D) $v_0 \cos\alpha$ vertically downward

8. The equation of a projectile is $Y = \sqrt{3}X - \frac{1}{2}gX^2$. The velocity of projection is

   (A) 1 m/s (B) 2 m/s

   (C) 3 m/s (D) 4 m/s

9. Two stones are projected with the same (magnitude) velocity but making different angles with the horizontal. Their ranges are equal. If the angle of projection of one is $\pi/3$, and its maximum height is y_1, then the maximum height of the other will be

   (A) $3y_1$ (B) $2y_1$

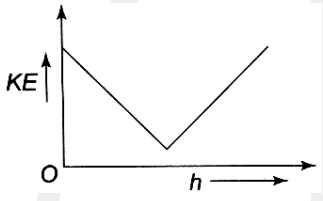
   (C) $\frac{y_1}{2}$ (D) $\frac{y_1}{3}$

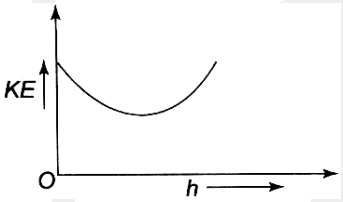
Space for Rough Work

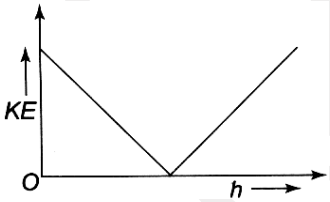
10. A boy playing on the roof of a 10 m high building throws a ball with a speed of 10 m/s at an angle of 30° with the horizontal. How far from the throwing point will the ball be at height of 10 m from the ground ?
[g = 10 m/s^2]
(A) 5.20 m (B) 4.33 m
(C) 2.60 m (D) 8.66 m

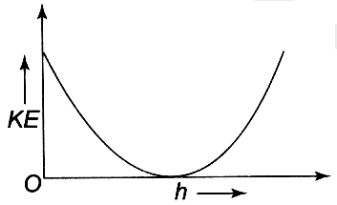
11. The horizontal range of projectile is $4\sqrt{3}$ times of its maximum height. The angle of projection will be
(A) 40° (B) 90°
(C) 30° (D) 45°

12. A ball is thrown up with a certain velocity at an angle θ to the horizontal. The kinetic energy 'KE' of the ball varies with height *h* as

(A) 

(B) 

(C) 

(D) 

13. A ball is projected with velocity *u* at an angle α with horizontal plane. Its speed when it makes an angle β with the horizontal is
(A) $u\cos\alpha$ (B) $\frac{u}{\cos\beta}$
(C) $u\cos\alpha\cos\beta$ (D) $\frac{u\cos\alpha}{\cos\beta}$

14. A projectile is given an initial velocity of $\hat{i}+2\hat{j}$. The cartesian equation of its path is (g = 10 m/s^2)
(A) $y=2x-5x^2$ (B) $y=x-5x^2$
(C) $4y=2x-5x^2$ (D) $y=2x-25x^2$

15. Rain water is falling vertically downward with velocity v. When velocity of wind is *u* in horizontal direction, water is collected at the rate of R m^3/s. When velocity of wind becomes 2*u* in horizontal direction, the rate of collection of water in vessel is
(A) R (B) $\frac{R}{2}$
(C) $2R$ (D) $\frac{R\sqrt{4u^2+v^2}}{\sqrt{u^2+v^2}}$

16. A particle moves along the parabolic path $y=ax^2$ in such a way that the x-component of the velocity remains constant, say c. The acceleration of the particle is
(A) $ac\hat{k}$ (B) $2ac^2\hat{j}$
(C) $ac^2\hat{k}$ (D) $a^2c\hat{j}$

17. Two cars A and B are going around concentric circular paths of radii r_A and r_B. If the two cars complete the circular paths in the same time then the ratio of angular speeds of A and B is
(A) 1 (B) $\frac{r_A}{r_B}$
(C) $\frac{r_B}{r_A}$ (D) $\frac{r_A^2}{r_B^2}$

Space for Rough Work

18. A particle revolving in a circular path completes first one third of the circumference in 2sec, while next one third in 1sec. The average angular velocity of particle will be (in rad/sec)

(A) $\frac{4\pi}{9}$ (B) $\frac{\pi}{3}$

(C) $\frac{4\pi}{3}$ (D) $\frac{5\pi}{3}$

19. The magnitude of the displacement of a particle moving in a circle of radius *a* with constant angular speed ω varies with time *t* as

(A) $2a\sin\omega t$ (B) $2a\sin\frac{\omega t}{2}$

(C) $2a\cos\omega t$ (D) $2a\cos\frac{\omega t}{2}$

20. Consider the following questions :

Assertion (A) : A cyclist always bends inwards while negotiating a curve.

Reason (R) : By bending he lowers his centre of gravity. Of these statements.

(A) both A and R are true and R is the correct explanation of A

(B) both A and R are true but R is not the correct explanation of A

(C) A is true but R is false

(D) A is false but R is true

21. A man fires bullets of mass m each with velocity v with the help of a machine gun. If he fires n bullets per sec, the reaction force on the man will be

(A) $\frac{m}{v}n$ (B) mnv

(C) $\frac{mv}{n}$ (D) $\frac{vn}{m}$

22. A body of mass 2kg is moving along x-direction with a velocity of 2m/sec. If a force of 4N is applied on it along y-direction for 1 sec, the final velocity of particle will be

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

(C) $1/\sqrt{2}$ m/s (D) $1/2\sqrt{2}$ m/s

23. A spring weighing machine inside a stationary lift reads 50 kg when a man stands on it. What would happen to the scale reading if the lift is moving upward with (i) constant velocity (ii) constant acceleration

(A) $50\,kgwt, \left(50+\frac{50a}{g}\right)kgwt$

(B) $50\,kgwt, \left(50+\frac{50g}{a}\right)kgwt$

(C) $50\,kgwt, \left(\frac{50a}{g}\right)kgwt$

(D) $50\,kgwt, \left(\frac{50g}{a}\right)kgwt$

24. A balloon of mass m is rising up with an acceleration a. The fraction of weight that must be detached from the balloon, in order to double its acceleration will be (assuming the air upthrust remain the same)

(A) $\frac{ma}{a+g}$ (B) $\frac{m}{a+g}$

(C) $\frac{ma}{2a+g}$ (D) $\frac{2ma}{a+g}$

25. A force produces an acceleration of $5m/s^2$ in a body and same force produces an acceleration of $15m/s^2$ in another body. The acceleration produced by the same force when applied to the combination of two bodies will be

(A) 3.75 m/s^2 (B) 20 m/s^2

(C) 10 m/s^2 (D) 0.667 m/s^2

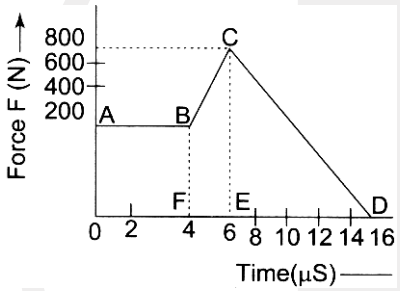
Space for Rough Work

26. A force produces acceleration $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots\ldots$ (all in m/s^2), when applied separately to n bodies. If these bodies are combined to from a single one, then the acceleration of the system will be, provided same force is taken into account

(A) $\frac{n}{2}$ (B) $\frac{2}{n(n+1)}$

(C) $\frac{n^2}{2}$ (D) $\frac{n^2(n+1)}{2}$

27. The magnitude of the force (in Newtons) acting on a body varies with time t (in microseconds) as shown in figure. The magnitude of the total impulse of the force on the body from $t = 4\mu s$ to $t = 16\mu s$ is ..... N.s.



(A) 5×10^{-4} N.S. (B) 5×10^{-3} N.S.

(C) 5×10^{-5} N.S. (D) 5×10^{-2} N.S.

28. An engine of mass 5×10^4 kg pulls a coach of mass 4×10^4 kg. Suppose that there is a resistance of 1N per 100 kg acting on both coach and engine, and that the driving force of engine is 4500 N. The acceleration of the engine and tension in the coupling will respectively be

(A) 0.04 m/s^2, 2000 N

(B) 0.4 m/s^2, 200 N

(C) 0.4 m/s^2, 20 N

(D) 4 m/s^2, 200 N

29. A block is kept on a horizontal table. The table is undergoing simple harmonic motion of frequency 3Hz in a horizontal plane. The coefficient of static friction between the block and the table surface is 0.72. Find the maximum amplitude of the table at which the block does not slip on the surface ($g = 10\ ms^{-2}$)

(A) 0.01 m (B) 0.02 m

(C) 0.03 m (D) 0.4 m

30. A particle describes a horizontal circle on the smooth surface of an inverted cone. The height of the plane of the circle above the vertex is 9.8 cm. The speed of the particle will be

(A) 9.8 m/s (B) 0.98 m/s

(C) 0.098 m/s (D) 98 m/s

31. When we kick a stone, we get hurt due to which one of the following properties of the stone ?

(A) Inertia (B) Velocity

(C) Reaction (D) Momentum

32. Mark correct options

(A) The body of greater mass needs more force to move due to more inertia

(B) Area under force versus time graph gives impulse

(C) Microscopic area of contact is about 10^{-4} times the actual area of the contact

(D) All of the above

33. Essential characteristic of equilibrium is

(A) Momentum equals zero

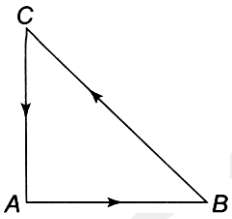
(B) Acceleration equals zero

(C) K.E. equals zero

(D) Velocity equals zero

Space for Rough Work

34. Three forces start acting simultaneously on a particle moving with velicity $\vec{v}$. These forces are represented in magnitude and direction by the three sides of a triangle ABC (as shown). The particle will now move with velocity



(A) less than $\vec{v}$

(B) greater than $\vec{v}$

(C) $|\vec{v}|$ in the direction of largest force BC

(D) $\vec{v}$ remains unchanged

35. When forces F_1, F_2 and F_3 are acting on a particle of mass *m* such that F_2 and F_3 are mutually perpendicular, then the particle remains stationary. If the force F_1 is now removed then the acceleration of the particle is

(A) $\frac{F_1}{m}$ (B) $\frac{F_2F_3}{mF_1}$

(C) $\frac{(F_2 - F_3)}{m}$ (D) $\frac{F_2}{m}$

36. A block rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is 0.8. If the frictional force on the block is 10 N, the mass of the block (in kg) is (Take g = 10 m/s^2)

(A) 1.6 (B) 2.0

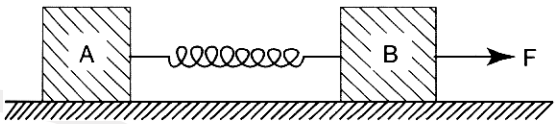
(C) 2.5 (D) 4.0

37. A pushing force making an angle θ to the horizontal is applied on a block of weight *W* placed on a horizontal table. If the angle of friction be ϕ, the magnitude of force required to move the body is equal to

(A) $\frac{W\cos\phi}{\cos(\theta+\phi)}$ (B) $\frac{W\sin\phi}{\cos(\theta+\phi)}$

(C) $\frac{W\tan\phi}{\sin(\theta+\phi)}$ (D) $\frac{W\sin\phi}{\tan(\theta+\phi)}$

38. Two bodies A and B each of mass *M* are connected together by a massless spring. A force F acts on the mass B as shown in figure. At the instant shown, the mass A has acceleration *a*. What is the acceleration of mass B ?



(A) (F/M) – a (B) a

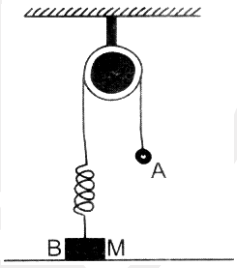
(C) – a (D) (F/M)

39. A block of mass 2 kg is placed on the floor. The coefficient of static friction is 0.4 If a force of 2.8 N is applied on the block parallel to floor, the force of friction between the block and floor (taking g = 10 m/s^2) is

(A) 2.8 N (B) 8 N

(C) 2 N (D) Zero

40. In the adjoining diagram, the ball A is released from rest when the spring is at its natural length (neither stretched nor compressed). For the block B of mass M to leave contact with the ground at some time, the minimum mass of A must be



(A) M/2

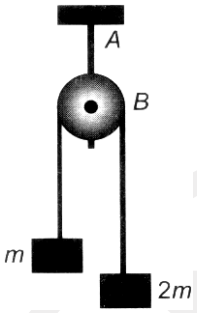
(B) M

(C) 2M

(D) a function of M and force constant *k* of spring

Space for Rough Work

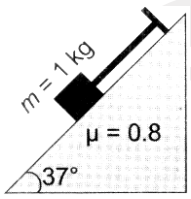
41. In the arrangement shown in the figure, the pulley has a mass 3m. Neglecting friction on the contact surface, the force exerted by the supporting rope *AB* on the ceiling is



(A) $6mg$ (B) $3mg$

(C) $4mg$ (D) $\frac{17}{3}mg$

42. For the arrangement shown in figure, the tension in the string to prevent it from sliding down, is



(A) 6 N (B) 6.4 N

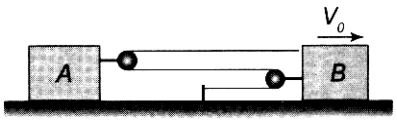
(C) 0. 4 N (D) zero

43. An open knife edge of mass *m* is dropped from a height '*h*' on a wooden floor. If the blade penetrates upto the depth *d* into the wood, the average resistance offered by the wood to the knife edge is

(A) $mg\left(1+\frac{h}{d}\right)$ (B) $mg\left(1+\frac{h}{d}\right)^2$

(C) $mg\left(1-\frac{h}{d}\right)$ (D) mg

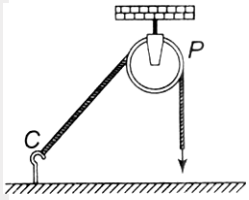
44. Block *B* moves to the right with a constant velocity v_0. The velocity of body *A* relative to *B* is



(A) $\frac{v_0}{2}$, towards left (B) $\frac{v_0}{2}$, towards right

(C) $\frac{3v_0}{2}$, towards left (D) $\frac{3v_0}{2}$, towards right

45. One end of a massless rope, which passes over a massless and frictionless pulley *P* is tied to a hook *C* while the other end is free. Maximum tension that the rope can bear is 360 N. With what value of maximum safe acceleration (in ms^{-2}) can a man of 60 kg climb down the rope ?
(Take g = $10m/s^2$)



(A) 16 (B) 6

(C) 4 (D) 8

[CHEMISTRY]

46. What is the mass of one molecule of yellow phosphorus?

(A) 1.993×10^{-22} mg (B) 1.993×10^{-19}mg

(C) 4.983×10^{-20} mg (D) 4.983×10^{-23} mg

47. for 14 g of CO, the wrong statement is

(A) it occupies 2.24 L at NTP

(B) it corresponds to $\frac{1}{2}$ mole of CO

(C) it corresponds to same mole of CO and nitrogen gas

(D) it corresponds to 3.01×10^{23} molecules of CO

Space for Rough Work

48. How many moles of magnesium phosphate, $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atom ?
(A) 0.02 (B) 3.125×10^{-2}
(C) 1.25×10^{-2} (D) 2.5×10^{-2}

49. The equivalent weight of potassium permanganate in alkaline solution is equal to
(A) $\frac{1}{5}$ th of the molar mass of $KMnO_4$
(B) $\frac{1}{6}$ th of the molar mass of $KMnO_4$
(C) $\frac{1}{3}$ rd of the molar mass of $KMnO_4$
(D) $\frac{1}{10}$ th of the molar mass of $KMnO_4$

50. In an experiment, 4 g of M_2O_x oxide was reduced to 2.8 g of the metal. If the atomic mass of the metal is 56 g mol^{-1}, the number of O-atoms in the oxide is
(A) 1 (B) 2
(C) 3 (D) 4

51. The volume of 2N H_2SO_4 solution is 0.1 dm^3. The volume of its decinormal solution (in dm^3) will be
(A) 0.1 (B) 0.2
(C) 2 (D) 1.7

52. The correctly reported answer of the addition of 4.523, 2.3 and 6.24 will have significant figures
(A) two (B) three
(C) four (D) five

53. The maximum number of molecules are present in
(A) 15 L of H_2 gas at STP
(B) 5 L of N_2 gas at STP
(C) 0.5 g of H_2 gas
(D) 10 g of O_2 gas

54. A gas mixture contains O_2 and N_2 in the ratio of 1:4 by weight. The ratio of their number of molecules is
(A) 1:8 (B) 1:4
(C) 3:16 (D) 7:32

55. Total number of protons in 10 g of calcium carbonate is ($N_A = 6.023\times10^{23}$)
(A) 12.04×10^{24} (B) 4.06×10^{24}
(C) 2.01×10^{24} (D) 3.24×10^{24}

56. When 22.4 L of H_2(g) is mixed with 11.2 L of Cl_2(g), each at STP, the moles of HCl (g) formed is equal to
(A) 1 mole of HCl(g)
(B) 2 moles of HCl(g)
(C) 0.5 mole of HCl(g)
(D) 1.5 mole of HCl(g)

57. In a closed vessel, 5 moles of $A_2(g)$ and 7 moles of $B_2(g)$ are reacted in the following manner,
$$A_2(g) + 3B_2(g) \rightarrow 2AB_3(g)$$
What is the total number of moles of gases present in the container at the end of the reaction ?
(A) 22/3 (B) 7/3
(C) 14/3 (D) 8/3

58. Cyclohexanol is dehydrated to cyclohexane on heating with conc. H_2SO_4. If the yield of this reaction is 75%, how much cyclohexene will be obtained from 100g of cyclohexanol ?
(A) 61.5 g (B) 75.0 g
(C) 20.0 g (D) 41.0 g

59. Volume of a gas at NTP is 1.12×10^{-7} cm^3. The number of molecules in it is
(A) 3.01×10^{12} (B) 3.01×10^{24}
(C) 3.01×10^{23} (D) 3.01×10^{20}

60. The number of moles of H_2 in 0.224 L of hydrogen gas at STP (273 K, 1 atm) is
(A) 0.1 (B) 0.01
(C) 0.001 (D) 1

61. *x* moles of potassium dichromate oxidises 1 mole of ferrous oxalate in acidic medium. Here *x* is
(A) 3 (B) 1.5
(C) 0.5 (D) 1.0

62. 100 mL of PH_3 on heating forms P and H_2, the volume change in the reaction is
(A) an increase of 50 mL
(B) an increase of 100 mL
(C) an increase of 150 mL
(D) a decrease of 50 mL

Space for Rough Work

63. How many moles of lead (II) chloride will be formed from a reaction between 6.5 g of PbO and 3.2 g of HCl?
(A) 0.044 (B) 0.333
(C) 0.011 (D) 0.029

64. 40 g of a sample of carbon on combustion left 10% of it unreacted. The volume of oxygen required at STP for this combustion reaction is
(A) 22.4 L (B) 67.2 L
(C) 11.2 L (D) 44.8 L

65. How many grams of NaOH will be required to neutralise 12.2 g benzoic acid ?
(A) 12.2 g (B) 16 g
(C) 40 g (D) 4 g

66. In which of the following reactions, H_2O_2 acts as a reducing agent ?
(A) $HOCl + H_2O_2 \xrightarrow{H^+} H_3O^+ + Cl^- + O_2$
(B) $Mn^{2+} + H_2O_2 \xrightarrow{OH^-} Mn^{4+} + 2OH^-$
(C) $2Fe^{2+} + H_2O_2 \xrightarrow{OH^-} 2Fe^{3+} + 2OH^-$
(D) $PbS(s) + 4H_2O_2(aq) \xrightarrow{H^+} PbSO_4(s) + 4H_2O(l)$

67. Which one of the following cannot act as a reducing agent ?
(A) CO_2 (B) SO_2
(C) NO_2 (D) ClO_2

68. The equivalent weight of $MnSO_4$ is equal to its molecular weight when it is converted to
(A) Mn_2O_3 (B) MnO_2
(C) MnO_4^- (D) MnO_4^{2-}

69. In the reaction,
$2H_2O_2 \longrightarrow 2H_2O + O_2$, oxygen is
(A) oxidised only
(B) reduced only
(C) neither oxidised nor reduced
(D) both oxidised and reduced

70. Which is the best description of behaviour of bromine in the reaction given below ?
$H_2O + Br_2 \longrightarrow HBr + HOBr$
(A) Proton accepted only
(B) Both oxidised and reduced
(C) Oxidised only
(D) Reduced only

71. What is the oxidation number of vanadium in $Rb_4Na[HV_{10}O_{28}]$?
(A) +8 (B) +5
(C) +3 (D) +1

72. The oxidation number of P in $Mg_2P_2O_7$ is
(A) +2 (B) +5
(C) –3 (D) +3

73. The oxidation number and the electronic configuration of sulphur in H_2SO_4 is
(A) $+4, 1s^2, 2s^2, 2p^6, 3s^2$
(B) $+2, 1s^2, 2s^2, 2p^6, 3s^2$
(C) $+3, 1s^2, 2s^2, 2p^6, 3s^2, 3p^1$
(D) $+6, 1s^2, 2s^2, 2p^6, 3s^2, 3p^4$

74. The oxidation number of iron in Fe_3O_4 is
(A) +2 (B) +3
(C) $\frac{8}{3}$ (D) $\frac{2}{3}$

75. Which gives + 7 oxidation state ?
(A) Mn (25) (B) Cr (24)
(C) Cu (29) (D) Fe (26)

76. chlorine is in + 1 oxidation state in
(A) HCl (B) $HClO_4$
(C) ICl (D) Cl_2O

77. State the oxidation number of carbonyl carbon in methanal and methanoic acid respectively.
(A) 0 and 0 (B) 0 and +2
(C) +1 and +2 (D) +1 and + 3

Space for Rough Work

78. Oxidation number of P in PO_4^{3-}, of S in SO_4^{2-} and that of Cr in $Cr_2O_7^{2-}$ respectively, are
(A) +5, +6 and +6 (B) +3,+6 and +5
(C) +5,+3 and +6 (D) –3,+6 and +6

79. The oxidation number of the sulphur atoms in peroxomonosulphuric acid (H_2SO_5) and peroxodisulphuric acid ($H_2S_2O_8$) respectively, are
(A) +8 and +7 (B) +3 and +3
(C) +6 and +6 (D) +4 and +6

80. In which of the following reactions, there is no change in valency ?
(A) $SO_2 + 2H_2S \longrightarrow 2H_2O + 3S$
(B) $2Na + O_2 \longrightarrow 2Na_2O_2$
(C) $Na_2O_2 + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O_2$
(D) $4KClO_3 \longrightarrow 3KClO_4 + KCl$

81. The oxidation state of Fe in the brown ring complex $[Fe(H_2O)_5NO]SO_4$ is
(A) 0 (B) +2
(C) +1 (D) +3

82. In the conversion of Br_2 to BrO_3^-, the oxidation number of Br changes from
(A) zero to +5 (B) +1 to +5
(C) zero to –3 (D) +2 to +5

83. Oxidation state of oxygen in F_2O is
(A) +1 (B) –1
(C) +2 (D) –2

84. When sulphur dioxide is passed in an acidified $K_2Cr_2O_7$ solution, the oxidation state of sulphur is changed from
(A) +4 to 0 (B) +4 to +2
(C) +4 to +6 (D) +6 to +4

85. +3 oxidation state is most common in
(A) Ni (28) (B) Fe (26)
(C) Zn (30) (D) Cu (29)

86. The oxidation number of nitrogen in $NaNO_2$ is
(A) +3 (B) +5
(C) –3 (D) –5

87. Carbon is in the lowest oxidation state in
(A) CO_2 (B) CF_4
(C) CCl_4 (D) CH_4

88. The oxidation number of xenon in $XeOF_2$ is
(A) zero (B) 2
(C) 4 (D) 3

89. In the redox reaction,
$xKMnO_4 + NH_3 \longrightarrow yKNO_3 + MnO_2 + KOH + H_2O$
x and y are
(A) $x = 4, y = 6$ (B) $x = 3, y = 8$
(C) $x = 8, y = 6$ (D) $x = 8, y = 3$

90. In the reaction,
$IO_3^- + SO_2 + 4H_2O \longrightarrow I_2 + SO_4^{2-} + 8H^+$
The coefficients of SO_2 is
(A) three (B) four
(C) five (D) six

[ZOOLOGY]

91. In which one of the following pairs of terms both represent one and the same thing ?
(A) Plasma – Serum
(B) Atrioventricular node – Pacemaker
(C) Leucocytes – Lymphocytes
(D) Mitral valve – Bicuspid valve

92. Consider the following four statements (i) - (iv) and select the correct option.
(i) SA node is natural pacemaker of heart.
(ii) Human heart has inter-auricular foramen.
(iii) Right atrioventricular valve is a semilunar valve.
(iv) Normal systolic and diastolic pressure of humans is 120 and 60 mm Hg respectively.

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

Space for Rough Work

93. The blood cells which help in the transportation of fats are
(A) Erythrocytes (B) Lymphocytes
(C) Monocytes (D) Neutrophils

94. Myogenic heart is not present in which of the following?
(A) Man (B) Limulus
(C) Frog (D) Mussel

95. One of the following is the characteristics feature of leucocytes
(A) Anucleated
(B) Diapedesis
(C) Agranular cytoplasm
(D) Coloured

96. Blood pressure is defined as the force with which blood
(A) Pushes against the wall of the blood vessels
(B) Is pushed to the legs
(C) Comes out of the atrium
(D) Comes out of the ventricle

97. Heart beats are accelerated by
(A) Cranial nerves and acetylcholine
(B) Sympathetic nerves and acetylcholine
(C) Cranial nerves and adrenaline
(D) Sympathetic nerves and epinephrine

98. Blood will lose most of the oxygen through
(A) Arteries (B) Veins
(C) Capillaries (D) Lungs

99. Myocardial infarction is caused by
(A) Hardening of arteries
(B) Lumpy thickness develops in the inner walls of heart
(C) Clot may occur in the lumen of a coronary artery
(D) Sudden interruption of blood flow towards a portion of heart

100. In a cardiac output of 5250 ml per minute, with 75 heart beats per minute, the stroke volume is
(A) 55 ml (B) 60 ml
(C) 70 ml (D) 80 ml

101. Heart sound which is longer is
(A) lubb
(B) dupp
(C) both equal
(D) sometimes (A) and sometimes (B)

102. Tricuspid valves are found in
(A) All mammals (B) All vertebrates
(C) Prototherians (D) Walrus

103. The conduction of impulse from SA node moves to
(A) AV-node (B) Bundle of His
(C) Purkinje fibres (D) Cardiac muscles

104. The heart sound 'dup' is produced when
(A) Tricuspid valve is opened
(B) Mitral valve is opened
(C) Mitral valve is closed
(D) Semilunar valves at the base of aorta get closed

105. 'P' wave of ECG occurs before the
(A) Onset of ventricular ejection
(B) End of arterial contraction
(C) Beginning of atrial contraction
(D) None of the above

106. The difference between pulmonary arteries and veins is that
(A) Former is associated with lungs and latter with heart
(B) Arteries have thicker walls
(C) Veins are more elastic
(D) Veins have valves

107. Which layer of the wall of blood vessel is made up of circular smooth muscles ?
(A) Outer (B) Middle
(C) Inner (D) Both (A) and (B)

Space for Rough Work

108. Plasma protein also does the work of
(A) Nutritive functioning
(B) Physiochemical functioning
(C) Transportive functioning
(D) All of the above

109. One of the following blood vessels is without valves
(A) Artery (B) Pulmonary artery
(C) Vein (D) Aorta

110. Which of the following are the first to have closed circulatory system ?
(A) Molluscs (B) Annelids
(C) Cardiac (D) Enhinoderms

111. Heart beats are affected by
(A) Carbon dioxide (B) Oxygen
(C) Vagus nerve (D) All of these

112. If the systolic pressure is 120 mm Hg and diastolic pressure is 80 mm Hg, the pulse pressure is _____ .
(A) 120 × 80 = 9600 mm Hg
(B) 120 + 80 = 200 mm Hg
(C) 120 – 80 = 40 mm Hg
(D) 120 / 80 = 1.5 mm Hg

113. The coronary sinus in the heart is situated along its
(A) Left margin
(B) Right margin
(C) Diaphragmatic surface
(D) Lower border of the heart

114. Systolic pressure is higher than diastolic pressure because
(A) Arteries are contracting during systole
(B) Blood is pumped with a pressure in the arteries by the heart during systole but not during diastole
(C) Arteries resist during systole only
(D) Volume of blood is higher in systole than that of diastole in the heart.

115. During circulation, blood passes from the inferior vena cava into the diastolic atrium of the heart because of
(A) Pushing of venous valves
(B) A pressure differential between the atrium and the vena cava
(C) The beating of the sinoatrial node
(D) Gravitational pull

116. In the cardiac cycle, diastole is
(A) The number of heart beats per minute
(B) The relaxation period after contraction of the heart
(C) The forceful pumping action of the heart
(D) The contraction period after relaxation of the heart

117. The cardiac cycle time during normal heart beat is 0.8 seconds which includes both systole and diastole. In the event of fast running, the heart starts beating faster leading to decrease in cardiac cycle timings.
This decrease is due to
(A) Proportional decrease in the duration of diastole as well as systole
(B) Less duration of diastole and more duration of systole
(C) Same duration of diastole and less duration of systole
(D) Much more decrease in the duration of diastole than that of systole

118. The heart usually pumps blood with greater force in old people than the young because
(A) The oxygen content per unit volume of the blood decreases
(B) The elasticity of the arteries decreases
(C) The elasticity of the arteries increases
(D) The nutrient content per unit of blood decreases

119. A portal system is that in which
(A) A vein begins from an organ and ends in heart
(B) An artery breaks up in an organ and restarts by the union of its capillaries
(C) The blood from gut is brought into the kidneys before it is poured into the heart
(D) A vein breaks up in an organ into capillaries and restarts by their union as a new vein in the same organ.

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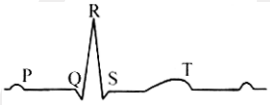
120. A vein has large lumen because
(A) Tunica interna and tunica media appear like a single coat
(B) Tunica media and tunica externa appear like a single coat
(C) Tunica media is a single coat
(D) Tunica interna, media and externa are thin

121. Innominate is
(A) A nerve and artery
(B) Skeleton part and artery
(C) A nerve and a vein
(D) A muscle and artery

122. Examine the diagrammatic representation of strandard ECG. Select an option with correct matching.



	P-Wave	QRS complex	T-wave
(A)	Repolarisation of the atria	Repolarisation of the ventricles	Depolarisation of the atria
(B)	Depolarisation of the atria	Depolarisation of the ventricles	Repolarisation of the ventricles
(C)	Repolarisation of the ventricles	Repolarisation of the atria	Depolarisation of the ventricles
(D)	Depolarisation of the ventricles	Depolarisation of atria	Repolarisation of atria

123. In connection with circulatory system, valves are present
(A) Not only in heart and blood vessels of vertebrates and invertebrates, but in vertebrate lymphatics as well
(B) Vertebrate heart only
(C) Vertebrate heart and invertebrate hearts only
(D) Vertebrate hearts, invertebrate hearts and their blood vessels

124. In an old man's ECG, T-waves shall be
(A) Flat (B) Inverted
(C) Very prominent (D) Same as in adults

125. Heart rate is increased by all of the following except
(A) Anoxia
(B) Moderate CO_2 excess
(C) Elevated body temperature
(D) Increased intracranial pressure

126. Vasa vasorum supplies blood to
(A) Pericardium
(B) Blood vessels
(C) Tunica adventitia and external part of tunica media
(D) Vas deferens

127. Blood pressure is measured by
(A) sphygmomanometer
(B) stethoscope
(C) electrocardiogram
(D) phenocardiogram

128. All of the following are vasoconstrictor agents except
(A) Norepinephrine (B) Angiotensin
(C) Vasopressin (D) Prostaglandins

129. Wenckebach phenomenon is seen in
(A) Complete heart block
(B) Partial heart block
(C) Ventricular fibrillation
(D) Myocardial infarction

130. Nature of blood plasma is
(A) Acidic (B) Alkaline
(C) Neutral (D) None of the above

131. Mark the odd one out.
(A) Lymphocytes (B) Monocytes
(C) Leucocytes (D) Neutrophils

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132. A mature human erythrocyte has the typical characteristics of
(A) A eukaryote cell
(B) A prokaryote cell
(C) Both a eukaryote cell and a prokaryote cell
(D) Neither a eukaryote nor a prokaryote cell

133. Buffer salts present in blood are
(A) Potassium
(B) Sodium
(C) Sodium and potassium both
(D) Cobalt, sodium and potassium

134. The mechanism of blood clotting was first described by
(A) Morawitz (B) Landsteiner
(C) Willaim-Harvey (D) James Watson

135. If haemoglobin instead of staying within the corpuscles remains free in the plasma, then
(A) The viscosity of blood will rise
(B) It will cause acidosis
(C) Oxygen-carrying capacity of blood will be reduced
(D) All of the above.

[BOTANY]

136. CAM helps the plants in
(A) secondary growth
(B) disease resistance
(C) reproduction
(D) conserving water

137. Of the total incident solar radiation the proportion of PAR is
(A) about 60% (B) less than 50%
(C) more than 80% (D) about 70%

138. Cyclic photophosphorylation links to
(A) PS-II (B) PS-I
(C) dark reaction (D) both (A) and (B)

139. In C_3 cycle for the fixation of every CO_2 molecules, the reduction and regeneration steps required
(A) 3 ATP and 2 $NADPH_2$
(B) 2 ATP and 2 $NADPH_2$
(C) 2 ATP and 3 $NADPH_2$
(D) 3 ATP and 1 $NADPH_2$

140. Which of the following is true for photosynthesis ?
(A) Reduction of CO_2 and water
(B) Oxidation of CO_2 and water
(C) Reduction of CO_2 and oxidation of water
(D) Oxidation of CO_2 and reduction of water

141. Which of the following is wrongly matched ?
(A) Sorghum – Kranz anatomy
(B) PEP carboxylase – Mesophyll cells
(C) Blackman – Law of limiting factors
(D) Photosystem-II – P_{700}

142. Cyclic-photophosphorylation results in the formation of
(A) NADPH
(B) ATP AND NADPH
(C) ATP, NADPH and oxygen
(D) ATP

143. In an experiment demonstrating the evolution of oxygen in Hydrilla, sodium bicarbonate is added to water in the experimental set-up. What would happen if all other conditions are favourable ?
(A) Amount of oxygen evolved decreases as carbon dioxide in water is absorbed by sodium bicarbonate.
(B) Amount of oxygen evolved increases as the availability of carbon dioxide increases.
(C) Amount of oxygen evolved decreases as the availability of carbon dioxide increases.
(D) Amount of oxygen evolved increases as carbon dioxide in water is absorbed by sodium bicarbonate.

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144. In C_3-plants, the first stable compound formed after carbon dioxide fixation is
(A) phosphoglyceraldehyde
(B) malic acid
(C) oxaloacetic acid
(D) 3-phosphoglycerate

145. The mineral involved in the photolysis of water are
I. Manganese II. Calcium
III. Magnesium IV. Chloride
(A) I and II only (B) I, II and IV only
(C) I, II and III only (D) I and IV only

146. Photolysis of water during photosynthesis occurs with the help of
(A) PS-II (B) PS-I
(C) ferredoxin (D) cytochrome

147. Chlorophyll-a and b differ in having
(A) chlorophyll-a has a methyl group and chlorophyll-b has aldehyde group in position X
(B) chlorophyll-a has an aldehyde group and chlorophyll-b has a methyl group in position X
(C) chlorophyll-a has a carboxyl group and chlorophyll-b has an aldehyde group in position X
(D) chlorophyll-a has an ethyl group and chlorophyll-b has an aldehyde group in position X

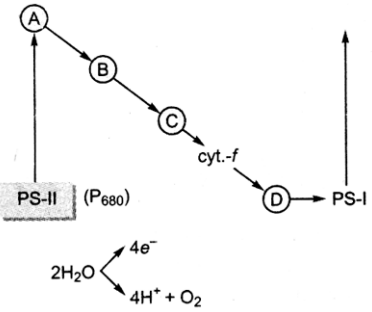
148. Match the phenomenon listed under column-II. Select the correct answer from the given options.

	Column-I		Column-II
(A)	Warburg effect	(1)	Change in gene frequency by chance
(B)	Pasteur effect	(2)	Postponing severance in the leaves by applying cytokinin
(C)	Emerson effect	(3)	Decline in the consumption of respiratory substrate due to a change from anaerobic to aerobic respiration.
(D)	Wright effect	(4)	Inhibitory effect of oxygen on photosynthesis
		(5)	Enhancement of photosynthesis by subjecting chlorophyll to the effect of two different wavelengths of light.

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

149. The net requirement of assimilatory power for the formation of 6 hexose molecules in maize plant is
(A) 72 ATP, 48 NADPH
(B) 90 ATP, 60 NADPH
(C) 108 ATP, 72 NADPH
(D) 180 ATP, 72 NADPH

150. Ammonia releases from
(A) photorespiration (B) dark respiration
(C) CAM (D) all of these

151. 

In the above schematic diagram, which is plastocyanin ?
(A) C (B) D
(C) A (D) B

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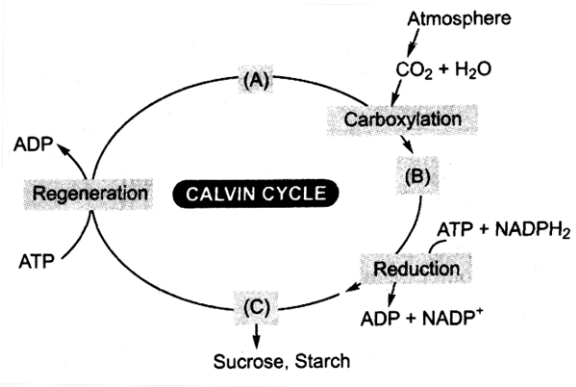
152. Choose the correct combination of labelling the carbohydrate molecule involved in the Calvin cycle.



(A) A-RuBP, B–Triose phosphate, C–PGA
(B) A–PGA, B–RuBP, C–Triose phosphate
(C) A–PGA, B–Triose phosphate, C–RuBP
(D) A–RuBP, B–PGA, C–Triose phosphate

153. Photolysis of each water molecule in light reaction will yield
(A) 2 electrons and 4 protons
(B) 4 electrons and 4 protons
(C) 4 electrons and 3 protons
(D) 2 electrons and 2 protons

154. Identify the correct combinations of the following :

	Substrate	Enzyme	Product
I.	Phosphoenol pyruvate	PEP carboxylase	C_4 acid
II.	Malate	Malic enzyme	C_4 acid
III.	RuBP	Ribulose-5-phosphate kinase	C_3 acid
IV.	Pyruvate	Pyruvate dikinase	C_3 acid

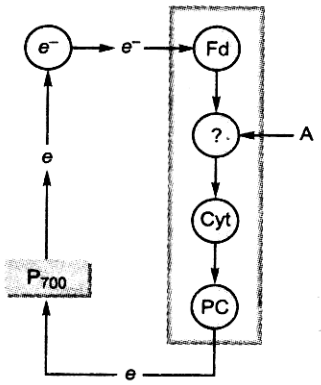
(A) III and IV (B) I and II
(C) II and III (D) I and IV

155. Cyclic photophosphorylation produces
(A) NADPH (B) ATP
(C) $ATP + NADPH_2$ (D) $ATP + NADPH_2 + O_2$

156. Adenosine diphosphate contains
(A) one high energy bonds
(B) two high energy bonds
(C) three high energy bonds
(D) four high energy bonds

157. Compensation point refers to
(A) little photosynthesis
(B) beginning of photosynthesis
(C) rate of photosynthesis equals to the rate of respiration
(D) None of these

158. In the given chart of photophosphorylation. What does 'A' represent ?



(A) PC (B) FRS
(C) PQ (D) Cyt - a_3

159. The special structure present in C_4 - plants is
(A) thin cuticle (B) multi-layered epidermis
(C) Kranz type body (D) one-layered epidermis

160. Core of chlorophyll is formed by
(A) iron (B) manganese
(C) methyl group (D) magnesium

Space for Rough Work

161. Photochemical reactions in the chloroplasts are directly involved in
(A) fixation of carbon dioxide
(B) synthesis of glucose and starch
(C) formation of phosphoglyceric acid
(D) photolysis of water and phosphorylation of ADP to ATP

162. Solarisation is
(A) formation of chlorophyll
(B) destruction of chlorophyll
(C) utilisation of sunlight
(D) effects of solar light

163. Match the following with correct combination.

	Column-I		Column-II
A.	Carboxylation	(1)	Oxygen evolution
B.	Phosphorylation	(2)	Photorespiration
C.	Photolysis of water	(3)	RUBISCO
D.	Phosphoglycolate	(4)	Chemosynthesis
E.	Nitrosomonas	(5)	ATP

	A	**B**	**C**	**D**	**E**
(A)	1	2	3	4	5
(B)	3	5	1	2	4
(C)	2	3	5	4	1
(D)	1	3	4	2	5

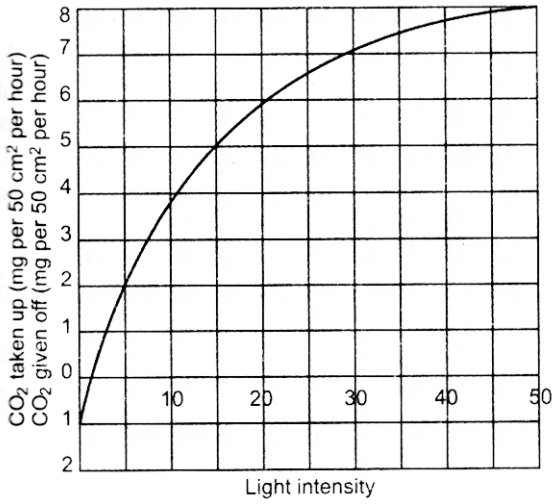
164. Radioactive C^{14} is given to carbon dioxide and released to atmosphere. This carbon dioxide is taken by RuBP in a C_3-plant. First radioactive C^{14} is seen, in which compound.
(A) PGAL (B) PEP
(C) RMP (D) PGA

165. In Hatch and Slack pathway,
(A) chloroplasts are of same type.
(B) Kranz anatomy occurs where mesophyll have small chloroplasts whereas bundle sheath have granal chloroplasts.
(C) Kranz anatomy occurs where mesophyll have small chloroplasts whereas bundle sheath have larger, agranal chloroplasts.
(D) Kranz anatomy where mesophyll cells are diffused.

166. Quantasomes occur on the surface of
(A) cristae (B) plasmalemma
(C) nuclear envelope (D) thylakoids

167. To form one molecule of glyceraldehyde phosphate in Calvin cycle
(A) 9 ATP and 36 NADPH are required
(B) 6 ATP and 6 NADPH are required
(C) 3 ATP and 3 NADPH are required
(D) 3 ATP and 6 NADPH are required

168. The graph below shows the relation between light intensity and the giving off and taking up of carbon dioxide by the leaves of a plant. Why is most carbon dioxide given off when the light intensity is zero units?



(A) Because it is just the start of the experiment
(B) Only respiration is taking place at this intensity of light
(C) Only photosynthesis is taking place at this intensity of light
(D) The rate of photosynthesis is equivalent to the rate of respiration

Space for Rough Work

169. Photorespiration could easily be detected in
(A) C_3 - plants (B) C_4 - plants
(C) Both (A) and (B) (D) None of these

170. Which one of the following is wrong in relation to photorespiration ?
(A) It is a characteristic of C_4 - plants
(B) It is a characteristic of C_3 - plants
(C) It occurs in chloroplasts
(D) It occurs in day-time only

171. Grana is ill developed or absent in the chloroplast in the
(A) stem of Hydrilla
(B) leaf of sunflower
(C) bundle sheath of sugarcane leaf
(D) mesophyll of grasses

172. Malic acid (4-C) is produced in which plant without Kranz anatomy ?
(A) Bryophyllum (B) Kalanchoe
(C) Opuntia (D) All of these

173. The two pigment system theory of photosynthesis was proposed by
(A) Blackman (B) Hill
(C) Emerson (D) Amon

174. Who proved that oxygen evolved in photosynthesis comes from water ?
(A) Calvin
(B) Mayer
(C) Blackman
(D) Ruben, Hassid and Kamen.

Direction for (Q. No. 175 to Q. Nos. 180)
(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 correct explanation of Assertion.
(C) If Assertion is true but Reason is false.
(D) If both Assertion and Reason are false.

175. **Assertion :** Cyclic pathway of photosynthesis first appeared in some eubacterial species.

Reason : Oxygen started accumulating in the atmosphere after the non-cyclic pathway of photosynthesis evolved.

176. **Assertion :** Photosynthetically, C_4-plants are less efficient than C_3-plants

Reason : The operation of C_4-pathway requires the involvement of only bundle-sheath cells.

177. **Assertion :** Under conditions of high light intensity and limited carbon dioxide supply, photorespiration has a useful role in protecting the plants from photoxidative damage.

Reason : If enough carbon dioxide is not available to utilize light energy for carboxylation to processed, the excess energy may not cause damage to plants.

178. **Assertion :** C_4 - photosynthetic pathway is more efficient than the C_3 - pathway.

Reason : Photorespiration is suppressed in C_4 - plants.

179. **Assertion :** The atmospheric concentration of carbon dioxide at which photosynthesis just compensated for respiration is referred to as carbon dioxide compensation point.

Reason : The carbon dioxide compensation point is reached when the amount of carbon dioxide uptake is less than that generated through respiration because the level of carbon dioxide in the atmosphere is more than that required for achieving carbon dioxide compensation point.

180. **Assertion :** Photorespiration decreases net photosynthesis.

Reason : Rate of respiration in dark and light is almost same in all plants.

❑❑❑

Space for Rough Work