



Aakash

Medical | IIT-JEE | Foundations

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MM : 720

Final Test Series(P1)_NEET2026_Test-02B

Time : 180 Min.

Topics Covered:

Physics: Laws of Motion, Work, Energy and Power, System of Particles and Rotational Motion

Chemistry: Haloalkanes and Haloarenes, Alcohols, Phenols and Ethers, Aldehydes, Ketones and Carboxylic Acids

Botany: Microbes in Human Welfare, Organisms and Populations

Zoology: Structural Organization in Animals, Biomolecules

General Instructions :

Duration of Test is 3 hrs.

The Test consists of 180 questions. The maximum marks are 720.

There are four parts in the question paper consisting of Physics, Chemistry, Botany and Zoology having 45 questions in each part of equal weightage.

Each question carries +4 marks. For every wrong response, -1 mark shall be deducted from the total score. Unanswered/unattempted questions will be given no marks.

Use blue/black ballpoint pen only to darken the appropriate circle.

Mark should be dark and completely fill the circle.

Dark only one circle for each entry.

Dark the circle in the space provided only.

Rough work must not be done on the Answer sheet and do not use white fluid or any other rubbing material on the Answer sheet.

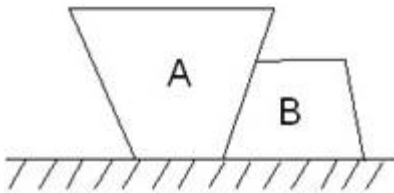
Some parts of this question paper have been masked to maintain its integrity. The missing information will be announced during/before the test.

PHYSICS

1. A rocket of mass 6000 kg is fired from earth, so that exhaust speed of gas is 1 km/s. The rate of ejection of gas, so the rocket lift with initial acceleration of 20 m/s^2 is

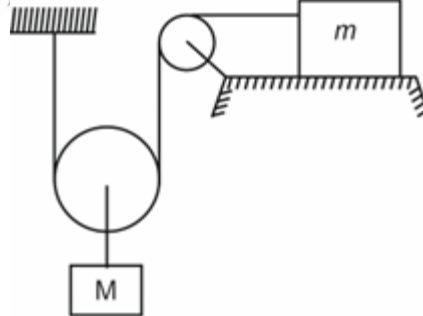
- (1) 60 kg/s (2) 180 kg/s
(3) 200 kg/s (4) 120 kg/s

2. Two blocks A and B are kept in contact on a smooth horizontal surface as shown. The contact force of A on B is in direction



- (1) \rightarrow (2) \leftarrow
(3) \searrow (4) Contact force is zero

3. The acceleration of block of mass m ($m = M/4$) kept on a smooth horizontal table, when the system is released from rest as shown in figure is (string and pulley are ideal)



- (1) g (2) $\frac{g}{2}$
(3) $2g$ (4) Zero
4. A force vector applied on a body is represented as $\vec{F} = (6\hat{i} - 8\hat{j} + 10\hat{k}) \text{ N}$ and it accelerates with 1 m/s^2 . What will be the mass of the body?
- (1) $10\sqrt{2} \text{ kg}$ (2) $2\sqrt{10} \text{ kg}$
(3) 10 kg (4) 20 kg

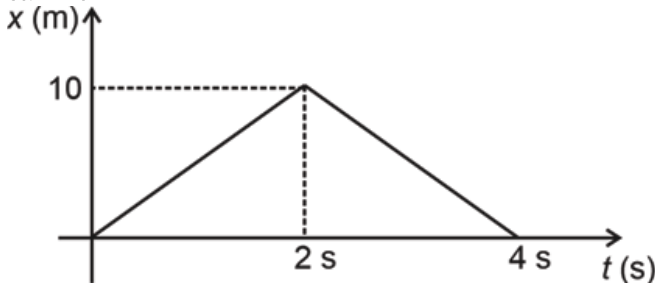
5. An object of mass m_1 moves with an acceleration \vec{a}_1 in an inertial reference frame. When it is observed by an observer of mass m_2 , moving with acceleration \vec{a}_2 , the pseudo force on the object is

- (1) $m_1 \vec{a}_1$ (2) $-m_2 \vec{a}_2$
 (3) $m_2 \vec{a}_1$ (4) $-m_1 \vec{a}_2$

6. A vehicle of mass 200 kg is moving along a levelled curved road of radius 70 m with angular velocity of 0.2 rad/s. The centripetal force acting on the vehicle is:

- (1) 560 N (2) 2800 N
 (3) 2240 N (4) 14 N

7. The position-time graph for a particle of mass 2 kg moving along x-axis is shown below. Based on this information we can find



- (1) Change in linear momentum of the body from 0 to 4 s
 (2) Impulse of force acting on the body from 0 to 4 s
 (3) The acceleration of the body at $t = 3$ s
 (4) All of these

8. A particle moving along x-axis is having potential energy $U(x) = (\frac{x^2}{2} - x)$ J. Its mass is 5 kg and total mechanical energy is given by 8 J. Maximum kinetic energy is

- (1) 9 J (2) 1 J
 (3) $\frac{1}{2}$ J (4) $\frac{17}{2}$ J

9. A bob of mass m is suspended by a light string of length L . It is imparted a horizontal velocity v at the lowest point such that it just completes a circular trajectory in the vertical plane. The ratio of kinetic energy at lowest and topmost point is

- (1) 6 (2) 3
 (3) 5 (4) 2

10. A shell of mass 20 kg at rest explodes into two fragments whose masses are in the ratio of 1 : 4. The smaller fragment moves with a velocity of 8 m/s. The kinetic energy of larger fragment is

- (1) 96 J (2) 64 J
 (3) 32 J (4) 48 J

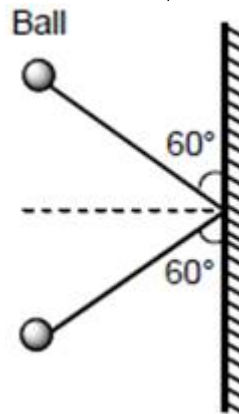
11. What is the nature of the graph between momentum of a body and its kinetic energy?

- (1) Straight line (2) Parabola
 (3) Circle (4) Ellipse

12. Two perfectly elastic objects A and B of identical mass are moving with velocity 15 m s^{-1} and 10 m s^{-1} respectively collide along the line joining their centres. The magnitude of their velocities after collision are respectively

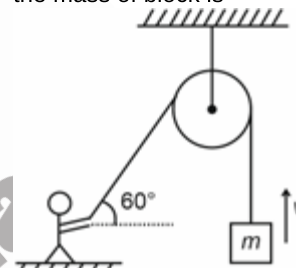
- (1) 10 m s^{-1} , 15 m s^{-1} (2) 20 m s^{-1} , 5 m s^{-1}
 (3) 0 m s^{-1} , 25 m s^{-1} (4) 5 m s^{-1} , 20 m s^{-1}

13. A ball of mass 3 kg, moving with a speed of 100 ms^{-1} , strikes a wall at an angle 60° (as shown in figure). The ball rebounds at the same speed and remains in contact with the wall for 0.2 sec; the force exerted by the ball on the wall is :



- (1) $1500\sqrt{3}$ N (2) 1500 N
 (3) $300\sqrt{3}$ N (4) 300 N

14. A man is supplying a power of 500 W at an instant on a massless string as shown in figure. If at that instant speed of block is 10 m/s and increasing at the rate of 10 m/s^2 . Then the mass of block is

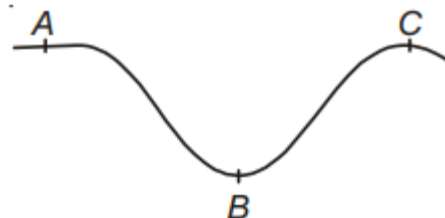


- (1) 2.5 kg (2) 4 kg
 (3) 6 kg (4) 1 kg

15. Which of the following statement is false regarding conservative force?

- (1) The work done by conservative force in taking a particle from A to B is negative of work done in taking it from B to A
 (2) The conservative force depends on physical quantity such as velocity.
 (3) Work done is zero in all possible closed loops
 (4) Friction in case of block sliding on fixed inclined plane is not a conservative force.

16. A car moves with constant speed upon the path as shown in figure. Normal reactions at A, B and C are N_A , N_B and N_C respectively, then

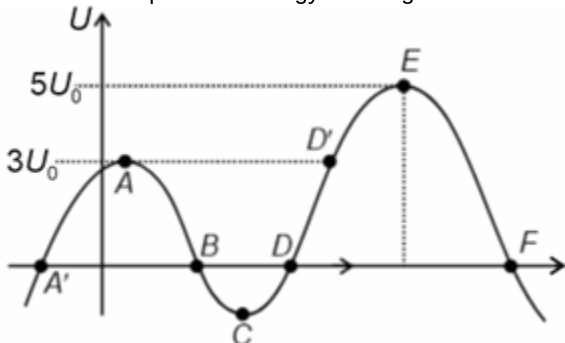


- (1) $N_A > N_B$ (2) $N_A > N_C$
 (3) $N_B = N_C$ (4) $N_B > N_C > N_A$

17. A block of mass 5 kg is pushed up on a smooth inclined plane of angle of inclination 30° with the help of a force of magnitude 50 N along the plane. The acceleration of the block will be

- (1) 2 m/s^2 (2) $50\sqrt{3} \text{ m/s}^2$
 (3) 5 m/s^2 (4) Zero

18. A particle is moving under single conservative force along x-axis for which potential energy field is given below



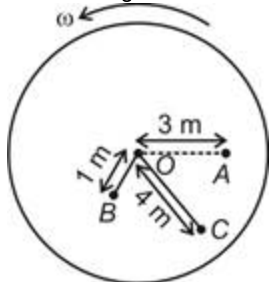
Consider following statements based on above information.

- (i) C is stable equilibrium point
 (ii) E and A are unstable equilibrium points
 (iii) If a particle has zero mechanical energy at point C, it can never be observed at point A in future.
 (iv) Work done by conservative force from A to E is $-2U_0$

Then correct statements are

- (1) (i) and (ii) only (2) (i), (ii) and (iii) only
 (3) (iii) and (iv) only (4) (i), (ii), (iii) and (iv)

19. A disc rotates about an axis through its centre O and perpendicular to plane with angular speed ω . The ratio of angular speeds of particles at A, B and C, respectively as shown in figure below is



- (1) 1 : 4 : 3 (2) 3 : 1 : 4
 (3) 1 : 1 : 1 (4) 1 : 3 : 4

20. A particle starts moving in a circle of radius 2 m with an angular acceleration of $\pi \text{ rad/s}^2$. After 10 revolutions the speed is nearly

- (1) $25\pi \text{ m/s}$ (2) 16 m/s
 (3) 31.4 m/s (4) 40 m/s

21. The angular momentum of a particle changes from $8 \text{ kg m}^2\text{s}^{-1}$ to $12 \text{ kg m}^2\text{s}^{-1}$ in 2 seconds. The torque acting on the particle is

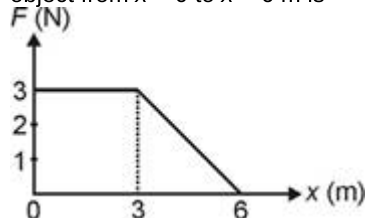
- (1) 6 N m (2) 4 N m
 (3) 8 N m (4) 2 N m

22. The vector products $(\vec{a} \times \vec{b})$ of two vectors,

$\vec{a} = (3\hat{i} - 4\hat{j} + 2\hat{k})$ and $\vec{b} = (-\hat{i} + 2\hat{j} - \hat{k})$, is

- (1) $\hat{i} - \hat{j} + 2\hat{k}$ (2) $-\hat{j} + 2\hat{k}$
 (3) $2\hat{i} + \hat{j} - 2\hat{k}$ (4) $\hat{j} + 2\hat{k}$

23. A force F acting on an object varies with distance x as shown here. The work done by the force in moving the object from $x = 0$ to $x = 6 \text{ m}$ is



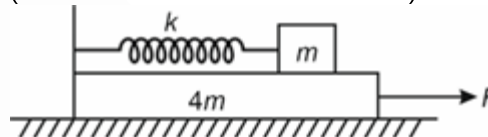
- (1) 4.5 J (2) 13.5 J
 (3) 9.0 J (4) 18.0 J

24. Velocity of centre of mass of system of two point masses shown in figure is



- (1) $4v$ (2) $\frac{v}{2}$
 (3) $2v$ (4) v

25. A block of mass m is placed on a horizontal platform of mass $4m$. The block is connected with a spring of spring constant k , which is fixed at its one end on a horizontal platform of mass $4m$ as shown in figure. If a horizontal force F is applied on platform, then maximum compression in the spring will be (Consider all the surfaces are smooth)



- (1) $\frac{F}{5k}$ (2) $\frac{F}{3k}$
 (3) $\frac{2F}{3k}$ (4) $\frac{2F}{5k}$

26. If the angle between the vectors \vec{A} and \vec{B} is θ , the value of the product $(\vec{B} \times \vec{A}) \cdot \vec{A}$ is equal to

- (1) $BA^2 \cos \theta$ (2) $BA^2 \sin \theta$
 (3) $BA^2 \sin \theta \cos \theta$ (4) Zero

27. **Statement (A):** The tension in the cable supporting an elevator is equal to weight of the elevator when elevator is going up with uniform velocity.

Statement (B): Friction force always oppose the motion.

- (1) Both statements A and B are correct
 (2) Both statements A and B are incorrect
 (3) Only statement A is correct
 (4) Only statement B is correct

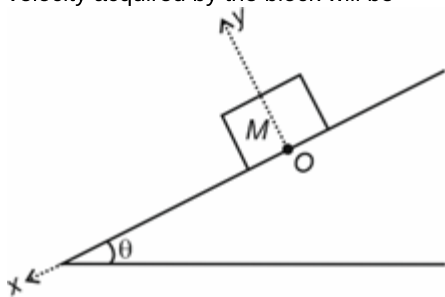
28. When a body is moving vertically up with constant velocity, then match the following.

Column-I

Column-II

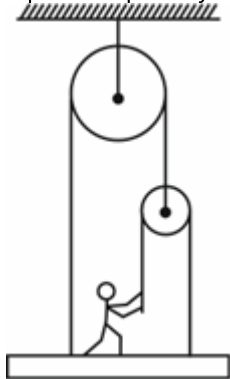
- (A) Work done by lifting force is (P) Negative
 (B) Total work done by all the forces is (Q) Positive
 (C) Work done by gravity (R) Zero
 (1) A(Q), B(R), C(P) (2) A(Q), B(P), C(R)
 (3) A(R), B(Q), C(P) (4) A(P), B(R), C(Q)

29. A block of mass M released from the top of an inclined as shown in figure. If coefficient of friction between the block and inclined plane varies with x as $\mu = Kx$ where $K = \tan \theta$ and x is displacement of block. The maximum velocity acquired by the block will be



- (1) $\sqrt{g \sin \theta}$ (2) $\sqrt{g \operatorname{cosec} \theta}$
 (3) $\sqrt{g \tan \theta}$ (4) $\sqrt{g \cos \theta}$

30. A man of mass 60 kg stands on the plank of mass 30 kg as shown in figure. The force with which the man must pull the rope to keep the system in equilibrium is



- (1) 450 N (2) 300 N
 (3) 225 N (4) 600 N

31. Given below are two statements: one is labelled as **Assertion (A)** and other is labelled as **Reason (R)**.

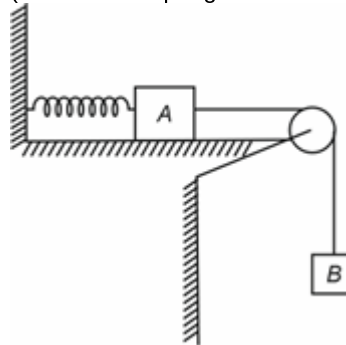
Assertion (A) : Linear momentum of a body changes when it is moving uniformly in a circle.

Reason (R) : In uniform circular motion velocity remain constant.

In the light of above statements, choose the correct answer from the options given below.

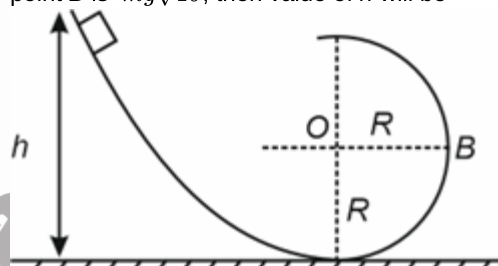
- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (3) (A) is true but (R) is false
 (4) Both (A) and (R) are false

32. Two blocks A and B having masses m and $2m$ respectively are connected with spring and ideal string as shown in figure. All the surfaces are smooth and system is released from rest with spring unstretched. The speed of block B when spring attains half of the maximum expansion is (Assume the spring constant of spring be K)



- (1) $g\sqrt{\frac{2m}{3K}}$ (2) $g\sqrt{\frac{2m}{K}}$
 (3) $3g\sqrt{\frac{m}{2K}}$ (4) $2g\sqrt{\frac{m}{3K}}$

33. A block of mass m starts sliding down on a smooth track from height h as shown in figure. If net force on the block at point B is $mg\sqrt{10}$, then value of h will be



- (1) 1.5R (2) 3.5R
 (3) 2R (4) 2.5R

34. Given below are two statements; one is labelled as **Assertion (A)** and other is labelled as **Reason (R)**.

Assertion (A): Instantaneous power is a scalar quantity.

Reason (R): Instantaneous power is cross product of force and velocity.

In the light of above statements, choose the correct answer from the options given below.

- (1) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (2) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (3) (A) is true but (R) is false
 (4) Both (A) and (R) are false

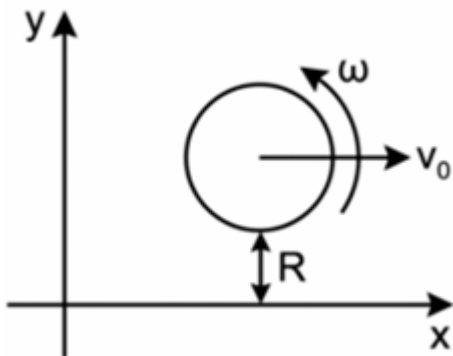
35. Variation of potential energy (U) of an object is given by $U = (2x^3 - 4x^2 + x)$ J where x is in meter. The work done by the conservative force when object moves from $x = 0$ to $x = 2$ m will be

- (1) -2 J (2) -4 J
 (3) +16 J (4) +24 J

36. A particle of mass 2 kg moves from rest under the action of force $F = 20$ N which acts for 2 s. The maximum power attained is

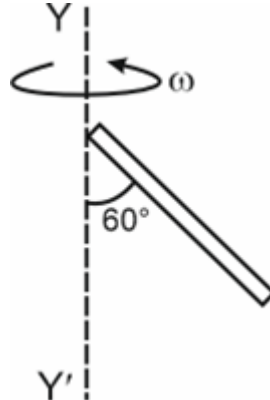
- (1) 200 W (2) 600 W
 (3) 400 W (4) 100 W

37. Consider the following statements for an elastic collision of two billiard balls during the short time of collision.
- (a) Momentum of the two ball system is conserved
 (b) Total mechanical energy of system is conserved
 (c) Kinetic energy of system will not be conserved
- (1) Only (a) and (b) are correct
 (2) Only (b) and (c) are correct
 (3) Only (a) and (c) are correct
 (4) All (a), (b) and (c) are correct
38. A ball is dropped from a height h . As it bounces off the floor, it loses its 25% of potential energy then co-efficient of restitution between the ball and surface will be
- (1) $\frac{1}{2}$ (2) $\frac{1}{\sqrt{3}}$
 (3) $\frac{\sqrt{3}}{2}$ (4) $\frac{\sqrt{3}}{4}$
39. Moment of inertia of thin hollow sphere (m , R), about its diameter, is
- (1) $\frac{2}{5}mR^2$ (2) $\frac{2}{3}mR^2$
 (3) $\frac{1}{5}mR^2$ (4) $\frac{mR^2}{2}$
40. A point object of mass m is kept at $(2d, 0)$ in xy -plane. Where should another point object of mass m should be kept so that centre of mass of the two particle system lies at origin?
- (1) $(0, 2d)$ (2) $(0, -2d)$
 (3) $(-d, 0)$ (4) $(-2d, 0)$
41. A spherical shell of mass M and radius R having velocity of centre of mass as v_0 and angular velocity ω is shown in figure. If $\omega = \frac{v_0}{2R}$, then angular momentum of spherical shell about the origin will be



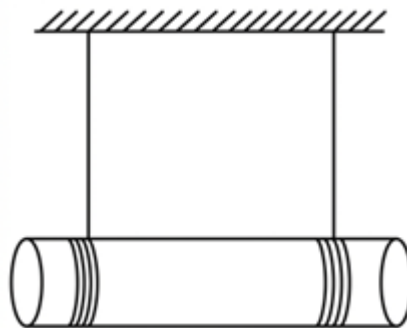
- (1) $-\frac{2}{3}mv_0R\hat{k}$ (2) $-\frac{5}{3}mv_0R\hat{k}$
 (3) $\frac{3}{4}mv_0R\hat{k}$ (4) $\frac{1}{2}mv_0R\hat{k}$

42. A uniform rod of mass M and length l is rotating about the YY' axis as shown in figure. The radius of gyration of the rod about the axis YY' is



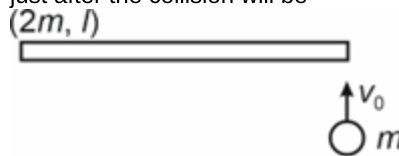
- (1) $\frac{l}{2}$ (2) $\frac{3l}{4}$
 (3) $\frac{l}{4}$ (4) $\frac{l}{3}$

43. A solid cylinder of mass $2m$ and radius R suspended by two strings wrapped around the cylinder one near each ends, the string being attached to hooks on the ceiling, and the length of cylinder always remains horizontal, as shown in figure. If the system is released from rest, then tension in the each string will be



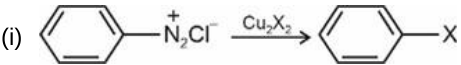
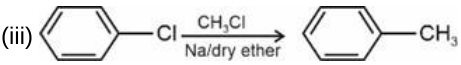
- (1) $\frac{mg}{3}$ (2) $\frac{mg}{4}$
 (3) $\frac{mg}{8}$ (4) $\frac{mg}{10}$

44. A person is sitting near the edge of rotating platform. When he walks towards the centre. Then
- (1) Moment of inertia of the system decrease
 (2) Angular velocity of platform increase
 (3) Angular momentum of the system remains conserved
 (4) All of these
45. A rod of length l and mass $2m$ lies on a frictionless horizontal surface on which it is free to move in any way. A ball of mass m moving with speed v_0 collides with the rod and stick to it. The angular velocity of the system (rod + ball) just after the collision will be



- (1) $\frac{V_0}{2l}$ (2) $\frac{3V_0}{2l}$
 (3) $\frac{V_0}{l}$ (4) $\frac{V_0}{3l}$

46. Compound which has the maximum dipole moment is
 (1) CH_3F (2) CH_3Cl
 (3) CH_3Br (4) CH_3I
47. Match the name of reactions given in the column I with their chemical equations given in column II.

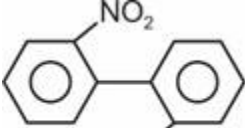
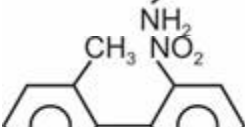
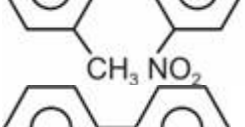
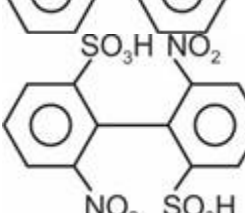
Column I	Column II
(a) Swarts reaction	(i) 
(b) Wurtz-Fittig reaction	(ii) $RBr \xrightarrow{AgF} RF$
(c) Finkelstein reaction	(iii) 
(d) Sandmeyer reaction	(iv) $RCl \xrightarrow[\text{dry acetone}]{NaI} RI$

Identify the **correct** option.

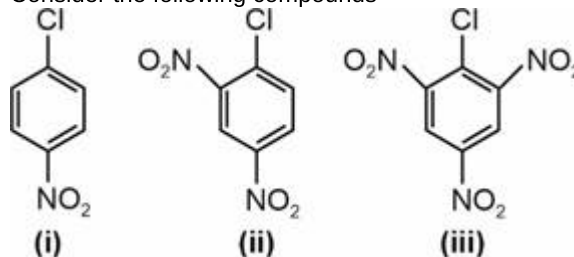
- (1) a(iv), b(iii), c(ii), d(i) (2) a(ii), b(i), c(iv), d(iii)
 (3) a(ii), b(iii), c(iv), d(i) (4) a(iv), b(i), c(ii), d(iii)
48. Correct order of leaving ability of groups is

- (1) $\ominus\text{CH}_3 > \ominus\text{NH}_2 > \ominus\text{OH} > \ominus\text{F}$
 (2) $\ominus\text{F} > \ominus\text{OH} > \ominus\text{NH}_2 > \ominus\text{CH}_3$
 (3) $\ominus\text{NH}_2 > \ominus\text{CH}_3 > \ominus\text{F} > \ominus\text{OH}$
 (4) $\ominus\text{F} > \ominus\text{CH}_3 > \ominus\text{NH}_2 > \ominus\text{OH}$

49. Which of the following biphenyls is optically active?

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

50. Consider the following compounds



The correct order of reactivity for nucleophilic substitution reaction is

- (1) (i) > (ii) > (iii) (2) (iii) > (ii) > (i)
 (3) (ii) > (i) > (iii) (4) (iii) > (i) > (ii)
51. Given below are two statements one is **Assertion (A)** other is **Reason (R)**


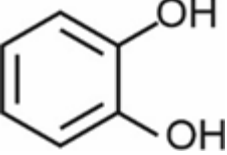
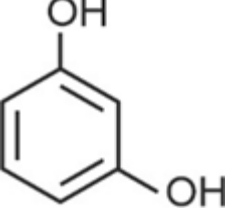
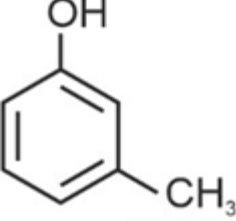
Assertion (A) : 2-chloro-2-methylpropane reacts with sodium ethoxide to form 2-Methylpropene as major product.

Reason (R) : If a tertiary alkyl halide reacts with strong base (sodium ethoxide) then elimination is preferred over substitution.

In the light of above statement, choose the **correct** option.

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (3) (A) is true but (R) is false
 (4) Both (A) and (R) are false

52. Match List I with List II

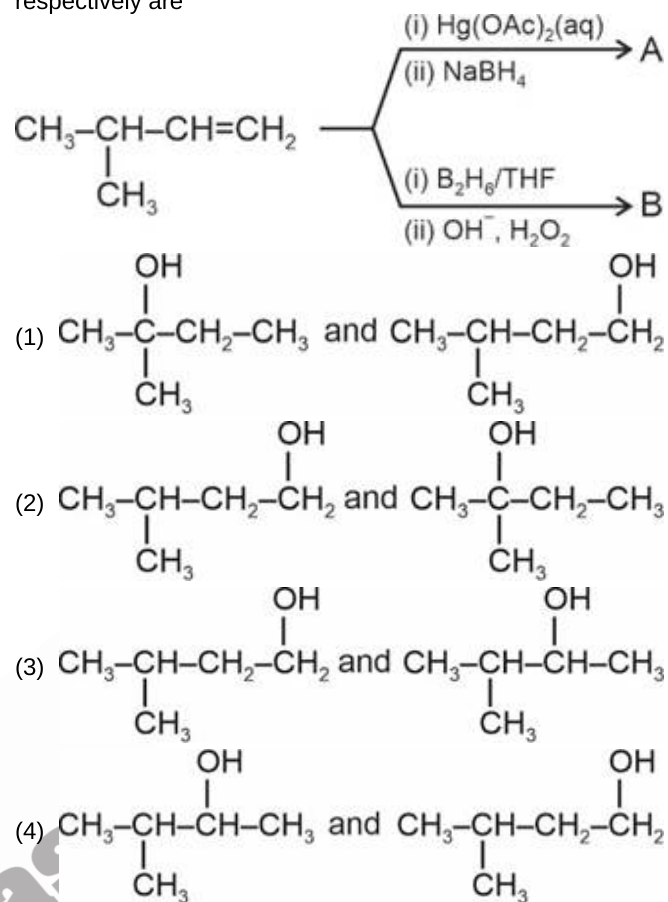
List-I (Name of compound)	List-II (Structure)
a. Resorcinol	(i) 
b. m-Cresol	(ii) 
c. Catechol	(iii) 
d. Quinol	(iv) 

The correct match is

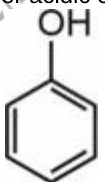
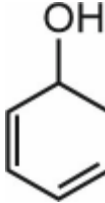
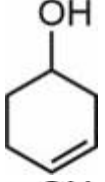
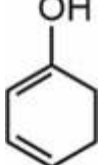
- (1) a(iii), b(iv), c(ii), d(i)
 (3) a(ii), b(iv), c(iii), d(i)

- (2) a(iv), b(iii), c(ii), d(i)
 (4) a(ii), b(iii), c(i), d(iv)

53. The major products A and B in the given reactions respectively are



54. Which among the following will be most readily dehydrated under acidic condition?

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

55. Given below are the two statements.

Statement I: Ethanol on reaction with copper at 573 K gives ethanoic acid as major product.

Statement II: Ethanol in presence of sulphuric acid at 413 K gives ethoxyethane as major product.

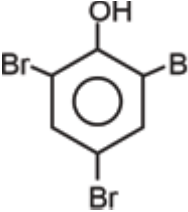
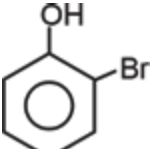
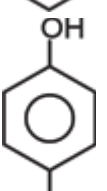
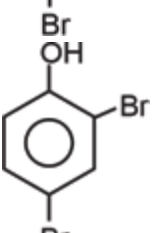
In light of above statements, choose the correct answer.

- (1) Statement I is incorrect but statement II is correct
- (2) Statement I is correct but statement II is incorrect
- (3) Both statement I and statement II are correct
- (4) Both statement I and statement II are incorrect

56. Electrophile involved in Reimer-Tiemann reaction is

- (1) ${}^+CCl_3$
- (2) $:CCl_2$
- (3) $:CHCl$
- (4) ${}^+CHCl_2$

57. When phenol reacts with Br_2 /water, the major product obtained is

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

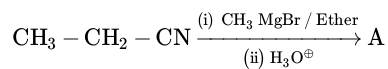
58. The ether which is most difficult to cleave on heating with HBr is

- (1) 
- (2) $Ph-CH_2-O-CH_2-Ph$
- (3) $Ph-O-CH_3$
- (4) $Ph-O-Ph$

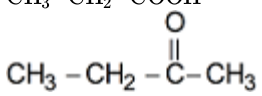
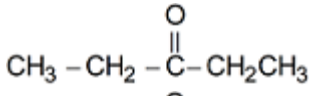
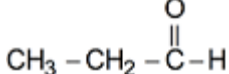
59. Total number of possible isomers (both structural as well as stereoisomers) of cyclic ethers of molecular formula C_4H_8O is :

- (1) 6
- (2) 8
- (3) 10
- (4) 11

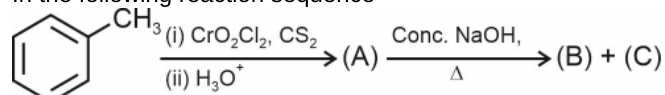
60. Consider the following reaction sequence




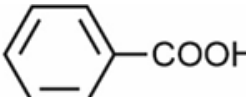

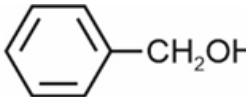

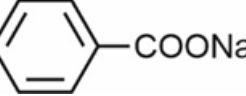

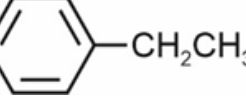
The major product 'A' is

- (1) CH_3-CH_2-COOH
- (2) 
- (3) 
- (4) 

61. In the following reaction sequence



Products (B) and (c) are

- (1)  and 
- (2)  and 
- (3)  and 
- (4)  and 

62. Given below are the two statements

Statement I: Boiling point of propanal is higher than acetone.

Statement II: Methanal, ethanal and propanone are miscible with water in all proportions.

In light of above statements, choose the correct answer from the options given below.

- (1) Statement I is correct but statement II is incorrect
- (2) Statement I is incorrect but statement II is correct
- (3) Both statement I and statement II are correct
- (4) Both statement I and statement II are incorrect

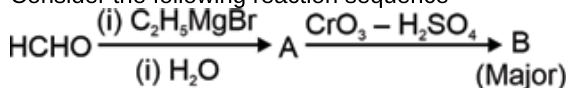
63. Match List-I with List-II.

List-I (Carbonyl derivative)	List-II (Name)
(a) $\text{>C=N-NH-C(=O)-NH}_2$	(i) Hydrazone
(b) >C=NH	(ii) Semicarbazone
(c) >C=N-OH	(iii) Imine
(d) >C=N-NH_2	(iv) Oxime

The correct match is

- (1) (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)
 (2) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
 (3) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
 (4) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

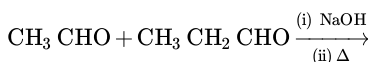
64. Consider the following reaction sequence



Major product B is

- (1) $\text{CH}_3\text{CH}_2\text{CHO}$
 (2) $\text{CH}_3\text{CH}_2\text{COOH}$
 (3) $\text{CH}_3\text{CH}=\text{CH}_2$
 (4) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$

65. Identify the possible products for the following reaction:



- (A) But-2-enal
 (B) 2-Methylpent-2-enal
 (C) Pent-3-enal
 (D) 2-Methylbut-2-enal

Choose the correct option.

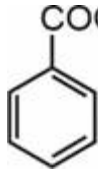
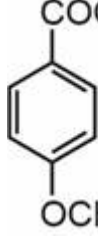

- (1) (A), (B) and (C) only (2) (B) and (C) only
 (3) (A) and (B) only (4) (A), (B) and (D) only

66. Consider the following statements.

Statement I : Carboxylic acids are reduced to primary alcohols by lithium aluminium hydride or with diborane.**Statement II**: Sodium borohydride does not reduce the carboxylic acid.In the light of above statements, choose the **correct** option.

- (1) Statement I is incorrect but Statement II is correct
 (2) Both statement I and statement II are correct
 (3) Both statement I and statement II are incorrect
 (4) Statement I is correct but statement II is incorrect

67. Match List I with List II

List I (Acid)	List II (pK _a value)
a. 	(i) 3.75
b. 	(ii) 4.19
c. 	(iii) 3.41
d. HCOOH	(iv) 4.46

Choose the correct answer from the options given below.

- (1) a(ii), b(ii), c(i), d(iv) (2) a(ii), b(iv), c(i), d(iii)
 (3) a(ii), b(i), c(iv), d(iii) (4) a(ii), b(iv), c(iii), d(i)

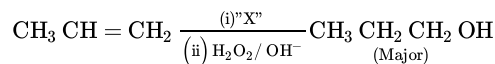
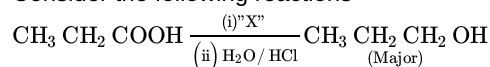
68. Correct order of boiling point of the given compounds is

- (i) $\text{C}_2\text{H}_5\text{N}(\text{CH}_3)_2$
 (ii) $(\text{C}_2\text{H}_5)_2\text{NH}$
 (iii) $n\text{-C}_4\text{H}_9\text{NH}_2$
 (1) (i) > (iii) > (ii) (2) (iii) > (ii) > (i)
 (3) (iii) > (i) > (ii) (4) (ii) > (i) > (iii)

69. The correct order of bond enthalpy of 'C-X' bond is

- (1) $\text{CH}_3-\text{Cl} > \text{CH}_3-\text{F} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{I}$
 (2) $\text{CH}_3-\text{F} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{Cl} > \text{CH}_3-\text{I}$
 (3) $\text{CH}_3-\text{Cl} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{F} > \text{CH}_3-\text{I}$
 (4) $\text{CH}_3-\text{F} > \text{CH}_3-\text{Cl} > \text{CH}_3-\text{Br} > \text{CH}_3-\text{I}$

70. Consider the following reactions



Identify 'X' in above reactions

- (1) LiAlH_4 (2) B_2H_6
 (3) NaBH_4 (4) $\text{H}_2/\text{Pd}-\text{BaSO}_4$

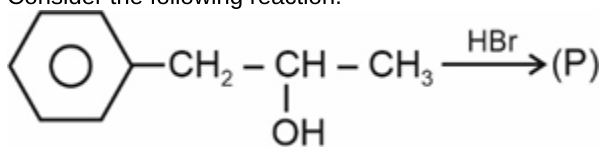
71. Given below are two statements

Statement (I): The product obtained by $\text{S}_{\text{N}}2$ reaction of haloalkane having chirality at the reaction site show inversion in configuration.**Statement (II)**: Enantiomers are superimposable mirror images of each other.

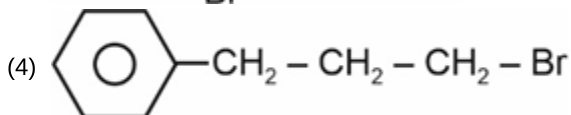
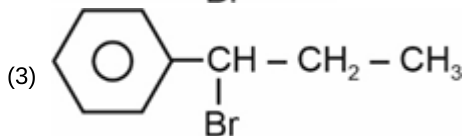
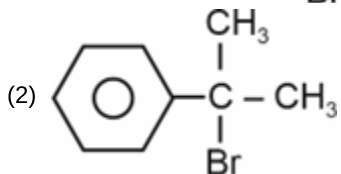
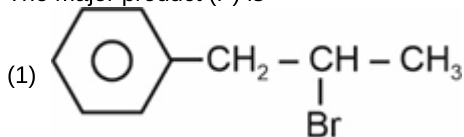
In light of above statements, choose the correct answer.

- (1) Statement (I) is correct but statement (II) is incorrect
 (2) Both statement (I) and statement (II) are incorrect
 (3) Both statement (I) and statement (II) are correct
 (4) Statement (I) is incorrect but statement (II) is correct

72. Consider the following reaction.



The major product (P) is



73. The compound A on treatment with Na gives B, and with SOCl_2 gives C. B and C react together to give diethyl ether.

A, B and C respectively are

- (1) $\text{C}_2\text{H}_5\text{OH}$, $\text{C}_2\text{H}_5\text{Cl}$, $\text{C}_2\text{H}_5\text{ONa}$
 (2) $\text{C}_2\text{H}_5\text{OH}$, C_2H_6 , $\text{C}_2\text{H}_5\text{Cl}$
 (3) $\text{C}_2\text{H}_5\text{Cl}$, C_2H_6 , $\text{C}_2\text{H}_5\text{OH}$
 (4) $\text{C}_2\text{H}_5\text{OH}$, $\text{C}_2\text{H}_5\text{ONa}$, $\text{C}_2\text{H}_5\text{Cl}$

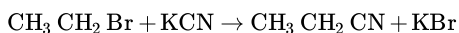
74. isopropyl alcohol and tert butyl alcohol can be chemically distinguished by which reagents?

- (a) NaBH_4
 (b) $\text{I}_2 + \text{NaOH}$
 (c) Na
 (d) Conc. HCl + anhyd. ZnCl_2

Choose the correct option.

- (1) (b) and (d) only (2) (a), (b) and (d) only
 (3) (c) and (d) only (4) (b), (c) and (d) only

75. Consider the reaction

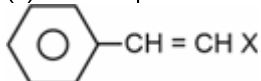


This reaction will be the fastest in

- (1) Methanol
 (2) Dimethyl sulfoxide (DMSO)
 (3) Ethanol
 (4) Water

76. Consider the following statements.

(a) The compound



is an example of Vinylic halide (where x = halide group).

(b) Chloropicrin can be prepared by the reaction of nitric acid with chloroform

(c) In an $\text{S}_{\text{N}}1$ reaction on chiral centres, there is retention more than inversion leading to partial racemization.

The correct statements are

- (1) (a) and (b) only (2) (b) and (c) only
 (3) (a) and (c) only (4) (a), (b) and (c)

77. Match the List-I with List-II.

	List-I (Reagent)		List-II (Product obtained on the reaction with phenol)
(a)	Zn dust/ Δ	(i)	Benzoquinone
(b)	(i) NaOH (ii) CO_2 (iii) $\text{H}_3\text{O}^{\oplus}$	(ii)	Salicylaldehyde
(c)	$\text{Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$	(iii)	Benzene
(d)	(i) Aqueous NaOH + CHCl_3 (ii) $\text{H}_3\text{O}^{\oplus}$	(iv)	Salicylic acid

Choose the correct match from the options given below.

- (1) (a) \rightarrow (iii), (b) \rightarrow (iv), (c) \rightarrow (i), (d) \rightarrow (ii)
 (2) (a) \rightarrow (iii), (b) \rightarrow (ii), (c) \rightarrow (i), (d) \rightarrow (iv)
 (3) (a) \rightarrow (ii), (b) \rightarrow (iii), (c) \rightarrow (i), (d) \rightarrow (iv)
 (4) (a) \rightarrow (iv), (b) \rightarrow (iii), (c) \rightarrow (i), (d) \rightarrow (ii)

78. Reaction of ethylene oxide with Grignard reagent and acidification leads to the formation of

- (1) Primary alcohol (2) Secondary alcohol
 (3) Tertiary alcohol (4) Cyclopropyl alcohol

79. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): When alkyl halide is reacted with AgCN then alkyl isocyanide is formed.

Reason (R): AgCN is mainly covalent in nature and nitrogen is free to donate electron pair forming isocyanide as the main product.

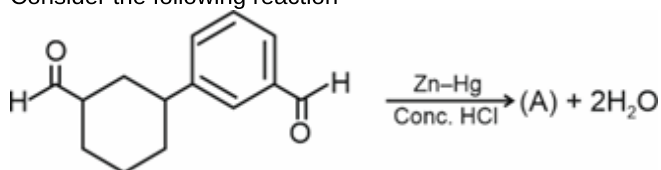
In the light of the above statements, choose the correct answer from the options given below.

- (1) Both (A) and (R) are true and (R) is not the correct explanation of (A)
 (2) (A) is true but (R) is false
 (3) (A) is false but (R) is true
 (4) Both (A) and (R) are true and (R) is the correct explanation of (A).

80. Fehling's solution 'B' is

- (1) Aqueous copper sulphate
 (2) Alkaline copper sulphate
 (3) Alkaline solution of sodium potassium tartrate (Rochelle salt)
 (4) Aqueous sodium citrate

81. Consider the following reaction



The major product A is

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

82. Consider the following compounds

- (a) Isopentane
(b) Ethoxyethane
(c) Butan-1-ol

The correct decreasing order of boiling point is

- (1) (c) > (b) > (a) (2) (b) > (c) > (a)
(3) (a) > (b) > (c) (4) (c) > (a) > (b)

83. Given below are two statements

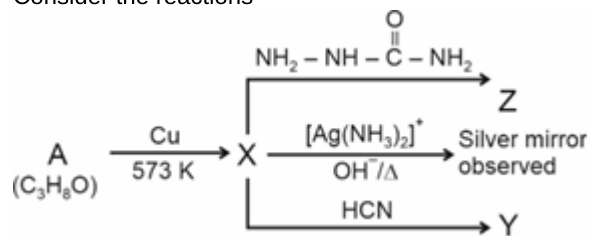
Statement (I): Sodium hydrogensulphite can be used for separation and purification of aldehydes.

Statement (II): Ketones react with ethylene glycol in the presence of dry hydrogen chloride to form cyclic products known as ethylene glycol ketals.

In the light of the above statements, Choose the correct answer from the options given below.

- (1) Statement (I) is true but statement (II) is false.
(2) Statement (I) is false but statement (II) is true
(3) Both statement (I) and statement (II) are true
(4) Both statement (I) and statement (II) are false

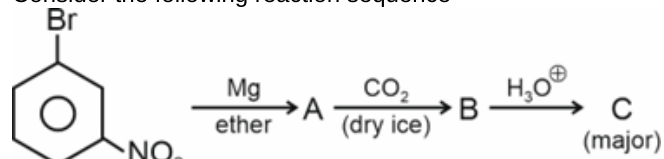
84. Consider the reactions



Identify A, X, Y and Z

- (1) A - Methoxyethane, X - Propanol, Y - Propanoic acid, Z - Hydrazone
(2) A - Propan-1-ol, X - Propanal, Y - Cyanohydrin, Z - Semicarbazone
(3) A - Propan-2-ol, X - Acetone, Y - Cyanohydrin, Z - Semicarbazone
(4) A - Methoxyethane, X - Acetone, Y - Semicarbazone, Z - Phenylhydrazone

85. Consider the following reaction sequence



The product 'C' is

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

86. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

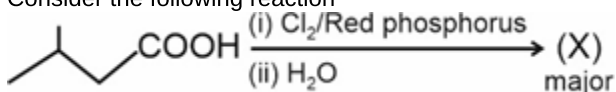
Assertion (A): Carboxylic acids are higher boiling liquids than aldehydes, Ketones and alcohols of comparable molecular masses.

Reason (R): This is due to more extensive association of carboxylic acid molecules through intermolecular hydrogen bonding.

In the light of the above statements, choose the correct answer from the options given below.

- (1) Both (A) and (R) are true and (R) is not the correct explanation of (A)
- (2) (A) is true but (R) is false
- (3) (A) is false but (R) is true
- (4) Both (A) and (R) are true and (R) is the correct explanation of (A).

87. Consider the following reaction



The major product 'X' is

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

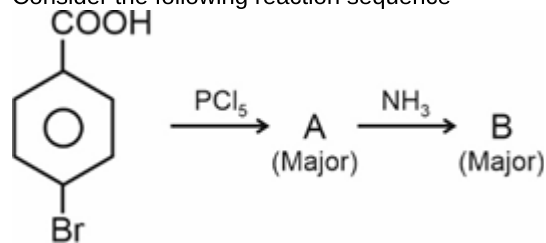
88. Consider the following statements

- (a) Sodium benzoate is used as a food preservative
- (b) Benzoic acid does not undergo Friedel-Crafts reaction
- (c) Carboxylic acids lose carbon dioxide to form hydrocarbons when their sodium salts are heated with soda lime.

Choose the correct statements.

- (1) (a) and (b) only
- (2) (b) and (c) only
- (3) (a) and (c) only
- (4) (a), (b) and (c)

89. Consider the following reaction sequence



The major product 'B' is

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

90. Consider the following reaction



The major product A is

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

BOTANY

91. An association between two species in which one is benefited while other is not affected at all is known as

- (1) Commensalism (2) Ammensalism
(3) Symbiosis (4) Co-operation

92. During secondary sewage treatment, mesh like structure is formed, known as flocs. It is

- (1) Masses of bacteria associated with fungal filaments
(2) Combination of algae and fungi
(3) Mass of bacteria only
(4) Mass of fungi only

93. Read the following statements and select the option which is true for them.

Statement A : Dragonflies are useful to get rid of aphids.

Statement B : The majority of baculoviruses used as biocontrol agents are in the genus *Nucleopolyhedrovirus*.

- (1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements A & B are correct
(4) Both statements A & B are incorrect

94. During sewage treatment when the BOD is reduced significantly, the effluent is passed into the

- (1) Large aeration tank
(2) Primary settling tank to remove primary sludge
(3) Secondary settling tank to sediment the flocs
(4) Anaerobic sludge digester

95. It is observed, in general that A and B are more adversely affected by competition than C.

Select the **correct** option for A, B and C.

- (1) A - Plants ; B - Carnivores; C - Herbivores
(2) A - Plants; B - Herbivores; C - Carnivores
(3) A - Carnivores ; B - Herbivores; C - Plants
(4) A - Decomposers ; B - Carnivores; C - Plants

96. Read the following statements and select the **correct** option.

Statement (A): Microbes of each category can be grown on nutritive media to form colonies, which can be seen with the naked eyes.

Statement (B): Production of beverages on an industrial scale requires growing microbes in very large vessels called fermentors.

- (1) Both the statements (A) and (B) are correct
(2) Both the statements (A) and (B) are incorrect
(3) Only statement (A) is correct
(4) Only statement (B) is correct

97. Bt toxin is produced by

- (1) Cotton (2) Cotton caterpillar
(3) A bacterium (4) A fungus

98. Organic acid used in preparation of vinegar is




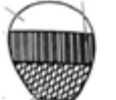






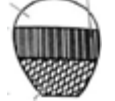

- (1) Acetic acid (2) Citric acid
(3) Lactic acid (4) Gluconic acid

99. Predation, parasitism and commensalism share a common characteristic that is

- (1) All the interacting species are benefitted but not harmed
(2) Interacting species live closely together.
(3) One of the species is benefitted while the other is harmed
(4) The closely related species compete for the same resources

100. How many of the given statements are **true** w.r.t cyanobacteria?
 a. They are autotrophic microbes, widely distributed in aquatic and terrestrial environments.
 b. *Anabaena*, *Nostoc* and *Oscillatoria* can fix atmospheric nitrogen.
 c. *Aulosira* fixes nitrogen actively in the rice fields in India by forming symbiotic association with these plants.
 d. Blue-green algae does not add any organic matter to the soil.
 e. They are one of the main sources of biofertilizers.
- (1) 2 (2) 3
 (3) 4 (4) 5

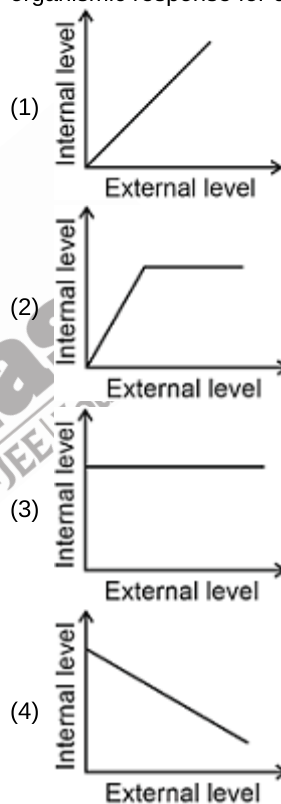
101. In the two decades starting from 1950s, the Chinese population exploded to double its size. This led to the implementation of the one child policy in 1979. This extreme step provided temporary stabilization in the following decades. However recent studies have shown an irreversible slowdown in the Chinese population growth. Which of the following options correctly represent Chinese population?

	1950-1980	1985-2000	2025-
(1)			
(2)			
(3)			
(4)			

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

102. The intrinsic rate of natural increase in population is called
 (1) Standing state (2) Carrying capacity
 (3) Standing crop (4) Biotic potential
103. State **True (T)** or **False (F)** for the following statements.
 a. Anaerobic digestion of activated sludge produces biogas in the sludge digester.
 b. *Rhizobium* is used as a biofertilizer for raising production of soyabean crop.
 c. Organic farming uses only naturally produced inputs like compost.
- (1) a(T), b(F), c(T) (2) a(T), b(T), c(T)
 (3) a(F), b(T), c(F) (4) a(F), b(F), c(T)
104. Which of the following products is formed due to fermentation activity of bacteria?
 (1) Roquefort cheese (2) Bread
 (3) Beer (4) Swiss cheese
105. Against herbivores what type of chemical defence is found in *Calotropis*?
 (1) Reserpine (2) Nicotine
 (3) Strychnine (4) Cardiac glycosides
106. The major component of biogas or gober gas is
 (1) CH₄ (2) CO₂
 (3) H₂ (4) H₂S

107. The principle of Competitive Exclusion was stated by
 (1) Gause (2) Charles Darwin
 (3) MacArthur (4) Connell
108. Abingdon tortoise in Galapagos islands became extinct within a decade after goats were introduced on the island. This was due to
 (1) Competitive exclusion (2) Competitive co-existence
 (3) Competitive release (4) Over-exploitation
109. The fermented preparation of rice and black gram is prepared by
 (1) *Streptococcus* (2) Yeast
 (3) *Lactobacillus* (4) *Acetobacter aceti*
110. The carrying capacity of an area is 500 and the population density is 400. If the intrinsic rate of natural increase is 0.01 then what will be the value of dN/dt for this population?
 (1) 0.01 (2) 0.8
 (3) 80 (4) 40
111. Select the **correct** diagrammatic representation of organismic response for conformers?



112. Tiger census in National parks of India is usually based on
 (1) The number of head counts
 (2) Estimating the carrying capacity of the area
 (3) Identification of the locations prone to poaching
 (4) Pugmarks and fecal pellets

113. During sewage treatment, secondary effluent was released into a nearby lake. Over time, it was observed that the BOD of the lake water decreased significantly.

As per the above observation, which of the following options, most appropriately explains the outcome on the indigenous fish population of the lake.

Microbes from the secondary effluent are used to

- (1) decompose organic matter in the lake, making it hospitable for populations of predators of fish.
- (2) Microbial action indirectly increases dissolved oxygen, that consequently allows the increase in the prey population for fishes.
- (3) Reduction in BOD avails more oxygen only for fish species, creating a favourable environment.
- (4) Increased dissolved oxygen have positive impact on flora of lake only.

114. During sewage treatment, methane is primarily formed

- (1) In anaerobic sludge digester
- (2) In tertiary treatment step
- (3) In primary settling tank
- (4) By aerobic bacteria

115. Read the following statements and select the **correct** option.

Statement A: Alexander Fleming discovered the first antibiotic, while working on spherical eubacteria which could not grow in the presence of a fungus.

Statement B: Fleming, Chain and Florey were awarded the Nobel Prize for establishing the full potential of Penicillin as an effective antibiotic.

- (1) Both the statements A and B are correct
- (2) Both the statements A and B are incorrect
- (3) Only statement A is correct
- (4) Only statement B is correct

116. The primary biochemical basis for curd formation from milk by LAB is:

- (1) Alcoholic fermentation of lactose
- (2) Proteolysis of milk proteins by alkaline enzymes
- (3) Acid-mediated coagulation of milk proteins
- (4) Partial digestion of milk proteins with the release of CO₂

117. Identify the **correct** match from the following.

(1)	Commercial production of butyric acid	–	A member of Protista
(2)	Fermentation of dough of bread	–	A member of Phycomycetes
(3)	Ripening of roquefort cheese	–	A member of Basidiomycetes
(4)	Production of statins	–	A member of Ascomycetes

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

118. Antibiotics are A substances which are B with reference to pathogens.

Choose the **correct** option to fill in the blanks.

- (1) A – Mostly synthetic biochemical, B – Against life
- (2) A – Chemical, B – Against life
- (3) A – Natural, B – Pro-life
- (4) A – Chemical, B – Pro-life

119. Read the followings statements.

- (a) CO₂ produced during fermentation, causes leavening of dough for bread and cake.
- (b) Pectinases and lipases are used for removing oily stains from the laundry.
- (c) Toddy is prepared by fermenting the sap from bamboo shoots.
- (d) *Saccharomyces cerevisiae* converts sugars into ethanol and CO₂.

State the above statements as True/False (T/F) and select the **correct** option.

	(a)	(b)	(c)	(d)
(1)	F	F	T	F
(2)	T	T	F	T
(3)	T	F	F	T
(4)	T	F	F	F

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

120. In which of the following processes prokaryotic organisms are involved?

- (a) Improving nutritional quality of milk
- (b) Controlling butterfly caterpillars
- (c) Production of cheese

The **correct** one(s) is/are:

- (1) (a) only
- (2) (a) and (b) only
- (3) (b) and (c) only
- (4) All (a), (b) and (c)

121. Read the following Assertion (A) and Reason (R) statements and select the **correct** option.

Assertion (A): Different kinds of cheese possess distinct flavours and textures even when produced from similar milk sources.

Reason (R): Specific microbial enzymes modify the fats and proteins in the milk differently during the process of fermentation.

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (3) (A) is true but (R) is false
- (4) (A) is false but (R) is true

122. Which of the following is used to produce enzymes that can act as blood-clot buster in the patients who have undergone myocardial infarction?

- (1) *Trichoderma polysporum*
- (2) *Monascus purpureus*
- (3) *Streptococcus*
- (4) *Penicillium*

123. Identify the **odd** one w.r.t. the biocontrol agents.

- (1) Bt toxins are activated in the gut of insects
- (2) Aphids control the population of ladybirds in the fields
- (3) *Trichoderma* is used against plant pathogens
- (4) Baculoviruses attack insects and other arthropods.

124. When the resources are unlimited, a growth pattern is observed in nature. Such growth pattern can be expressed through an equation. Integral form of the growth equation is

- (1) $N_t = N_0 + e^{rt}$
- (2) $N_{t+1} = N_0 \left(\frac{K-N}{K} \right)$
- (3) $N_t = N_0 e^{rt}$
- (4) $N_0 = N_t + K^{rt}$

125. *Convolvulus arvensis* is detrimental for the growth of wheat. This is an example of

- (1) Amensalism
- (2) Parasitism
- (3) Competition
- (4) Predation

126. Find the **odd** one out w.r.t. the population interactions exhibited by the following pairs of interacting species.

- (1) Snail and liver fluke
- (2) *Cuscuta* and hedge plant
- (3) Cuckoo and crow
- (4) *Chathamalus* and *Balanus*

127. Observe the figure given below.



Read the following functions.

- (a) Helps to replenish soil nutrients.
 - (b) Plays a major role in fermentation of malted cereals.
 - (c) Protects plants from insects and arthropods.
 - (d) Used by organic farmers as a biofertilizer.
 - (e) Majorly helps plants in absorbing potassium, phosphorus from the soil.
 - (f) Forms symbiotic association with the roots of legumes.
- How many of the above functions are **correct** for the organism in the above given diagram?

- (1) Two
- (2) Four
- (3) Three
- (4) Five

128. Match the following columns and select the **correct** option.

	Column I		Column II
(a)	Produce large number of small - sized offsprings throughout life	(i)	Fig wasps
(b)	Breed only once in a life time	(ii)	Copepods
(c)	Grow on surface of marine fishes	(iii)	Pelagic fishes
(d)	Depend on other organism to lay eggs.	(iv)	Pacific salmon fishes

- (1) a-(iv), b-(iii), c-(i), d-(ii)
- (2) a-(iii), b-(iv), c-(ii), d-(i)
- (3) a-(i), b-(ii), c-(iv), d-(iii)
- (4) a-(iii), b-(i), c-(ii), d-(iv)

129. Consider the following statements.

- (a) Exponential population growth cannot be observed in a natural ecosystem even for a short period.
- (b) Prey populations periodically recover, even in the presence of predators.
- (c) Predator-prey relation has employed to control the spread of exotic species in an area.
- (d) Predator – prey interactions always decline the prey populations making them extinct.

Select the **correct** ones.

- (1) All (a), (b), (c) and (d)
- (2) Only (a), (c) and (d)
- (3) Only (c) and (d)
- (4) Only (b) and (c)

130. The intrinsic rate of natural increase for the population of (A) Elephant, (B) Fruit fly and (C) Human is 0.0004, 0.15 and 0.02 respectively. All three populations are growing in the same habitat, following the logistic growth model. If the value of N for all is initially equal to $K/2$, which of the following correctly represents the order in which these populations will reach close to the carrying capacity at the earliest (Note: All other environmental factors are favourable)?

- (1) A, B, C
- (2) B, C, A
- (3) C, B, A
- (4) B, A, C

131. Read the following statements and state them as true (T) or false (F).

- (i) Microbes used in curd formation and making of dough for bread, perform anaerobic respiration.
- (ii) Biological treatment of sewage to reduce BOD is similar to the action of decomposers on detritus in nature w.r.t. availability of oxygen.
- (iii) Mycorrhiza and *Rhizobium*, both increase plant nutrient uptake, by fixing nitrogen of atmosphere.
- (iv) *Bacillus thuringiensis* is a parasite of cotton plant.

	(i)	(ii)	(iii)	(iv)
(1)	F	F	T	F
(2)	T	T	F	F
(3)	T	F	T	F
(4)	F	T	F	T

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

132. Which of the following is an advantage of mycorrhizal association to the host plant?

- a. Resistance to root borne pathogens
 - b. Overall increase in plant growth and development
 - c. Increased tolerance to salinity and drought
- (1) a only
 - (2) b and c only
 - (3) a and c only
 - (4) All a, b and c

133. Cyclosporin A is used as

- (1) Blood cholesterol lowering agent
- (2) Immunosuppressive agent
- (3) Blood clot buster
- (4) Preservative in food industry

134. Which among the given pairs of alcoholic beverages, is directly obtained from action of yeast?

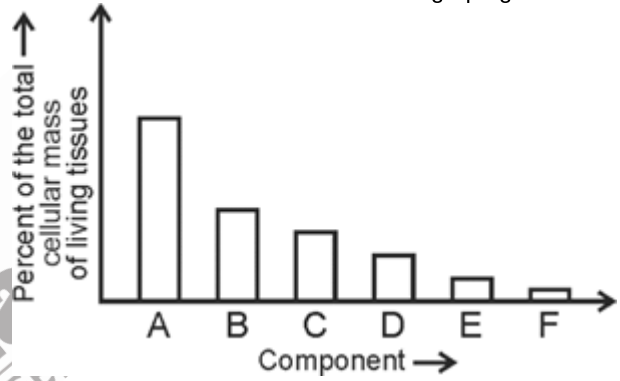
- (1) Whiskey and Rum
- (2) Beer and Brandy
- (3) Wine and Beer
- (4) Wine and Whiskey

135. Identify the **incorrect** statements from the following and choose the appropriate option.

- (a) If in a pond, there were 15 lotus plants last year and through reproduction, 5 new plants are added, taking current population to 20, the birth rate is 0.3 offsprings per lotus per year.
- (b) A bell-shaped population pyramid is always achieved when the pre-reproductive individuals are less than the post-reproductive individuals in a population.
- (c) In 1981, the r value for human population in India was 0.205.
- (d) Connell's field experiments confirmed that resource partitioning promotes co-existence.

- (1) Only (a) and (b)
- (2) (b), (c) and (d)
- (3) Only (b) and (d)
- (4) Only (c) and (d)

ZOOLOGY

136. The R group in alanine is 'X' while in serine it is 'Y'. Choose the option that correctly identifies 'X' and 'Y' respectively.
 (1) Methyl, hydroxy (2) Hydrogen, methyl methyl
 (3) Hydroxy methyl, ethyl (4) Methyl, ethyl
137. The inner lining of fallopian tubes in human females is formed by
 (1) Ciliated columnar epithelium
 (2) Non-ciliated columnar epithelium
 (3) Cuboidal epithelium
 (4) Squamous epithelium
138. A student wanted to study about gap junctions in more detail. He can do so by analysing the muscle fibres which are characterised by
 (a) Peripheral nuclei
 (b) Central nucleus
 (c) Striations with intercalated discs
 (d) Branching pattern
 Choose the option with the correct set.
 (1) (a) and (c) only (2) (b), (c) and (d) only
 (3) (a), (c) and (d) only (4) (b) and (d) only
139. Read the following statements and choose the option with all correct statements.
 a. When a neuron is suitably stimulated, an electrical disturbance is generated which travels along its plasma membrane.
 b. Cardiac muscle cells contract as a unit due to presence of adhering junctions at some fusion points.
 c. Specialized junctions in nearly all animal tissues provide both structural and functional links between the individual cells.
 d. Most of the bones in vertebrate embryos are replaced by cartilages in adults.
 (1) a and b (2) b and c
 (3) c and d (4) a and c
140. Division of labour due to tissue formation for first time became evident in the members of phylum.
 (1) Porifera (2) Platyhelminthes
 (3) Echinodermata (4) Cnidaria
141. The structure of protein which provides positional information of amino acids is 'X' that possess
 (1) Hydrogen bonds (2) Peptide bonds
 (3) Disulphide bonds (4) Ester bonds
142. The total number of hydroxyl groups in a glycerol molecule is equal to the total number of
 (1) Hydroxyl groups attached to the heterocyclic ring in adenine
 (2) Hydroxyl groups present in a glucose molecule
 (3) Nitrogen atoms present in the adenine
 (4) Fatty acids present in a triglyceride
143. Read the following statements A and B and choose the correct option
Statement A: All the elements present in sample of earth's crust are also present in a sample of living tissues.
Statement B: Relative abundance of carbon, hydrogen and oxygen with respect to other elements is higher in humans than in earth's crust.
 (1) Both statements A and B are correct
 (2) Both statements A and B are incorrect
 (3) Only statement A is correct
 (4) Only statement B is correct
144. Consider a chemical reaction with optimum temperature of 35°C. If during the reaction, the temperature of the setup is changed from 35°C to 25°C, then the rate of reaction becomes 'X'. Thus, the initial rate of reaction would have been
 (1) $\frac{X}{2}$ (2) $\frac{X}{4}$
 (3) 2X (4) 4X
145. If the total amount of cytosine and guanine in a dsDNA is 60%, the amount of adenine in this DNA will be
 (1) 30% (2) 20%
 (3) 40% (4) 50%
146. How many biomolecules given in the box below contain peptide bonds?
 Guanine, Glycine, Glycogen, Collagen, Carboxypeptidase, Fructose, Antibody
 Select the correct option.
 (1) Three (2) Four
 (3) Two (4) Five
147. Select the correct match based on the graph given.
- 
- Percent of the total cellular mass of living tissues
- Component →
- (1) A - Proteins (2) E - Lipids
 (3) B - Nucleic acids (4) C - Ions
148. Read the following statements and choose the option that correctly identifies them as True (T) or False (F).
 a. Arachidonic acid has 19 carbon atoms excluding the carboxyl group.
 b. Some tissues especially the dense connective tissues have lipids with more complex structures.
 c. A nucleoside is composed of a pentose sugar attached to a nitrogenous base.
 d. Adenosine and thymidylic acid are nucleotides.
 (1) a(T), b(F), c(T), d(F) (2) a(T), b(F), c(T), d(T)
 (3) a(F), b(T), c(F), d(T) (4) a(F), b(F), c(T), d(F)
149. A compound 'X' is formed after a dehydration reaction in which two glucose molecules are linked by a glycosidic bond. Select the correct molecular formula for compound 'X'.
 (1) $C_{12}H_{24}O_{12}$ (2) $C_{10}H_{24}O_{10}$
 (3) $C_{12}H_{22}O_{11}$ (4) $C_{12}H_{22}O_{12}$
150. Read the following statements (A) and (B) w.r.t. cockroach.
Statement (A): The proventriculus consists of an outer thick layer of circular muscles.
Statement (B): The cuticular lining of the proventriculus is thickened to form six highly chitinised plates called teeth.
 Choose the correct option.
 (1) Both statements (A) and (B) are incorrect.
 (2) Statement (A) is correct and statement (B) is incorrect.
 (3) Statement (A) is incorrect and statement (B) is correct.
 (4) Both statements (A) and (B) are correct.

- 151.** Read the statements (A – C) w.r.t *Rana tigrina* and select the option that correctly states them as true(T) or false(F).
 (A) Alimentary canal, urinary and reproductive tracts open into a common chamber called conus arteriosus.
 (B) In dry land it would die due to lack of O₂ if its mouth is forcefully kept closed for some days.
 (C) Oviparous and direct development through larval stage.
 (1) A-T, B-F, C-T (2) A-F, B-T, C-F
 (3) A-F, B-T, C-T (4) A-T, B-F, C-F
- 152.** The erythrocytes of frogs are different from the RBCs of humans as the former are
 (1) Non-nucleated and convex
 (2) Convex without haemoglobin
 (3) Nucleated without haemoglobin
 (4) Nucleated and biconvex
- 153.** The route for passage of sperms in frog is given below.
 Testis → (A) → Kidneys → (B) → Urinogenital duct → (C).
 Identify (A), (B) and (C) and choose the correct option.
 (A) (B) (C)
 (1) Vas deferens Bidder's canal Ureter
 (2) Vasa efferentia Vas deferens Cloaca
 (3) Vasa efferentia Bidder's canal Cloaca
 (4) Epididymis Nephron Cloacal aperture
 (1) (1) (2) (2)
 (3) (3) (4) (4)
- 154.** Match list I and list II w.r.t. *Periplaneta americana*.
- | List I | List II |
|--|------------------------------------|
| a. Joined by paired longitudinal connectives on the ventral side | (i) Supra-oesophageal ganglion |
| b. The brain represented in head region | (ii) Ommatidia |
| c. Situated on dorsal surface of the head | (iii) Segmentally arranged ganglia |
| d. Each eye consists of about 2000 hexagonal units | (iv) Compound eyes |
- Choose the **correct** answer from the options given below.
 (1) a(iv), b(iii), c(ii), d(i) (2) a(iii), b(ii), c(iv), d(i)
 (3) a(ii), b(iv), c(i), d(iii) (4) a(iii), b(i), c(iv), d(ii)
- 155.** Complete the analogy by selecting the **correct** option.
 A single layer of cube-like cells: _____ : : More than one-layer of cells : Dry surface of the skin
 (1) Lining of intestine
 (2) PCT of renal tubules
 (3) Inner layer of blood vessels
 (4) Alveolar sacs
- 156.** All of the following are released through ducts or tubes, **except**
 (1) Saliva (2) Earwax
 (3) Insulin (4) Pepsin
- 157.** Consider the following features:
 (a) Involved in filtration, osmosis and diffusion
 (b) Possess flattened cells with irregular boundaries
 (c) Nucleus of each cell is oval or sphere and is centrally located
 (d) Not found in body areas that are subjected to mechanical stress.
 Select the type of tissue which is characterised by all of the above given features.
 (1) Simple columnar epithelium
 (2) Simple cuboidal epithelium
 (3) Transitional epithelium
 (4) Simple squamous epithelium

- 158.** Choose the **correct** statement.
 (1) All types of connective tissues are characterised by the presence of macrophages.
 (2) All cells of the neural tissue have the ability to respond to the stimulus.
 (3) All types of connective tissues have a rich blood supply.
 (4) Collagen fibres produced by fibroblasts in connective tissue are responsible for providing strength.
- 159.** **Assertion (A):** The type of skeletal connective tissue found in vertebrate embryos is more elastic and softer than bone.
Reason (R): The matrix of cartilage is hard and non-pliable due to the presence of chondroitin salts.
 In the light of above statements, choose the **correct** option.
 (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (2) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
 (3) (A) is true, (R) is false
 (4) Both (A) and (R) are false
- 160.** The type of muscles responsible for locomotion, maintaining posture and heat production possess muscle fibres which are
 (1) Branched (2) Syncytial
 (3) Unstriated (4) Involuntary
- 161.** 'X' make up more than one-half the volume of neural tissue in our body. 'X' assist in
 (1) Passing impulses between neurons via neurotransmitters.
 (2) Maintaining the appropriate chemical environment for generation of nerve impulse.
 (3) Insulating the axons that decrease the speed of nerve impulse conduction.
 (4) Providing considerable strength, elasticity and extensibility to the neurons.
- 162.** How many of the features mentioned in the box given below is/are common between the muscle fibres present in the iris of the eye and biceps?
- | |
|--|
| Cylindrical shape, central nuclei, uninucleate condition, striated appearance, absence of intercalated discs |
|--|
- Select the **correct** option.
 (1) One (2) Three
 (3) Two (4) Four
- 163.** Read the given statements and select the **correct** option.
Statement (A): Plant cell walls and paper made from plant pulp are cellulosic in nature.
Statements (B): Exoskeleton of arthropods has complex polysaccharide which is a homopolymer.
 (1) Both statements (A) and (B) are correct
 (2) Both statements (A) and (B) are incorrect
 (3) Only statement (A) is correct
 (4) Only statement (B) is correct

164. Match Column I with Column II and select the correct option.

	Column I		Column II
(a)	Macrophage	(i)	Fat-storing cell
(b)	Adipocyte	(ii)	Ingests cell debris, bacteria and foreign matter
(c)	Mast cell	(iii)	Produces matrix
(d)	Fibroblast	(iv)	Produces heparin and serotonin

- (1) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
 (2) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
 (3) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
 (4) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

165. Enzymes are divided into _____ classes each with _____ sub-classes.

Select the option that correctly fills the respective blanks.

- (1) 6; 4-13 (2) 5; 10-12
 (3) 7; 13-15 (4) 4; 11-15

166. The enzyme that catalyses the breakdown of hydrogen peroxide to water and oxygen possesses a co-factor that differs from the co-factor present in carboxypeptidase as

- (1) Former is inorganic and is loosely attached with apoenzyme.
 (2) Latter is a metal ion that forms coordination bonds with the side chains at the active site.
 (3) Former is organic and its removal does not affect the catalytic activity.
 (4) Latter is inorganic and it is tightly bound to the co-enzyme.

167. Choose the incorrect match.

(1)	NADP	-	Contains vitamin niacin
(2)	Oxidoreductase	-	Represents class I of enzymes
(3)	Haem	-	Competitive inhibitor for succinic dehydrogenase
(4)	α -helix	-	Represents the secondary structure of a protein

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

168. Consider the following.

- (a) Homopolymer of fructose
 (b) Storage polysaccharide found in roots and tubers of dahlia.
 (c) Cannot be metabolised in human body
 All of the above given features are true for
 (1) Glycogen (2) Cellulose
 (3) Inulin (4) Chitin

169. **Assertion (A):** Arachidonic acid has low melting point in comparison to unsaturated palmitic acid.

Reason (R): Arachidonic acid being a saturated fatty acid, possesses C – C bonds that prevents it from packing closely together.

In the light of above statements, choose the correct option.

- (1) Both (A) and (R) are true, (R) is the correct explanation of (A)
 (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (3) (A) is true, (R) is false
 (4) Both (A) and (R) are false

170. 'X' is present as a store house of energy in animals. Identify 'X' and choose the correct option w.r.t. it.

- (1) Contains complex helices and can hold I_2 molecules to give blue colour
 (2) Its right end is called the non-reducing end.
 (3) It is a polymer of glucose
 (4) Has unbranched structure

171. The class of enzymes that includes DNA polymerase whose E.C. number is 2.7.7.7, is named as

- (1) Ligases (2) Transferases
 (3) Dehydrogenases (4) Lyases

172. Select the incorrect statement.

- (1) Based on the nature of R-group, there are 20 amino acids that occur in proteins.
 (2) The essential chemical components of many co-enzymes are vitamins
 (3) Most enzymes are proteins but some are lipids.
 (4) Carbohydrates, the most abundant biomolecules on Earth, are produced by algae and plant cells.

173. 'P' constitute 5-7% of the total cellular mass. 'P' contains

- (a) Hydrogen bond
 (b) Glycosidic acid
 (c) Ester bond
 (d) Disulphide bond

Choose the option with correct set.

- (1) (a) and (c) only (2) (b) and (c) only
 (3) (a), (b), (c) and (d) (4) (a), (b) and (c) only

174. Consider the given figure.



Select the correct option w.r.t. the above diagram.

- (1) Adult human haemoglobin represents this type of structure.
 (2) Formed by a single polypeptide chain
 (3) Active site of any enzyme is never present in this type of structure.
 (4) Gives positional information of amino acids in a protein.

175. Complete the analogy by selecting the correct option.

Pepsin : Heteropolymer :: _____ : Homopolymer

- (1) Insulin (2) Glucagon
 (3) Starch (4) RuBisCO

176. In a DNA strand, a purine base which lies perpendicular to the sugar phosphate backbone, pairs with a pyrimidine base by double H-bonds. The purine in the question is

- (1) Adenine (2) Guanine
 (3) Thymine (4) Cytosine

177. Choose the correct representation of a holoenzyme.

(1)	Holoenzyme	=	Apoenzyme + Metal ion
(2)	Holoenzyme	=	Co-enzyme + Co-factor
(3)	Holoenzyme	=	Prosthetic group + Co-factor
(4)	Holoenzyme	=	Metal ion + Co-factor

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

178. Titillator and pseudopenis are associated with which of the following structures of a cockroach?

- (1) Left phallomere (2) Right phallomere
(3) Ventral phallomere (4) Long tubules

179. In cockroach, the bundles of sperms called spermatophores are stored within

- (1) Testes (2) Ejaculatory duct
(3) Seminal vesicles (4) Long tubules

180. Choose the **incorrect** match w.r.t. frog.

(1)	Skin	-	Highly vascularised
(2)	Rectum	-	Opens into cloaca
(3)	Pancreas	-	One of the main digestive glands
(4)	Fertilization	-	Internal

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

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