

# NEW STANDARD ACADEMY

Test Type : Unit Test - 04

Do not open this Test Booklet until you are asked to do so. 11-09-2023

**PRE-MEDICAL :12<sup>th</sup> Undergoing/Pass Students**

Read carefully the Instructions on the Back Cover of this Test Booklet.

## Important Instructions :

1. On the answer sheet, fill in the particulars on Side-1 and Side -2 carefully with blue/black ball point pen only.
2. The test is of 3 hours 20 minutes duration and this Test Booklet contains 200 questions. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores. The maximum marks are 720.
3. In this Test Paper, each subject will consist of two sections. Section A will consist of 35 questions (all questions are mandatory) and Section B will have 15 questions. Candidate can choose to attempt any 10 question out of these 15 questions. In case if candidate attempts more than 10 questions, first 10 attempted questions will be considered for marking.
4. In case of more than one option correct in any question, the best correct option will be considered as answer.
5. Use Blue/Black Ball Point Pen only for writing particulars on this page/marking responses.
6. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
7. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.
8. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Form No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
9. Use of white fluid for correction is not permissible on the Answer Sheet.

Name of the Candidate(In Capitals) \_\_\_\_\_

Date of Examination \_\_\_\_\_

Candidate`s Signature: \_\_\_\_\_ Invigilator`s Signature: \_\_\_\_\_

## SECTION - A (PHYSICS)

1. Radius vector is the vector which join the centre of the circle and the particle performing circular motion which option is true about it :-

- (1) Variable magnitude and variable direction.
- (2) Variable magnitude and constant direction.
- (3) Constant magnitude and variable direction.
- (4) Constant magnitude and constant direction.

2. A bicycle wheel attained a velocity of 20 rad/sec in 5 sec starting from rest, find the number of revolutions made by the wheel.

- (1)  $\frac{\pi}{25}$  revolutions
- (2)  $\frac{1}{\pi}$  revolutions
- (3)  $\frac{25}{\pi}$  revolutions
- (4) None

3. A wheel is rotating at 900 rpm about its axis when the power is cut off. It comes to rest in one minute.

The angular retardation will be (in  $\frac{\text{rad}}{\text{s}^2}$ ) :-

- (1)  $\frac{\pi}{2}$
- (2)  $\frac{\pi}{4}$
- (3)  $\frac{\pi}{6}$
- (4)  $\frac{\pi}{8}$

4. A particle of mass 'm' describes a circle of radius (r). The centripetal acceleration of the particle is  $\frac{4}{r^2}$ . The momentum of the particle :-

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

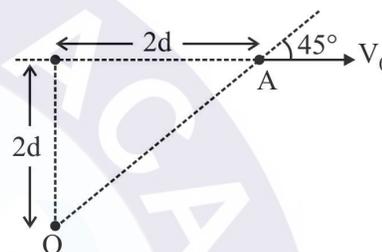
5. A particle is moving along a circular path with uniform speed. Through what angle does its angular velocity change when it completes half of the circular path ?

- (1)  $0^\circ$
- (2)  $45^\circ$
- (3)  $180^\circ$
- (4)  $90^\circ$

6. A particle revolving a circular path completes first one third of circumference in 3 sec, while next one third in 2 sec. Calculate the average angular velocity of particle.

- (1)  $\frac{2\pi}{5}$
- (2)  $\frac{4\pi}{15}$
- (3)  $\frac{6\pi}{5}$
- (4)  $\frac{3\pi}{10}$

7. Find angular velocity of A with respect to O, at the instant shown in figure.



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

8. A particle travels in a circle of radius 20 cm at a speed that uniformly increases. If the speed changes from 5 m/s to 6 m/s in 2 sec. Find the angular acceleration -

- (1)  $2 \text{ Rad/s}^2$
- (2)  $2.5 \text{ Rad/s}^2$
- (3)  $3 \text{ Rad/s}^2$
- (4)  $3.5 \text{ Rad/s}^2$

9. Water from a stream is falling on the blades of a turbine at the rate of 100 kg/s. If the height of the stream is 100m, then the power delivered to the turbine is :

- (1) 100 kW
- (2) 100 W
- (3) 10 kW
- (4) 1 kW

10. A particle of mass m is moving in a circular path of constant radius 'r' such that its centripetal acceleration is varying with time t as  $a_c = k^2 r t^2$ , where k is a constant. The power delivered to the particle by the force acting on it is :-

- (1)  $2\pi m k^2 r^2$
- (2)  $m k^2 r^2 t$
- (3)  $\frac{m k^4 r^2 t^5}{3}$
- (4) zero

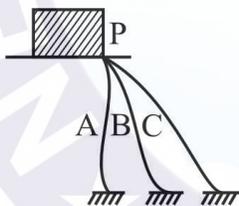
11. A body moves a distance of 10 m along a straight line under the action of a force of 5 N. If the work done is 25 J, the angle which the force makes with the direction of motion of the body is :-

- (1)  $0^\circ$  (2)  $30^\circ$  (3)  $60^\circ$  (4)  $90^\circ$

12. A heavy box of 40 kg is pushed slowly 20 m by a coolie over a railway platform whose coefficient of friction with the box is 0.4. The work done by the coolie is (take  $g = 10 \text{ m/s}^2$  & assume that forces applied to be horizontal) :-

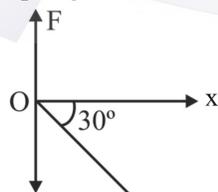
- (1) +3200 J  
 (2) -3200 J  
 (3) +1600 J  
 (4) -1600 J

13. A greased block P may slide along any of the three smooth slopes A, B or C. to reach the ground. The work done on the block by the block's weight  $mg$  are  $w_A$ ,  $w_B$  &  $w_C$  for the three slopes respectively then :-



- (1)  $w_A < w_B < w_C$   
 (2)  $w_A > w_B > w_C$   
 (3)  $w_A = w_B = w_C$   
 (4) None of these

14. In a spring, it is found that the spring force  $F$  and the extension in the spring  $x$  are related as shown in figure. Then spring constant will be :-



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

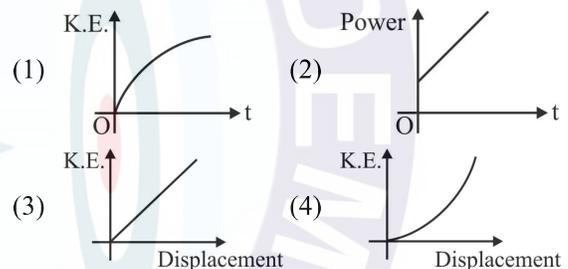
15. A 5 kg block is thrown up a  $30^\circ$  incline with an initial speed  $V$  of 6 m/s. It is found to travel a distance  $d = 2\text{ m}$  up the plane as its speed gradually decreases to zero, then the loss in mechanical energy of the block due to friction in this process is ( $g = 9.8 \text{ m/s}^2$ ) :-

- (1) 8 J (2) 41 J (3) 49 J (4) 90 J

16. If a man increases his speed by 2m/s, his K.E. is doubled. The original speed of the man is :-

- (1)  $(2 + \sqrt{2}) \text{ m/s}$  (2)  $(2 + 2\sqrt{2}) \text{ m/s}$   
 (3) 4 m/s (4)  $(1 + \sqrt{2}) \text{ m/s}$

17. A block is resting over a smooth horizontal plane. A constant horizontal force starts acting on it at  $t = 0$ . Which of the following graph is/are correct ?



18. The linear momentum of a body is increased by 50%. Then increase in the kinetic energy will be :-

- (1) 25% (2) 50% (3) 100% (4) 125%

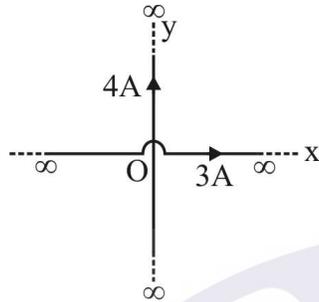
19. A body of mass 2 kg is thrown up vertically with a kinetic energy of 490 J. If  $g = 9.8 \text{ m/s}^2$ , the height at which the kinetic energy becomes half of its original value is :-

- (1) 10 m (2) 12.5 m  
 (3) 25 m (4) 50 m

20. A body of mass  $m$  is projected at an angle  $\theta$  to the horizontal with initial velocity  $u$ . The mean power developed by the gravity over the time of flight is :-

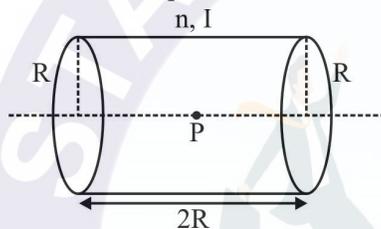
- (1)  $mg \sin \theta$  (2)  $mg \cos \theta$   
 (3)  $mg(gt - u)$  (4) zero

21. Magnetic field at point P(0, 0, a) will be :-



- (1)  $\frac{\mu_0}{2\pi a}$  (2)  $\frac{3\mu_0}{2\pi a}$  (3)  $\frac{5\mu_0}{2\pi a}$  (4)  $\frac{7\mu_0}{2\pi a}$

22. A tightly wound solenoid is shown in figure. Magnetic field at mid point P is :-



- (1)  $\mu_0 nI$  (2)  $\frac{\mu_0 nI}{2}$   
 (3)  $\frac{\mu_0 nI}{\sqrt{2}}$  (4)  $\sqrt{2}\mu_0 nI$

23. A proton and deuteron describes circular path of same radius when projected in uniform transverse magnetic field. Then ratio of their kinetic energy is :-

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

24. An electron is moving along +ve x-axis with constant velocity. If a uniform magnetic field is applied over the region along +y-axis. Then electron will move :-

- (1) Linearly along +x axis  
 (2) In a circular path in xy plane  
 (3) In a circular path in yz plane  
 (4) In a circular path in xz plane

25. A charge particle (charge q, mass m) is shot directly towards a wall with velocity  $v_0$  from a distance d. What minimum magnetic field should exist in region so that particle just misses to hit the wall.

- (1)  $\frac{mv_0}{2qd}$  (2)  $\frac{2mv_0}{qd}$   
 (3)  $\frac{mv_0}{qd}$  (4) None of these

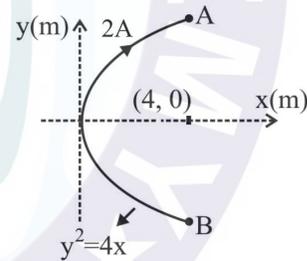
26. A proton enters a uniform transverse magnetic field of 1 mT with velocity  $10^4$  m/sec making an angle  $30^\circ$  with field direction. Then radius of its helical path will be nearly.

- (1) 5 cm (2) 10 cm (3) 15 cm (4) 20 cm

27. A proton enters a uniform transverse magnetic field with speed v & describes a circular path with time period T. If a proton enters same magnetic field with speed 2v making an angle  $60^\circ$  with field direction, then time period of revolution becomes :-

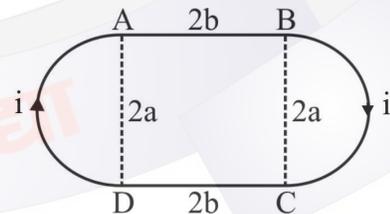
- (1)  $\frac{\sqrt{3}T}{2}$  (2) T  
 (3)  $\frac{T}{2}$  (4)  $\frac{2}{\sqrt{3}}T$

28. A parabolic wire AB is placed in uniform magnetic field  $\vec{B} = 0.5T(-\hat{k})$  as shown in figure magnetic force on wire AB will be :-



- (1)  $4N(+\hat{j})$  (2)  $8N(-\hat{j})$   
 (3)  $4N(+\hat{i})$  (4)  $8N(-\hat{i})$

29. Magnetic moment of current carrying loop will be :-



- (1)  $i(ab + 4\pi a^2)$   
 (2)  $i\left(4ab + \frac{\pi a^2}{2}\right)$   
 (3)  $i(4ab + \pi a^2)$   
 (4)  $i(ab + \pi a^2)$

30. At a place on earth surface dip angle is  $30^\circ$ , when dip needle is placed in a vertical plane making an angle  $30^\circ$  with magnetic meridian. Then actual dip at that place is :-

- (1)  $\tan^{-1}(0.2)$  (2)  $\tan^{-1}(0.3)$   
 (3)  $\tan^{-1}(0.5)$  (4) None of these

31. On moving a dip needle in magnetic meridian from equator to poles, dip angle.

- (1) Increases (2) Decreases  
 (3) Remain same (4) Can't say

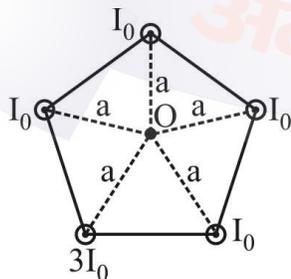
32. Susceptibility of diamagnetic substances :-

- (1) Increases linearly with temperature.  
 (2) Decreases linearly with temperature.  
 (3) Is independent of temperature.  
 (4) Varies inversely with temperature.

33. Material suitable for making core of transformer should have :-

- (1) High retentivity, high coercivity  
 (2) Low retentivity, low coercivity  
 (3) High retentivity, low coercivity  
 (4) Low retentivity, high coercivity

34. Five parallel infinite wires are placed at the vertices of a regular pentagon. Four wires carry current  $I_0$  each while the fifth wire carries current  $3I_0$  as shown in figure. The resultant magnetic field at centre O is :-



- (1) Zero (2)  $\frac{\mu_0 I_0}{2\pi a}$  (3)  $\frac{\mu_0 I_0}{\pi a}$  (4)  $\infty$

35. Two identical short bar magnets each having magnetic moment  $M$  are placed a distance of  $2d$  apart with axes perpendicular to each other in a horizontal plane. The magnetic induction at a point midway between them is :-

- (1)  $\frac{\mu_0 \sqrt{2}M}{4\pi d^3}$   
 (2)  $\frac{\mu_0 \sqrt{3}M}{4\pi d^3}$   
 (3)  $\frac{2\mu_0 M}{\pi d^3}$   
 (4)  $\frac{\mu_0 \sqrt{5}M}{4\pi d^3}$

### SECTION - B (PHYSICS)

36. The angular velocity of a particle is given by  $\omega = 1.5t - 3t^2 + 2$ . Find the time when its angular acceleration becomes zero.

- (1) 0.5 sec (2) 0.75 sec  
 (3) 0.25 sec (4) 0.40 sec

37. A body is displaced from (0, 0) to (1m, 1m) along the path  $x = y$  by a force  $\vec{F} = (x^2\hat{j} + y\hat{i})N$ . The work done by this force will be :-

- (1)  $\frac{4}{3}J$  (2)  $\frac{5}{6}J$  (3)  $\frac{3}{2}J$  (4)  $\frac{7}{5}J$

38. A mass of 1 kg is acted upon by a single force  $\vec{F} = (4\hat{i} + 4\hat{j})N$ . Due to force mass is displaced from (0, 0) to (1m, 1m). If initially the speed of the particle was 2 m/s. Its final speed approximately is :-

- (1) 6 m/s (2) 4.5 m/s  
 (3) 8 m/s (4) 7.2 m/s

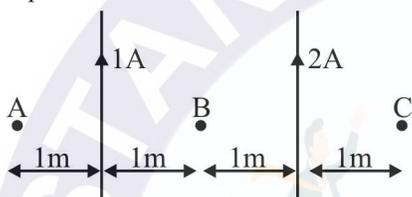
39. A water-pump driven by petrol raises water at a rate of  $0.5 \text{ m}^3/\text{min}$ . from a depth of 30 m. If the pump is 70% efficient, what power is developed by the engine :- ( $g = 9.8 \text{ m/s}^2$ )

- (1) 1750 W (2) 2450 W  
 (3) 3500 W (4) 7000 W

40. Power supplied to a particle of mass 2kg varies with time as  $P = \frac{3t^2}{2}$  watt. here t is in second and velocity of particle at  $t = 0$  is  $v = 0$  the velocity of particle at time  $t = 2$  sec will be-

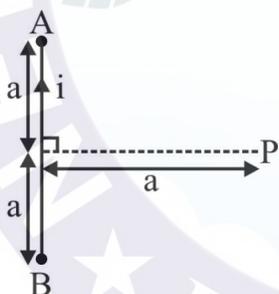
- (1) 1m/s (2) 4m/s  
 (3) 2m/s (4)  $2\sqrt{2}$ m/s

41. Two long straight wires carry current as shown in figure. Then ratio of magnitude of magnetic fields at point A, B & C is :-



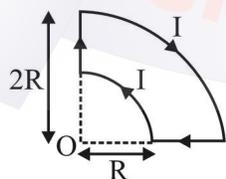
- (1) 1 : 3 : 5 (2) 3 : 5 : 7  
 (3) 5 : 3 : 7 (4) 7 : 3 : 5

42. Magnetic field at point P due to current carrying conductor AB will be :-



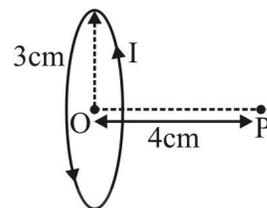
- (1)  $\frac{\mu_0 i}{4\pi a}$  (2)  $\frac{\mu_0 i}{\sqrt{2}\pi a}$   
 (3)  $\frac{\mu_0 i}{2\pi a}$  (4)  $\frac{\mu_0 i}{2\sqrt{2}\pi a}$

43. Magnetic field at centre of current carrying geometry is :-



- (1)  $\frac{\mu_0 I}{8R}$  (2)  $\frac{\mu_0 I}{4R}$   
 (3)  $\frac{\mu_0 I}{12R}$  (4)  $\frac{\mu_0 I}{16R}$

44. If magnetic field at point P is  $54 \mu\text{T}$  ; then magnetic field at centre of coil will be :-

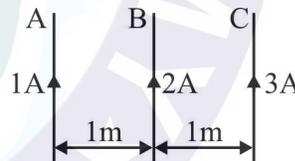


- (1)  $100 \mu\text{T}$   
 (2)  $200 \mu\text{T}$   
 (3)  $250 \mu\text{T}$   
 (4)  $350 \mu\text{T}$

45. A long straight cylindrical conductor of radius R has current density  $J_0$ . Magnetic field at a point lying inside the conductor at a distance r from its axis is :-

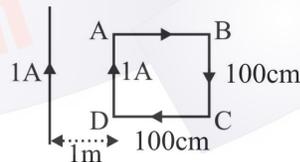
- (1)  $\mu_0 J_0 r$  (2)  $\frac{\mu_0 J_0 r}{2}$   
 (3)  $\frac{\mu_0 J_0 R^2}{2r}$  (4)  $\frac{\mu_0 J_0 R^2}{2}$

46. Force on 10 cm length of wire B will be :-



- (1)  $6 \times 10^{-8}$  N  
 (2)  $7 \times 10^{-8}$  N  
 (3)  $8 \times 10^{-8}$  N  
 (4)  $9 \times 10^{-8}$  N

47. Net force on square loop ABCD will be :-



- (1)  $10^{-6}$  N away from wire  
 (2)  $10^{-7}$  N towards wire  
 (3)  $10^{-5}$  N away from wire  
 (4)  $10^{-8}$  N towards wire

48. Match the column I with column II

Column-I		Column-II	
(a)	Magnetic field inside a long straight solenoid is	(p)	Not constant
(b)	Magnetic field inside a toroidal solenoid is	(q)	zero
(c)	Magnetic field inside a conducting hollow pipe having current parallel to its axis	(r)	Non zero Constant
(d)	Magnetic field due to current carrying wire on its surface is	(s)	maximum

- (1) (a) → r; (b) → p; (c) → q; (d) → s  
 (2) (a) → s; (b) → p; (c) → q, r; (d) → r  
 (3) (a) → r; (b) → s; (c) → q, r; (d) → p  
 (4) (a) → r; (b) → p; (c) → q, p; (d) → s

49. **Assertion :** In a conductor, free electrons keep on moving but no magnetic force acts on a conductor in magnetic field if no current is flowing.

**Reason :** Force on free electrons due to magnetic field always acts perpendicular to its direction of motion.

- (1) If both assertion and reason are true and true reason is correct explanation of the assertion.  
 (2) If both assertion and reason are true but reason is not correct explanation of the assertion.  
 (3) If assertion is true but the reason is false.  
 (4) If assertion is false but reason is true.

50. **Statement-1 :** The sensitivity of a moving coil galvanometer is increased by placing a suitable magnetic material as a core inside the coil.

**Statement-2 :** Soft iron has a low magnetic permeability and cannot be easily magnetized or demagnetized.

- (1) Statement-1 is true, statement-2 is true, statement-2 is a correct explanation of statement-1  
 (2) Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation of statement-1  
 (3) Statement-1 is true, statement-2 is false  
 (4) Statement-1 is false, statement-2 is true

## SECTION-A (CHEMISTRY)

51. The rate of reaction is expressed in different ways as follows :

$$+\frac{1}{2} \frac{d[C]}{dt} = -\frac{1}{3} \frac{d[D]}{dt} = +\frac{1}{4} \frac{d[A]}{dt} = -\frac{d[B]}{dt}$$

The reaction is :

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

52. For the reaction  $3A + 2B \rightarrow C$ , which statement is correct :-

- (1) Rate of formation of C is three times of rate of disappearance of A  
 (2) Rate of disappearance of B is 3/2 times of rate of disappearance of A  
 (3) Rate of disappearance of A is 3/2 times of rate of disappearance of B  
 (4) Rate of disappearance of B is half of the rate of formation of C

53. It is observed for the reaction  $2A + B \rightarrow \text{Product}$ , that

The order of the reaction is two with respect to A and zero with respect to B. If the concentration of each species is increased four times. Then rate becomes :-

- (1) 64 times  
 (2) 16 times  
 (3) 256 times  
 (4) 4 times

54. For the reaction  $A + B \rightarrow C$ ; starting with different initial concentration of A and B, initial rate of reaction were determined experimently in four experiments.

	[A] <sub>0</sub> /M (Initial conc.)	[B] <sub>0</sub> /M (Initial conc.)	rate/(M sec <sup>-1</sup> )
1.	$1.6 \times 10^{-3}$	$5 \times 10^{-2}$	$10^{-3}$
2.	$3.2 \times 10^{-3}$	$5 \times 10^{-2}$	$4 \times 10^{-3}$
3.	$1.6 \times 10^{-3}$	$10^{-1}$	$2 \times 10^{-3}$
4.	$3.2 \times 10^{-3}$	$10^{-1}$	$8 \times 10^{-3}$

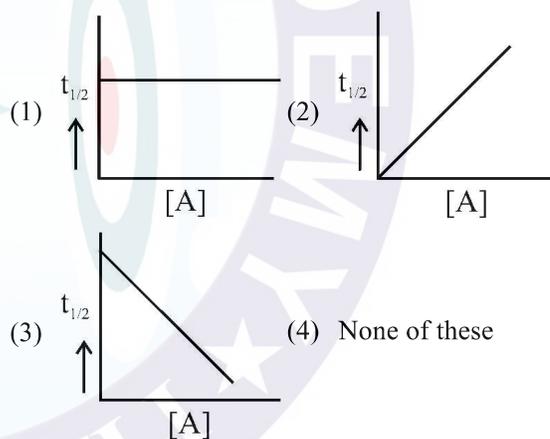
Rate law for reaction from above data is

- (1)  $r = k[A]^2 [B]^2$       (2)  $r = k[A]^2 [B]$   
 (3)  $r = k[A] [B]^2$       (4)  $r = k[A] [B]$
55. Consider the reaction mechanism  
 $A_2 \rightleftharpoons 2A$  (fast) ;  $K_C = k$   
 $A + B \xrightarrow{k_2} P$  (slow)  
 where A is the intermediate. The rate law for the reaction is  
 (1)  $k_2[A][B]$       (2)  $k_2K^{1/2}[A_2]^{1/2}[B]$   
 (3)  $k_2K^{1/2}[A][B]$       (4)  $k_2K^{1/2}[A]^2[B]$
56. For an elementary reaction  $A + B \rightarrow P$  the molecularity and order will be respectively :-  
 (1) 1, 1    (2) 2, 2    (3) 1, 2    (4) 2, 1
57. Which of the following is not correct for order of reaction :-  
 (1) Order is an experimental term  
 (2) Order can be in fraction  
 (3) Over all order of reaction can be negative  
 (4) Order may or may not be zero.
58. If unit of k is  $L^{1/2} \text{ Mole}^{-1/2} \text{ sec}^{-1}$  then order of reaction will be :-  
 (1)  $-1/2$     (2)  $1/2$     (3)  $3/2$     (4)  $-3/2$

59. **Assertion (A)** :- Hydrolysis of ester in the presence of acid is a first order reaction whereas in the presence of alkali, it is a second order reaction.

**Reason (R)** :- In hydrolysis of ester, acid acts only as catalyst whereas alkali acts as one of the reactant.

- (1) Both (A) and (R) are correct but (R) is not the correct explanation of (A)  
 (2) (A) is correct but (R) is not correct  
 (3) (A) is incorrect but (R) is correct  
 (4) Both (A) and (R) are correct and (R) is the correct explanation of (A)
60. Which of the following curve represents zero order reaction :-



61. Initial concentration of Reactant P is 5 mol/L for the reaction  $P \rightarrow Q$  and Rate constant 'k' is  $0.02 \text{ mol/Lmin}^{-1}$  then half life( $t_{1/2}$ ) of reaction is :-  
 (1) 250 min      (2) 500 min  
 (3) 125 min      (4) 62.5 min
62. The initial concentration for a first order reaction has been taken equal to  $M/10$ . After 8 minutes and 20 seconds the reactant concentration has become  $M/100$ . What is the velocity constant for reaction.  
 (1)  $5 \times 10^{-3} \text{ sec}^{-1}$     (2)  $2.303 \times 10^{-5} \text{ sec}^{-1}$   
 (3)  $2.303 \times 10^{-4} \text{ sec}^{-1}$     (4)  $4.606 \times 10^{-3} \text{ sec}^{-1}$

63. Wrong fact for the first order reaction are :-

- (1)  $t_{50\%} = 100 \text{ sec.}, t_{75\%} = 200 \text{ sec}$
- (2)  $t_{75\%} = 32 \text{ min}, t_{50\%} = 16 \text{ min}$
- (3) Both of the above
- (4)  $t_{50\%} = 100 \text{ sec.}, t_{75\%} = 150 \text{ sec}$

64. Which of the following statements is incorrect ?

- (1) A second order reaction must be a bimolecular elementary reaction
- (2) A bimolecular elementary reaction must be a second order reaction
- (3) Zero order reaction must be a complex reaction.
- (4) First order reaction may be complex or elementary reaction.

65. Match the Column :

	Column-I		Column-II
(P)	Zero order reaction	(1)	$t_{1/2} \propto \frac{1}{[A]_0}$
(Q)	First order reaction	(2)	$t_{100\%} = [A]_0/k$
(R)	Second order reaction	(3)	Involves at least two reactants
(S)	Pseudo unimolecular reaction	(4)	$[A]_t = [A]_0 e^{-kt}$

- (1) P-2; Q-1; R-4; S-3
- (2) P-2; Q-4; R-1; S-3
- (3) P-2; Q-1; R-3; S-4
- (4) P-3; Q-2; R-1; S-4

66. The energies of activation for forward and reverse reactions for  $A_2 + B_2 \rightleftharpoons 2AB$  are  $180 \text{ kJ mol}^{-1}$  and  $200 \text{ kJ mol}^{-1}$  respectively. The presence of a catalyst lowers the activation energy of both (forward and reverse) reactions by  $100 \text{ kJ mol}^{-1}$ . The enthalpy change of the reaction ( $A_2 + B_2 \rightarrow 2AB$ ) in the presence of catalyst will be (in  $\text{kJ mol}^{-1}$ ) -

- (1) 300
- (2) 120
- (3) 280
- (4) -20

67. The rate constant of a reaction does not depend on

- (1) temperature
- (2) activation energy
- (3) catalyst
- (4) concentration of reactants and products

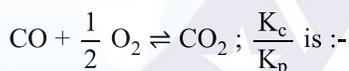
68. The plot of  $\ln K$  v/s  $\frac{1}{T}$  for a reaction gives a straight line with the slope of line equal to  $-2 \times 10^4 \text{ K}$ . Activation energy for the reaction in  $\text{kJ/mol}$ . (Given  $R = 8.3 \text{ JK}^{-1}\text{mol}^{-1}$ )

- (1) 83
- (2) 166
- (3) 249
- (4) 332

69. At equilibrium, the correct statement from the following is :-

- (1) Concentration must be different
- (2) Concentration must be equal
- (3) Rate of forward and backward reactions must be equal
- (4) Rate of forward and backward reactions may be equal

70. For the gaseous reaction,



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

71. The equilibrium  $\text{SO}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightleftharpoons \text{SO}_3(\text{g})$  is established in a container of 4 litre at a particular temperature. If number of moles of  $\text{SO}_2$ ,  $\text{O}_2$  and  $\text{SO}_3$  at equilibrium are 2, 1 and 4 respectively. Then value of  $K_C$  will be :-

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

72. For the reaction  $\text{C}(\text{s}) + \text{CO}_2(\text{g}) \rightleftharpoons 2\text{CO}(\text{g})$  the partial pressure of  $\text{CO}$  and  $\text{CO}_2$  are 2.0 and 4.0 atm respectively at equilibrium. The  $K_p$  for the reaction is :-

- (1) 0.5
- (2) 4.0
- (3) 8.0
- (4) 1

73. If equilibrium constant is  $K_C$  for the reaction  $2\text{HI}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{I}_2(\text{g})$ , then equilibrium concentration of HI will be :-  
(Consider initially only HI is present)

(1)  $\frac{[\text{H}_2]}{[\text{K}_C]^{\frac{1}{2}}}$

(2)  $\left[ \frac{[\text{H}_2][\text{I}_2]}{\text{K}_C} \right]^{\frac{1}{2}}$

(3)  $[\text{I}_2][\text{K}_C]^{-1/2}$

(4) All of the above

74. Favourable condition for melting of ice are :-

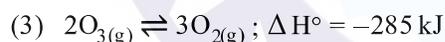
(1) High temperature and low pressure

(2) High temperature and high pressure

(3) Low temperature and high pressure

(4) Low temperature and low pressure

75. Consider the following reactions, in which case product formation is favoured by low pressure & low temperature :-



76. When aqueous solution of HCN is diluted four times then degree of ionisation of HCN will be -

(1) 3 times (2) 4 times

(3) 2 times (4) 1/3 times

77. Which of the following solutions when added to 1 L of 0.1 M  $\text{CH}_3\text{COOH}$  will decrease the pH of the solution ?

(1) 1 L of  $\text{H}_2\text{O}$

(2) 1 L of 0.1 M  $\text{CH}_3\text{COONa}$

(3) 1 L of 0.1 M HCl

(4) 1 L of 0.1 M  $\text{CH}_3\text{COOH}$

78. The common ion effect is shown by which of the following pair of solutions :-

(1)  $\text{BaCl}_2 + \text{BaNO}_3$  (2)  $\text{NaCl} + \text{HCl}$

(3)  $\text{NH}_4\text{OH} + \text{CH}_3\text{COOH}$  (4) None of these

79. Which one of the following salt is an acidic salt :-

(1)  $\text{Na}_2\text{HPO}_4$  (2)  $\text{NaH}_2\text{PO}_2$

(3)  $\text{Na}_2\text{HPO}_3$  (4)  $\text{NH}_4\text{NO}_2$

80. Calculate the degree of hydrolysis of 0.1 M  $\text{CH}_3\text{COONa}$  solution if ionisation constant of  $\text{CH}_3\text{COOH}$  is  $10^{-5}$  ?

(1)  $10^{-4}$  (2)  $10^{-8}$

(3)  $10^{-9}$  (4) None of these

81. Calculate the pH of a solution necessary to just begin the precipitation of  $\text{Mg}(\text{OH})_2$  when  $[\text{Mg}^{2+}] = 0.001 \text{ M}$ . ( $K_{\text{sp}}$  for  $\text{Mg}(\text{OH})_2 = 1.2 \times 10^{-11}$ )

(1) 11 (2) 10 (3) 9 (4) 8

82.  $10^{-5} \text{ M}$  NaOH solution at  $25^\circ\text{C}$  is diluted 1000 times. The pH of the resultant solution will :-

(1) be equal to 8 (2) lie between 7 and 8

(3) lie between 6 and 7 (4) remain unchanged

83. 50 ml of 2 N acetic acid is mixed with 10 ml of 1N sodium acetate solution. The solution will have an approximate pH of :- (If  $K_a(\text{CH}_3\text{COOH}) = 10^{-5}$ )

(1) 4 (2) 5 (3) 6 (4) 7

84. What is the suitable indicator for titration of NaOH and oxalic acid :-

(1) Methyl orange (2) Methyl red

(3) Phenolphthalein (4) Starch solution

85. For a sparingly soluble salt  $\text{AX}_2$  if value of its solubility product is  $3.2 \times 10^{-11}$ . Its solubility is :-

(1)  $4 \times 10^{-4} \text{ M}$  (2)  $5.6 \times 10^{-6} \text{ M}$

(3)  $2 \times 10^{-4} \text{ M}$  (4)  $3.1 \times 10^{-4} \text{ M}$

## SECTION-B (CHEMISTRY)

86. The rate law for the reaction  $A + B \rightarrow C$  is :  
 Rate =  $k[A][B]^{1/3}$ . If the concentration of B is increased by eight times while that of A is reduced to half then the rate of reaction becomes :
- (1) Twice (2) Thrice  
 (3) No change (4) Half
87. The reaction :  $2A \rightarrow 2B + C$  occurs by the mechanism :
- $$A \xrightarrow{k_1} B + X \text{ [slow] } \dots (1)$$
- $$A + X \xrightarrow{k_2} B + C \text{ [fast] } \dots (2)$$
- Which of the following statement is incorrect ?
- (1) Molecularity of the reaction is meaningless  
 (2) The order of the reaction with respect to A is two  
 (3) The rate law is :  $r = k_1[A]$   
 (4)  $k_2 > k_1$
88. Under what conditions a bimolecular reaction may be kinetically first order ?
- (1) When both reactants have same concentration  
 (2) When one of the reacting species is in large excess  
 (3) When the reaction is in equilibrium  
 (4) When the activation energy of reaction is less
89. The ratio of  $t_{7/8}$  and  $t_{1/2}$  for zero order reaction is :-
- (1)  $t_{7/8} = 3 \times t_{1/2}$  (2)  $t_{7/8} = \frac{7}{4} \times t_{1/2}$   
 (3)  $t_{7/8} = \frac{3}{2} \times t_{1/2}$  (4)  $t_{7/8} = 2 \times t_{1/2}$
90. For the reaction  $A \rightarrow 3B$  concentration of A and B becomes equal at 't' time, then 't' should be :-
- (1)  $t_{1/4}$  (2)  $t_{1/2}$   
 (3)  $t_{1/3}$  (4)  $t_{3/4}$
91. A first order reaction :  $A \rightarrow \text{Products}$  and a zero order reaction:  $R \rightarrow \text{Products}$  both have half life of 20 min when they are carried out taking  $4 \text{ mol L}^{-1}$  of their respective reactants. The number of mol per litre of A and R remaining unreacted after 60 min from the start of the reaction, respectively, will be :-
- (1) 1 M and 0.5 M (2) 0.5 M and 1 M  
 (3) 0.5 M and 0 M (4) 1 M and 0.25 M
92. If fraction of active molecules in a chemical reaction are  $10^{-5}$ , then calculate activation energy of this reaction at  $27^\circ\text{C}$  ?
- (1) 28.72 kcal (2) 2.87 kcal  
 (3) 6909 kcal (4) 6.909 kcal
93. The following equilibrium exists in a 10 litre flask at 500 K.  
 $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ .  
 Initially 1 mol each of  $\text{SO}_2$  &  $\text{O}_2$  is taken. if at equilibrium the number of moles of  $\text{SO}_3$  is twice the number of moles of  $\text{SO}_2$  then the number of moles of  $\text{O}_2$  at equilibrium is :
- (1)  $\frac{1}{2}$  (2)  $\frac{4}{3}$  (3)  $\frac{1}{3}$  (4)  $\frac{2}{3}$
94. For the reaction  
 $\text{SnO}_2(\text{s}) + 2\text{H}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g}) + \text{Sn}(\text{l})$   
 calculate  $K_p$  at 900 K, where the equilibrium steam-hydrogen mixture was 45%  $\text{H}_2$  by volume:-
- (1) 1.49 (2) 1.22  
 (3) 0.67 (4) None of these
95. At equilibrium Adding inert gas at constant volume  
 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$  will lead to :
- (1)  $\text{N}_2$  and  $\text{H}_2$  are formed in abundance  
 (2)  $\text{N}_2$ ,  $\text{H}_2$  and  $\text{NH}_3$  will have the same concentration  
 (3) The production of ammonia increases  
 (4) No change in the equilibrium mixture

96. pH of 0.001M acetic acid solution would be :-

- (1) 2
- (2) >3
- (3) 7
- (4) 14

97. If pH of the solution is 6.5 then :-

- (1)  $[H^+] > [OH^-]$
- (2)  $[H^+] = [OH^-]$
- (3)  $[H^+] < [OH^-]$
- (4) Any of the above (depend upon temperature)

98. A precipitate of  $CaF_2$  ( $K_{SP} = 1.7 \times 10^{-10}$ ) will be obtained when equal volume of the following are mixed-

- (1)  $10^{-4} M Ca^{2+}$  and  $10^{-4} M F^-$
- (2)  $10^{-2} M Ca^{2+}$  and  $10^{-3} M F^-$
- (3)  $10^{-5} M Ca^{2+}$  and  $10^{-3} M F^-$
- (4)  $10^{-3} M Ca^{2+}$  and  $10^{-5} M F^-$

99. Which of the following will produce a buffer solution when mixed in equal volumes ?

- (1)  $0.1 \text{ mol dm}^{-3} NH_4OH$  and  $0.1 \text{ mol dm}^{-3} HCl$
- (2)  $0.05 \text{ mol dm}^{-3} NH_4OH$  and  $0.1 \text{ mol dm}^{-3} HCl$
- (3)  $0.1 \text{ mol dm}^{-3} NH_4OH$  and  $0.05 \text{ mol dm}^{-3} HCl$
- (4)  $0.1 \text{ mol dm}^{-3} CH_3COONa$  and  $0.1 \text{ mol dm}^{-3} NaOH$

100. In which of the following combination, buffer action is expected ?

- (A)  $NH_4OH + NH_4Cl$
- (B)  $HCl + NaCl$
- (C)  $NH_4OH + HCl$  in 2 : 1 mole ratio

Select the correct answer from the following options :

- (1) A and B
- (2) A and C
- (3) A, B and C
- (4) None of these

## SECTION - A (BOTANY)

101. Gregor Mendel, conducted hybridisation experiments on garden peas for :-

- (1) Seven years (1822 - 1829)
- (2) Seven years (1856 - 1863)
- (3) Seven years (1957 - 1964)
- (4) Seven years (1858 - 1865)

102. To determine the genetic constitution of a tall garden pea plant at  $F_2$ , Mendel crossed it with a dwarf plant. This cross is called as :-

- (1) Self cross
- (2) Reciprocal cross
- (3) Out cross
- (4) Test cross

103. Read the following statement.

(A) For monohybrid cross, Mendel selected 14 true breeding pea plant varieties, as pairs which were similar except for two characters with contrasting traits.

(B) Mendel's experiments had a large sampling size, which gave greater credibility to the data that he collected.

(C) A true breeding line is one that having undergone continuous self pollination, shows the stable trait inheritance and expression for several generations.

(D) Law of dominance does not explain the proportion of 3 : 1 obtained at the  $F_2$  of monohybrid cross.

How many statements given above are correct.

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

104. Mendelian monohybrid test cross ratio is :-

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

105. Which of the following gamete will not be produced by genotype AaBBCc ?

- (1) ABC (2) aBc (3) aBC (4) AbC

106. Match the following and choose the correct combination from the option given below :

	Column-I		Column-II
(A)	Tt × Tt	(i)	1 : 1
(B)	Tt × tt	(ii)	3 : 1
(C)	TtRr × TtRr	(iii)	1 : 1 : 1 : 1
(D)	TtRr × ttrr	(iv)	9 : 3 : 3 : 1

- (1) A-ii, B-i, C-iv, D-iii  
 (2) A-iii, B-i, C-iv, D-ii  
 (3) A-ii, B-i, C-iii, D-iv  
 (4) A-ii, B-iv, C-i, D-iii

107. **Assertion (A)** :- 'ABO' blood grouping provides a good example of multiple alleles.

**Reason (R)** :- Multiple alleles can be found only when population studies are made.

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

108. Blood group of father is 'A' and that of daughter is 'O'. The genotype of mother could be :

- (1)  $I^A I^A$  or ii  
 (2)  $I^A I^B$  or ii  
 (3)  $I^A i$  or  $I^B i$  or ii  
 (4)  $I^A i$  or  $I^B i$  or  $I^A I^B$

109. A diploid organism is heterozygous for 3 loci, how many types of gamete can be produced :-

- (1) 4 (2) 8 (3) 16 (4) 32

110. **Statement-1** :- Phenylketonuria disease is caused by mutation in the gene that codes for the enzyme phenyl alanine hydroxylase.

**Statement-2** :- Phenylketonuria disease is an example of pleiotrophy.

- (1) Both statement-1 and 2 are correct.  
 (2) Both statement-1 and 2 are incorrect.  
 (3) Only statement-1 is correct.  
 (4) Only statement-2 is correct.

111. The inheritance of size of starch grains in *Pisum sativum* is example of :-

- (1) Co-dominance  
 (2) Incomplete dominance  
 (3) Multiple alleles  
 (4) Polygenic inheritance

112. Which law explains the proportion of 3 : 1 obtained at the  $F_2$  in monohybrid cross?

- (1) Law of independent assortment  
 (2) Linkage  
 (3) Law of dominance  
 (4) Both (1) and (2)

113. The modified allele is equivalent to the unmodified allele when it produces :-

- (1) No enzyme at all  
 (2) Normal enzyme  
 (3) Non functional enzyme  
 (4) Either non functional or no enzyme at all.

114. When two pairs of traits are combined in a hybrid, segregation of one pair of traits is independent of the other pair of traits. This explains :-

- (1) Law of independent assortment  
 (2) Law of dominance  
 (3) Law of segregation  
 (4) Linkage

**115.** Which law explains that the alleles do not show any blending and that both the characters are recovered as such in the  $F_2$  generation though one of these is not seen at the  $F_1$  stage ?

- (1) Law of segregation
- (2) Law of independent assortment
- (3) Linkage
- (4) Law of paired factors

**116.** In which case dominance is not an autonomous feature of a gene or the product that it has information for ?

- (1) One phenotype is influenced by one gene.
- (2) More than one phenotype is influenced by the same gene.
- (3) One phenotype is influenced by many genes.
- (4) More than two genes affecting a single character.

**117.** Sickle cell anaemia is caused by the substitution of glutamic acid by (A) at the sixth position of the (B) globin chain of the haemoglobin molecule.

- (1) A-Glutamine, B-Beta
- (2) A-Valine, B-Alpha
- (3) A-Valine, B-Beta
- (4) A-Glycine, B-Beta

**118.** Behaviour of chromosome is parallel to behaviour of gene is given by –

- (1) Sutton and Boveri
- (2) Mendel
- (3) Hershey and Chase
- (4) T.H. Morgan

**119.** What is the probability of female child to be colourblind if father is colourblind and mother is also carrier for colourblindness.

- (1) 50%
- (2) 25%
- (3) 0%
- (4) 75%

**120.** XX female and XO type of sex determination is also known as -

- (1) Protenor type
- (2) Progametic type
- (3) Lygaeus type
- (4) Syngamic

**121.** Match the following column -

Column-I		Column-II	
(1)	XX – XO	(a)	Birds
(2)	ZW – ZZ	(b)	Grass hopper
(3)	XX – XY	(c)	Human
(4)	Haploid Diploid mechanism	(d)	Honey bee

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

**122.** Recombination frequency between gene a and b is 5% between b and c is 20% between a and c is 25% Find out sequence of these gene on linear chromosome.

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

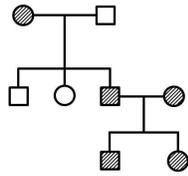
**123.** In a random mating population frequency of dominance allele is 0.6 what will be the frequency of recessive phenotype -

- (1) 0.09
- (2) 0.16
- (3) 0.49
- (4) 0.21

**124.** Yellow body white eyed Drosophila is crossed with brown body red eyed drosophila. The what would be frequency of recombinant in  $F_2$  generation.

- (1) 98.7%
- (2) 1.3%
- (3) 62.8%
- (4) 37.2%

125. Study the pedigree given below and assign the type of inheritance of the Trait –



- (1) Sex linked Recessive  
 (2) Autosomal Recessive  
 (3) Autosomal Dominant  
 (4) Both 2 and 3
126. **Assertion:** Parbhani kranti is yellow mosaic resistant variety of lady finger.  
**Reason:** Parbhani kranti is produced by cross between domestic variety of lady finger and wild variety of lady finger.
- (1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.  
 (2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.  
 (3) Assertion is True but the Reason is False.  
 (4) Both Assertion & Reason are False.
127. Match the following column -

Column-I		Column-II	
(1)	Kalyan sona	(a)	Rice
(2)	IR - 8	(b)	Wheat
(3)	Pusa swarnim	(c)	Pusa Komal
(4)	Lobia	(d)	Mustard

- (1) 1 – a, 2 – b, 3 – d, 4 – c  
 (2) 1 – b, 2 – a, 3 – d, 4 – c  
 (3) 1 – c, 2 – b, 3 – a, 4 – d  
 (4) 1 – d, 2 – a, 3 – c, 4 – b
128. Production of crop of high protein content, vitamin, micronutrient is known as -
- (1) Single cell protein (2) Biofortification  
 (3) Tissue culture (4) Totipotency

129. **Statement-I:** Production of thousands of plant by tissue culture is known as micro propagation.

**Statement-II:** Genetically identical plant is known as soma clone.

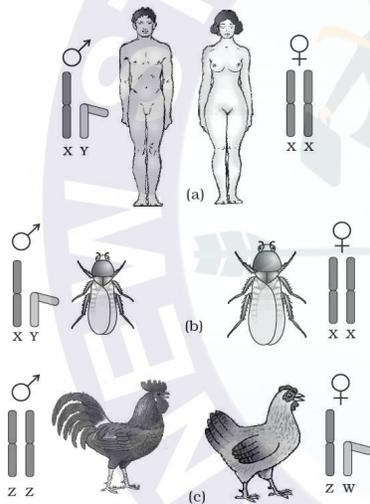
- (1) Both statements I and II are incorrect.  
 (2) Both statements I and II are correct.  
 (3) Statement-I incorrect statement-II correct.  
 (4) Statement-I correct statement-II incorrect.
130. **Statement-I:** Drosophila produce large number of progeny flies is single mating.  
**Statement-II:** They complete their life cycle in about 2 weeks.
- (1) Both statement are correct.  
 (2) Both statement are incorrect.  
 (3) Statement-I correct statement-II incorrect.  
 (4) Statement-II incorrect statement-I correct
131. Colourblindness is present in -
- (1) 0.4 % Female & 10% male  
 (2) 0.4 % Female & 12% male  
 (3) 0.4 % Female & 8% male  
 (4) 0.4 % Female & 0.8% male
132. Which of the following are the main variety of wheat developing during green Revolution.
- (1) Sonora 64  
 (2) Atlas 66  
 (3) Pusa Subhra  
 (4) Pusa sawani
133. How many statement are correct regarding steps of plant breeding.
- (1) Collection of variability  
 (2) Evaluation and selection of parent.  
 (3) Self pollination among the selected parent.  
 (4) Selection of superior recombinant.
- (1) 1 (2) 3 (3) 4 (4) 2

**134. Assertion:** Explant is part of plant that is excised from its original location. It may be root tip, shoot tip.

**Reason:** Meristematic cells are present in explant.

- (1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- (2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- (3) Assertion is True but the Reason is False.
- (4) Both Assertion & Reason are False.

**135.** Following diagram represent determination of sex.



Which of the following is Lygaeus Type?

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

### SECTION - B (BOTANY)

**136.** What results Mendel would have got when he self-pollinated a impure tall  $F_2$  garden pea plant?

- (1) All tall plants
- (2) All dwarf plants
- (3) Tall and dwarf plants in 3 : 1 ratio
- (4) Tall and dwarf plants in 1 : 1 ratio

**137.** In a Mendelian dihybrid cross in garden pea plants, 1024 plants were obtained in  $F_2$  generation. How many plants will show dominant traits for both characters?

- (1) 576
- (2) 64
- (3) 384
- (4) 256

**138.** Which of the following traits in garden pea plants express in both homozygous and heterozygous condition?

- (a) White flower colour
- (b) constricted pod shape
- (c) Yellow seed colour
- (d) Wrinkled seed shape
- (e) Green pod colour

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

**139.** If both parents are affected by autosomal recessive disorder then what are the chances of pregnancy resulting in a affected child?

- (1) 25%
- (2) 50%
- (3) 0%
- (4) 100%

**140.** What will be the probability of parental phenotype in the  $F_2$  generation of a quantitative character regulated by three genes.

- (1)  $\frac{2}{64}$
- (2)  $\frac{62}{64}$
- (3)  $\frac{2}{16}$
- (4)  $\frac{14}{16}$

**141.** Correctly match column-I with column-II

	Column-I		Column-II
(A)	Incomplete dominance	(i)	Skin colour in human
(B)	Co-dominance	(ii)	Phenylketonuria
(C)	Pleiotropy	(iii)	'AB' blood group
(D)	Polygenic inheritance	(iv)	Flower colour in snapdragon

- (1) A-iv, B-iii, C-ii, D-i
- (2) A-iv, B-iii, C-i, D-ii
- (3) A-iv, B-ii, C-iii, D-i
- (4) A-iii, B-iv, C-ii, D-i

142. **Statement-I** :- 'ABO' blood groups are controlled by the gene I.

**Statement-II** :- A total of six different phenotypes of the human 'ABO' blood types are possible.

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

143. Which of the following statement is incorrect ?

- (1) Genes which code for a pair of contrasting traits are known as alleles.
- (2) The production of gametes by the parents, the formation of the zygotes, the  $F_1$  and  $F_2$  plants can be understood from a diagram called Punnett square.
- (3) Genotypic ratio at  $F_2$  in monohybrid cross is 1 : 2 : 1.
- (4) In a Mendelian monohybrid cross in garden pea plants 4 types of phenotype are obtained at  $F_2$ .

144. Skin colour in human is example of ?

- (1) Polygenic inheritance
- (2) Monogenic quantitative inheritance
- (3) Incomplete Dominance
- (4) Co Dominance

145. Mendelian disorder is –

- (1) Hemophilia
- (2) Klinefelter syndrome
- (3) Down's syndrome
- (4) Turner syndrome

146. Germ plasm collection is known as -

- (1) Collection of all the diverse allele of all genes.
- (2) Collection of best cultivar.
- (3) Cross between superior recombinant
- (4) Cross between parents

147. Pomato is produce by the process of -

- (1) Somatic embryogenesis
- (2) Somatic hybridisation
- (3) Micro propagation
- (4) Totipotency

148. Sex determination in honey bee is due to -

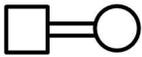
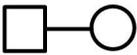
- (1)  $\frac{X}{A}$  = Ratio
- (2) ZW – ZZ type
- (3) Haploid-Diploid mechanism of sex determination
- (4) XX-XY Type

149. **Statement-I:** Independent pair segregate independently of each other represent gene.

**Statement-II:** One Pair Segregates independently of Another pair represent chromosome.

- (1) Both statement are wrong.
- (2) Statement-I and Statement-II are both correct
- (3) Statement-II correct Statement-I incorrect
- (4) Statement-I correct statement-II incorrect

150. Which of the following symbol represent consanguineous marriage.

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

## SECTION - A (ZOOLOGY)

151. If any protein-encoding gene is expressed in a heterologous host it is called a:-

- (1) Enzymatic protein (2) Recombinant protein  
(3) Folded protein (4) Toxic protein

152. Which help in identifying the successful transformant with recombinant DNA cell :

- (1) Enzyme (2) cloning site  
(3) Restriction site (4) Selectable markers

153. Which divalent cations are usually used to make competent cells ?

- (1) Fe (2)  $Ca^{2+}$  (3) Cu (4)  $N_2$

154. During electrophoresis DNA fragments move towards the :-

- (1) Anode (2) Cathode  
(3) Both the pole (4) Not any pole

155. During gel electrophoresis for visualization of DNA fragments acted upon by restriction endonuclease enzyme they are stained by :-

- (1) Green dye (2) Acetocarmine  
(3) Ethidium bromide (4) Janus green

156. \_\_\_ organism plasmid was used for the construction of first r-DNA.

- (1) BGA  
(2) *Bacillus substalis*  
(3) *Salmonella typhimurium*  
(4) *E.Coli*

157. In which DNA sequence does the restriction enzyme EcoRI always cleave the nitrogen sequence.

- (1) GAATTC (2) GGATCC  
(3) GATTTG (4) TGGCCA

158. Restriction enzymes are \_\_\_\_ :-

- (1) Molecular glues (2) Molecular vector  
(3) Molecular scissors (4) *Nucleic acids*

159. Who gave the definition of biotechnology :-

- (1) NCBI (2) EFB (3) NIH (4) NCCS

160. Which metal microparticles are used in gene gun method.

- (1) Iron (2) Silver  
(3) Gold or tungsten (4) Calcium and copper

161. Restriction in restriction enzyme refer to :-

- (1) Cutting of DNA helix at specific position only  
(2) Cutting of DNA helix at non specific position only  
(3) Cleaving of phosphodiester bond in DNA.  
(4) Prevention of the multiplication of bacteriophage in bacteria.

162. Read statement carefully and select correct one with respect to gel electrophoresis :-

- (1) DNA can be seen in visible light  
(2) DNA can be seen without staining in visible light.  
(3) Ethidium bromide stained DNA can be seen under exposure to UV-light.  
(4) Ethidium bromide stained DNA can be seen under exposure to visible light.

163. What is the process of separating and purifying recombinant protein before marketing called ?

- (1) Up stream processing  
(2) Down stream processing  
(3) Bioprocessing  
(4) Bioinformatics

164. An enzyme catalysing the removal of nucleotides from the end of DNA is :-

- (1) Endonuclease (2) Exonuclease  
(3) ECORI (4) Hind-II

165. After incubation of bacterial cells with recombinant DNA on ice, heat shock is given in which the bacterial cells are exposed to a temperature of :

- (1) 22° C (2) 32° C (3) 42° C (4) 52° C

166. In gel electrophoresis, DNA molecules are separated on the basis of :-

- (1) Size
- (2) Volume
- (3) Positive charge of DNA
- (4) Both charge and volume

167. Which of the following step's are catalysed by Taq DNA polymerase in a P.C.R.

- (1) Denaturation      (2) Primer annealing
- (3) Extension of primers (4) All step's

168. Micro-injection method is used to introduce alien DNA into host cells, r-DNA is directly injected into the nucleus of ..... cell :

- (1) Animal      (2) Plant
- (3) Bacterial      (4) Fungal

169. Given below are two statements : One is labelled as Assertion **A** and the other is labelled as Reason **R** :

**Assertion (A)** : The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to visible light.

**Reason (R)** : You can not see pure DNA fragments in the UV-light and without staining by ethidium bromide.

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

170. Which vector have the ability to replicate within bacterial cells independent of the control of chromosomal DNA :

- (1) Plasmids
- (2) Bacteriophages
- (3) Both plasmids and Bacteriophages
- (4) Prions

171. When protein encoding gene is expressed in heterologous host, it is known as \_\_\_\_\_ :

- (1) Transformed protein
- (2) Non transformed protein
- (3) Recombinant protein
- (4) Non recombinant protein

172. Enzyme Linked Immuno-Sorbent Assay (ELISA) is a technique :-

- (1) of conventional method of dignosis
- (2) based on antigen antibody interaction in molecular diagnosis
- (3) of separation of DNA in gel electrophoresis
- (4) of large production in green revolution

173. A transgenic animal that developed for use in testing the safety of vaccine before they are used on human :-

- (1) Cow (2) Mice (3) Goat (4) pig

174. Bt cotton is a pest resistance crop :-

- (1) It increased reliance on chemical pesticide
- (2) It enhanced nutritional value of food
- (3) It contain a gene of *Bacillus thuringiensis* to reduce post harvest losses
- (4) It reduce reliance on chemical pesticide.

175. Who observed that restriction enzymes have the capability to cut DNA strands in a particular fashion :-

- (1) Herbert Boyer      (2) H.G. Khorana
- (3) Alexander Fleming (4) M.S. Swaminathan

176. What term is used for a sequence in pBR322 from where replication starts and also responsible for copy number of linked DNA.

- (1) Selectable marker (2) Cloning site
- (3) Ori site      (4) Vir-gene

177. A part of plasmid of *Agrobacterium tumifaciens* which is able to deliver a piece of DNA to transform normal plant cells into a tumor.

- (1) T-DNA                      (2) F-DNA  
 (3) T-RNA                      (4) F-RNA

178. Which of the following statements is NOT correct :-

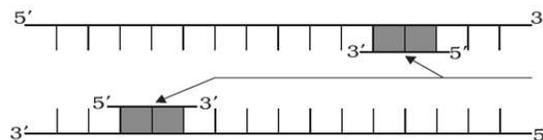
- (1) Insulin used for diabetes was earlier extracted from pancreas of slaughtered cattle and pigs.  
 (2) Proinsulin consist of two short polypeptide chains.  
 (3) In mature insulin chain A and Chain B, that are linked together by disulphide bridges.  
 (4) In 1983. Eli Lilly an American company prepared two DNA sequences corresponding to A and B.

179.

List-I (Enzyme)		List-II (Substrate)	
(A)	Lysozyme	(i)	Cut Ends of DNA
(B)	Cellulase	(ii)	Bacteria cell wall
(C)	Chitinase	(iii)	Fungus cell wall
(D)	Exonucleases	(iv)	Plant cell wall

- (1) (A)-ii, (B)-iv, (C)-iii, (D)-i  
 (2) (A)-ii, (B)-iv, (C)-i, (D)-iii  
 (3) (A)-iv, (B)-ii, (C)-iii, (D)-i  
 (4) (A)-iv, (B)-iii, (C)-i, (D)-ii

180.



Above diagram showing one stage of PCR. Choose the correct representation.

- (1) Denaturation  
 (2) Extension  
 (3) Binding of DNA primer with DNA template  
 (4) Polymerisation of deoxyribonucleotides by taq polymerase

181. Which of the following human disease does not have transgenic models:-

- (1) Cystic fibrosis  
 (2) Rheumatoid arthritis  
 (3) Alzheimer's  
 (4) Phenylketonuria

182. **Statement-I** : Most Bt-toxic genes are insect group specific.

**Statement-II** : The choice of Bt toxic genes depends upon the crop and targeted pest.

- (1) Statement-I & Statement-II both are correct.  
 (2) Statement-I & Statement-II both are incorrect.  
 (3) Only Statement-I is correct.  
 (4) Only Statement-II is correct.

183. **Statement-I** : DNA fragments can be separated by a technique known as PCR.

**Statement-II** : Multiple copies of the gene of interest is synthesised in-vitro by using gel electrophoresis.

- (1) Statement-I and II both are correct.  
 (2) Statement-I and II both are incorrect.  
 (3) Only statement-I is correct.  
 (4) Only statement-II is correct.

184. **Statement-I** : The Indian parliament has recently cleared the second amendment of the Indian Patent Bill.

**Statement-II** : In 2022 an African company got patent right on basmati rice.

- (1) Statement-I and II both are correct.
- (2) Statement-I and II both are incorrect
- (3) Only statement-I is correct.
- (4) Only statement-II is correct.

185. **Statement-I** : Probe is a double stranded DNA tagged with a radioactive molecule.

**Statement-II** : PCR is now routinely used to detect HIV in suspected AIDS patients.

- (1) Statement-I and II both are correct.
- (2) Statement-I and II both are incorrect.
- (3) Only statement-I is correct.
- (4) Only statement-II is correct.

### SECTION - B (ZOOLOGY)

186. The techniques of \_\_\_\_\_ overcome the limitation of traditional hybridization process.

- (1) Get electrophoresis
- (2) Morden hybridization
- (3) PCR
- (4) Genetic engineering

187. There is a restriction endonuclease called EcoRI what does "R" letter stand for :

- (1) Restriction Enzyme
- (2) Species
- (3) Genus
- (4) Name of bacterial strain

188. Which organism can transfer 'T-DNA' with in plants:

- (1) *Penicillium notatum*
- (2) *Agrobacterium tumifaciens*
- (3) *E.Coli*
- (4) *Xanthomonas citrii*

189. Match the columns :-

	Column-A		Column-B
(1)	Elution	(A)	Cloning vector
(2)	Ampicillin resistant gene	(B)	Obtaining DNA Fragments with sticky end
(3)	Ti Plasmid	(C)	Selectable marker
(4)	Restriction enzyme	(D)	Obtaining bands of DNA from agrose gel

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

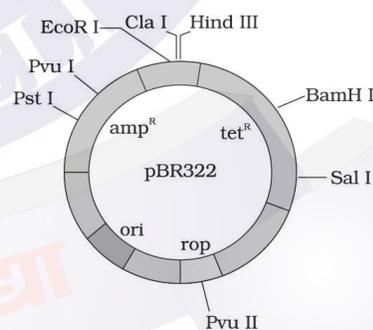
190. Primers used in PCR are :-

- (1) Chemically synthesised dinucleotide
- (2) Chemically synthesised oligonucleotide
- (3) Natural oligonucleotide
- (4) Natural polymer

191. Restriction enzyme breaks :-

- (1) Hydrogen bond
- (2) Glycosidic bond
- (3) Sugar phosphate back bone linkage.
- (4) All bonds in DNA

192. If EcoRI, Hind III and Sal I act on their respective sites on pBR322, than which condition will results ?



	pBR322 restores resistance against	
	Ampicillin	Tetracycline
(1)	No	No
(2)	No	Yes
(3)	Yes	No
(4)	Yes	Yes

- 193.** Read the following statements carefully.  
 (a) The first restriction endonuclease - BamHI  
 (b) Restriction enzymes are used in the isolation of DNA from other macro-molecule.  
 (c) Downstream processing is one of the steps of r-DNA technology.  
 (d) Disarmed pathogen vectors are also used in the transfer of r-DNA into the host.  
 How many statements is/are correct.

(1) Two (2) One (3) Three (4) Four

- 194.** Given below are two statements :

**Statement I :** Selection of recombinants due to inactivation of antibiotics is cumbersome procedure because it requires simultaneous plating on two plate having different antibiotics.

**Statement II :** An alternative selectable markers have been developed which differentiate recombinants from non-recombinants on the basis of their ability to produce colour in presence of a chromogenic substrate.

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

- 195.** Which method involves silencing of a specific mRNA in *Meloidogyne incognita*.

(1) DNai (2) RNAi (3) PCR (4) ELISA

- 196.** Identify the correct statements :

(A) The cutting of DNA by restriction endonucleases results in the fragments of DNA  
 (B) DNA fragments are positively charged molecules.

(C) DNA fragments can be separated by forcing them to move towards the anode under an electric field through matrix.

(D) Agarose is the most commonly used matrix which is extrated from terrestrial weed.

(E) The DNA fragments separate according to their size through sieving effect provided by the agarose gel.

Choose the correct answer from the options given below :-

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

- 197.** Match List I with List II :

List I		List II	
A.	Denaturation	I	DNA primer
B.	Extension	II	Heat
C.	Taq poly merase	III	Deoxy ribonucleotides
D.	Annealing	IV	<i>Thermus aquaticus</i>

Choose the correct answer from the options given below :

- (1) A-(II), B-(III), C-(I), D-(IV)  
 (2) A-(II), B-(III), C-(IV), D-(I)  
 (3) A-(III), B-(II), C-(IV), D-(I)  
 (4) A-(III), B-(II), C-(I), D-(IV)

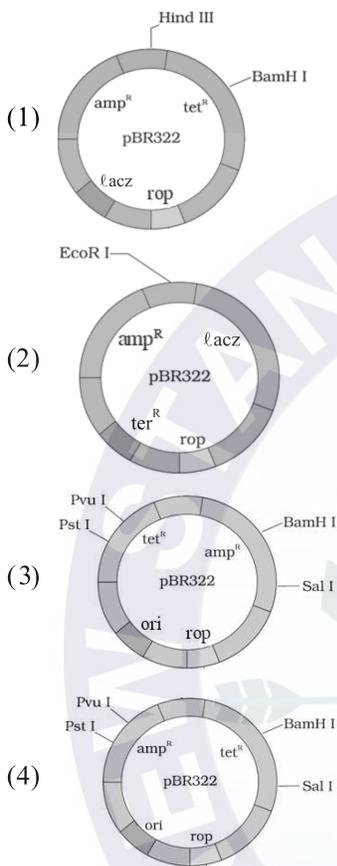
- 198.**

List I		List II	
(A)	$\alpha$ -1 Antitrypsin	(i)	Gene therapy
(B)	$\alpha$ -lactalbumin	(ii)	Genetically engineered insulin
(C)	Adenosine deaminase	(iii)	Transgenic cow
(D)	Humulin	(iv)	emphysema

Choose the correct answer from option given below :-

	A	B	C	D
(1)	iii	iv	i	ii
(2)	ii	i	iii	iv
(3)	iv	i	iii	ii
(4)	iv	iii	i	ii

199. Which of the following artificial cloning vector of *E.coli* showing CORRECT sequence of ori site, selectable marker and cloning sites etc.



200.

List-I		List-II	
(P)	Spooling	(i)	The separated bands of DNA are cut out from agarose gel and extracted from the gel piece
(Q)	Ori of pBR322	(ii)	Purified DNA ultimately precipitates out after addition of chilled ethanol
(R)	Elution	(iii)	Controlling the copy number of linked DNA
(S)	Cloning site of pBR322	(iv)	Required to linked the alien DNA with vector

- (1) P-(iii), Q-(iv), R-(i), S-(ii)  
 (2) P-(ii), Q-(iii), R-(i), S-(iv)  
 (3) P-(ii), Q-(i), R-(iii), S-(iv)  
 (4) P-(i), Q-(iv), R-(iii), S-(ii)