



# Monthly Progressive Test

Class: XI

Subject: PCMB



Test Booklet No.: MPT-06

Test Date: 

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Time: 120 mins

Full Marks: 200

## Important Instructions :

1. The Test is of 120 mins duration and the Test Booklet contains 100 multiple choice questions of single correct option only. There are four sections with four subjects. You have to attempt all 100 questions (Candidates are advised to read all 100 questions). Questions 1 to 25 contain Physics, Questions 26 to 50 contain Chemistry, Questions 51 to 75 contain Mathematics, Questions 76 to 100 contain Biology.
2. Each question carries 2 marks. For each correct response, the candidate will get 2 marks. There is no negative mark for wrong response. The maximum mark is 200.
3. Use Blue / Black Ball point Pen only for writing particulars marking responses on Answer Sheet.
4. Rough work is to be done in the space provided for this purpose in the Test Booklet only.
5. On completion of the test, the candidate must handover the Answer Sheet to the invigilator before leaving the Room / Hall. The candidates are allowed to take away this Test Booklet with them.
6. The CODE for this Booklet is Off Line MPT06 16012026.
7. 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 UID No. anywhere else except in the specified space. Use of white fluid for correction is NOT permissible on the Answer Sheet. **Do not scibble or write on or beyond discrete bars of OMR Sheet at both sides.**
8. Each candidate must show on-demand his/her Registration document to the Invigilator.
9. No candidate, without special permission of the Centre Superintendent or Invigilator, would leave his/her seat.
10. Use of Electronic Calculator/Cellphone is prohibited.
11. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
12. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
13. There is no scope for altering response mark in Answer Sheet.

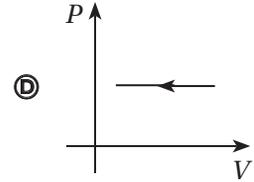
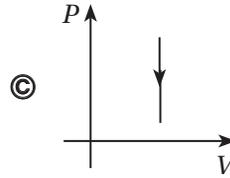
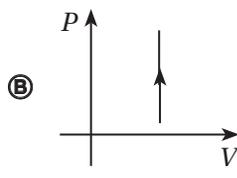
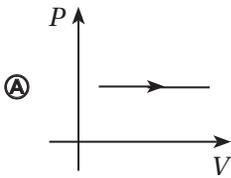
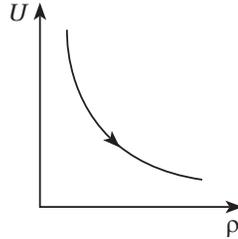
**Space For Rough Works**



# Physics

## Topic : Thermodynamics and Revision

1. Variation of internal energy with density is given in the graph. Draw its pressure ( $P$ ) and volume ( $V$ ) graph



2. Amount of heat added to a system is  $Q$  and work done on the system is  $\frac{Q}{4}$ ; what will be the molar heat capacity for this system (for diatomic gas)

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

(B)  $\frac{4R}{3}$

(C)  $2R$

(D)  $\frac{5R}{4}$

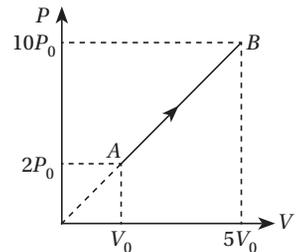
3. For diatomic two mole gas pressure and volume graph is as follows molar heat capacity for this process—

(A)  $2R$

(B)  $3R$

(C)  $\frac{3R}{2}$

(D)  $\frac{4R}{5}$



4. In a thermodynamic process  $V = \frac{K}{T^2}$ . If temperature increases by  $100^\circ\text{C}$  for 2 mole diatomic gas find work done—

(A)  $100R$

(B)  $200R$

(C)  $300R$

(D)  $400R$

5. Molar heat capacity of gas depends on

(A) Material of the gas

(B) atomicity of the gas

(C) degrees of freedom

(D) thermodynamic process

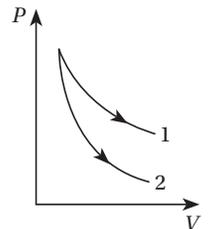
6. For adiabatic process ( $P$ - $V$ ) diagram for  $\text{H}_2$  and  $\text{He}$  is as follows

(A) 1 is for  $\text{H}_2$

(B) 1 is for  $\text{He}$

(C) 2 is for  $\text{H}_2$

(D) All of the above



7. Volume of a gas increases from  $V_1$  to  $V_2$  by three different thermodynamic process (i) isothermal (ii) adiabatic (iii) isobaric separately. Work is done by the processes are  $W_1$ ,  $W_2$  and  $W_3$  respectively, then

(A)  $W_1 > W_2 > W_3$

(B)  $W_3 > W_1 > W_2$

(C)  $W_2 > W_1 > W_3$

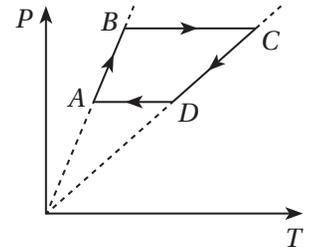
(D)  $W_1 = W_3 = W_2$

8. Volume of a gas increases from  $V_0$  to  $2V_0$  by adiabatically and then volume decreases from  $2V_0$  to  $V_0$  by isobarically, the net work done for the total process

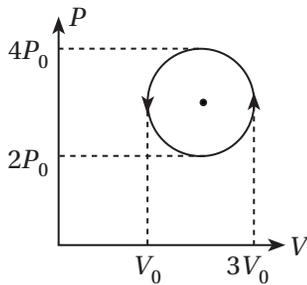
(A)  $W = -ve$  (B)  $W = +ve$   
 (C)  $W = 0$  (D) depends of atomicity of the gas

9. Six moles of an ideal gas performs a cycle shown in figure. If the temperatures are  $T_A = 600$  K,  $T_B = 800$  K,  $T_C = 2200$  K and  $T_D = 1200$  K. The work done per cycle is

(A) 20 kJ  
 (B) 30 kJ  
 (C) 40 kJ  
 (D) zero



10. In a thermodynamics process ( $P$ - $V$ ) diagram is as follows.



(A)  $-\pi P_0^2$  (B)  $-\pi V_0^2$  (C)  $-\pi P_0 V_0$  (D) All of the above

11. The elastic limit for a gas—

(A) exists only at absolute zero (B) exists always  
 (C) exists for a perfect gas (D) does not exist

12. Friction force for a rest body placed on a horizontal surface depends on

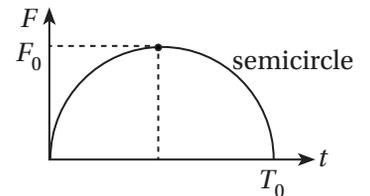
(A) Nature of contact surface (B) Normal reaction force  
 (C) Applied force (D) Area of contact

13. Sand is dropped on a conveyor belt at the rate of 5 kg/s. The extra force required to keep the belt moving at  $2 \text{ ms}^{-1}$  is

(A) 1 N (B) 10 N (C) 20 N (D) 4 N

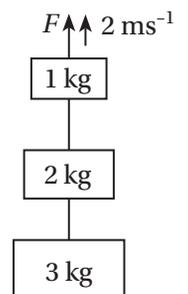
14. Force on a particle is given the graph with time shown in figure. Find the change in momentum.

(A)  $\frac{\pi}{2} F_0^2$  (B)  $\frac{\pi}{8} T_0^2$   
 (C)  $\frac{\pi}{4} F_0 T_0$  (D) all of the above



15. According to the diagram the system moving upward with constant velocity  $2 \text{ ms}^{-1}$ . Find the net force acting on the 2 kg mass.

(A) 30 N  
 (B) 50 N  
 (C) 60 N  
 (D) zero



## Assertion-Reason Type Questions

**Directions:** Read the following questions and choose any one of the following four responses.

- A. If both Assertion and Reason are true and Reason is the correct explanation of the Assertion.  
 B. If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.  
 C. Assertion is true but the Reason is false.  
 D. Assertion is False and Reason is true.

16. Assertion (A): The area under a velocity-time graph gives displacement.

Reason (R): Velocity is the rate of change of displacement with time.

- (A) A                                      (B) B                                      (C) C                                      (D) D

17. Assertion (A): The momentum of a body remains constant if no external force acts on it.

Reason (R): This is a consequence of Newton's first law of motion.

- (A) A                                      (B) B                                      (C) C                                      (D) D

18. Assertion (A): The value of acceleration due to gravity is maximum at the poles.

Reason (R): The radius of the Earth is minimum at the poles.

- (A) A                                      (B) B                                      (C) C                                      (D) D

19. Assertion (A): Work done by centripetal force in circular motion is zero.

Reason (R): The centripetal force is always perpendicular to the velocity of the particle.

- (A) A                                      (B) B                                      (C) C                                      (D) D

## Case Based Questions (MCQ Type)

**Case 1:** A car starts from rest and moves with uniform acceleration in a straight line. After 10 s, it attains a velocity of  $20 \text{ ms}^{-1}$ .

20. What is the acceleration of the car?

- (A)  $1 \text{ ms}^{-2}$                                       (B)  $2 \text{ ms}^{-2}$                                       (C)  $4 \text{ ms}^{-2}$                                       (D)  $0.5 \text{ ms}^{-2}$

21. What distance does the car travel in 10 s?

- (A) 50 m                                      (B) 100 m                                      (C) 150 m                                      (D) 200 m

22. Which equation of motion is used to calculate the distance traveled?

- (A)  $v = u + at$                                       (B)  $s = ut + \frac{1}{2}at^2$                                       (C)  $v^2 = u^2 + 2as$                                       (D)  $a = (v - u)/t$

**Case 2:** A satellite is moving in a circular orbit around the Earth with constant speed.

23. The force responsible for the circular motion of the satellite is:

- (A) Magnetic force                                      (B) Electrostatic force                                      (C) Gravitational force                                      (D) Frictional force

24. The work done by the centripetal force on the satellite is:

- (A) Maximum                                      (B) Minimum                                      (C) Zero                                      (D) Depends on speed

25. If the centripetal force suddenly becomes zero, the satellite will:

- (A) Fall vertically down                                      (B) Move in a circular path  
 (C) Move in a straight line tangentially                                      (D) Come to rest

## Chemistry

26. The shape of  $\text{XeO}_2\text{F}_2$  is:

- (A) Trigonal bipyramidal                                      (B) Square planar                                      (C) Tetrahedral                                      (D) See-saw

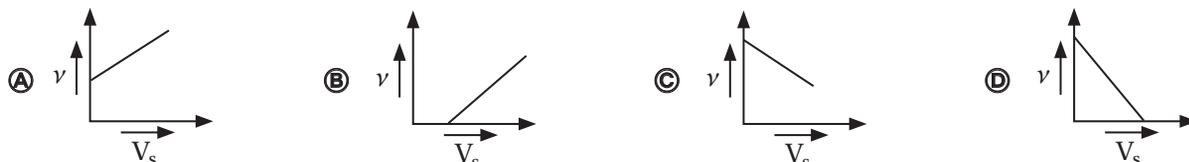
27. Which of the following compounds have zero dipole moment?



28. The species having bond order different from that in CO is:



29. Graph of incident frequency with stopping potential in photoelectric effect is:



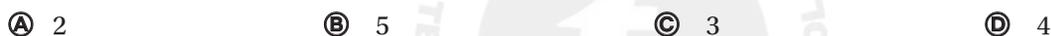
30. How many electrons with  $l = 2$  are there in an atom having atomic number 54?



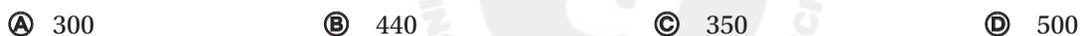
31. A 'd' orbital can accommodate maximum of—electrons:



32. An ion  $\text{M}^{4+}$  has the magnetic moment equal to  $\sqrt{24}\text{BM}$ . The value of 'a' us (Atomic number of M = 24):



33. A compound contains 3.2% of oxygen. The minimum molecular weight of the compound is:



34. The normality of solution obtained by mixing 100 ml of 0.2M  $\text{H}_2\text{SO}_4$  with 100 ml of 0.2 M NaOH is:



35. The mole fraction of glucose in aqueous solution is 0.2. Then molality of solution will be:



36. Least basic species among the following is:



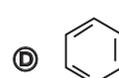
37. Pick out the most acidic species from the following:



38. Which of the following contains only aromatic species?



39. Which of the following hydrocarbon is most acidic?



40. The number of  $sp^2$  hybridised carbon in one benzene molecule is:

(A) 4

(B) 5

(C) 6

(D) 3

#### ASSERTION-REASON BASED QUESTIONS (Q.41 - Q.44):

**Directions:** Read the following questions and choose any one of the following four responses.

- a: Assertion and Reason both are correct and Reason is the correct explanation of Assertion.  
 b: Assertion and Reason both are correct and Reason is not the correct explanation of Assertion.  
 c: Assertion is correct but Reason is wrong.  
 d: Assertion is wrong but Reason is correct.

41. **Assertion (A):** NaI shows more water solubility than NaCl at constant temperature.

**Reason (R):** Higher the radius of anion, extent of hydration is higher.

(A) a

(B) b

(C) c

(D) d

42. **Assertion (A):** Ionic character of NaF is higher than NaCl.

**Reason (R):** Melting point of NaF is higher than NaCl.

(A) a

(B) b

(C) c

(D) d

43. **Assertion (A):** In LiCl, more covalent character is present than in LiF.

**Reason (R):** Polarizability of  $Cl^-$  is more than  $F^-$

(A) a

(B) b

(C) c

(D) d

44. **Assertion (A):** Among 4f and 5d orbitals, 4f fills earlier than 5d.

**Reason (R):** Total number of electrons in 3d orbital of  $Mn_{25}^{3+}$  ion is 3.

(A) a

(B) b

(C) c

(D) d

#### CASE STUDY BASED QUESTION- I (Q.45 - Q.47):

Read the passage carefully and select the correct option

Electrons in the outer shell face repulsion and the order of the extent of repulsion is lone pair-long pair > lone pair-bond pair > bond pair-bond pair. Due to this repulsion, some changes occur in the molecules or ions. The impact of this repulsion hampers bond length, bond angle, shape of the molecule, etc. Now, the lone pairs in the molecules or ions having  $sp^3d$ ,  $sp^3d^2$ ,  $sp^3d^3$  hybridization are always placed at equatorial position not in axial positions. This is due to minimise the said repulsion.

45. The correct order of carbon - carbon bond length is

(A)  $C_2H_6 > C_2H_4 > C_2H_2$

(B)  $C_2H_6 > C_2H_2 > C_2H_4$

(C)  $C_2H_2 > C_2H_4 > C_2H_6$

(D)  $C_2H_2 > C_2H_6 > C_2H_4$

46. Correct order of  $\angle HMH$  bond angle is

(A)  $H_2Te > H_2Se > H_2S > H_2O$

(B)  $H_2Te > H_2S > H_2O > H_2Se$

(C)  $H_2O > H_2S > H_2Se > H_2Te$

(D)  $H_2O > H_2Se > H_2S > H_2Te$

47. Find out wrong statements

(I) Oxygen-oxygen bond length in  $H_2O_2$  is lower than that in  $O_2$  molecule

- (II) In  $\text{ClF}_3$  molecule, one lone pair of chlorine is placed at axial position and other is at equatorial position  
 (III) There are two lone pairs on the central atom of  $\text{XeF}_4$   
 (IV)  $\text{BF}_3$  and  $\text{NH}_3$  have same shapes

- (A) I, II, III, IV      (B) I, II, III      (C) I, III, IV      (D) I, II, IV

### CASE STUDY BASED QUESTION- II (Q.48 – Q.50):

Read the passage carefully and select the correct option

In 1913, Niels Bohr proposed an atomic model which was based upon quantum physics. Bohr's theory was applicable for one electron system only and electron revolves around the nucleus in some circular paths having fixed radius and energy. These circular paths are termed as orbits and the angular momentum is  $m_e v r = n \cdot \frac{h}{2\pi}$ . Energy of an orbit is  $-13.6 \frac{Z^2}{n^2} \text{eV}$  and radius of an orbit is  $\frac{0.529 \cdot n^2}{Z} \text{Å}$ .

48. Energy of which is equal to  $-54.4 \text{ eV}$ ?  
 (A) 2nd Bohr orbit of  $\text{Li}^{2+}$  ( $Z = 3$ )      (B) 2nd Bohr orbit of  $\text{Be}^{3+}$  ( $Z = 4$ )  
 (C) 3rd Bohr orbit of  $\text{Li}^{2+}$  ( $Z = 3$ )      (D) 4th Bohr orbit of  $\text{Be}^{3+}$  ( $Z = 4$ )
49. Correct value of radius of 4th orbit of  $\text{Be}^{3+}$  ion ( $Z = 4$ )?  
 (A)  $1.116 \text{ Å}$       (B)  $2.016 \text{ Å}$       (C)  $1.008 \text{ Å}$       (D)  $2.116 \text{ Å}$
50. The potential energy of an electron in the first Bohr orbit of hydrogen atom is zero, the total energy of the electron in second Bohr orbit is  
 (A)  $-30.6 \text{ eV}$       (B)  $+30.6 \text{ eV}$       (C)  $-23.8 \text{ eV}$       (D)  $+23.8 \text{ eV}$

## Mathematics

51. Let  $S = \{1, 2, 3, \dots, 100\}$ . The number of non-empty subsets  $A$  of  $S$  such that the product of elements in  $A$  is even is  
 (A)  $2^{100} - 1$       (B)  $2^{50}(2^{50} - 1)$       (C)  $2^{50} - 1$       (D)  $2^{50} + 1$
52. Let  $f(x) = (-1)^{[x]}$  (where  $[.]$  denotes the greatest integer function), then  
 (A) Range of  $f$  is  $\{-1, 1\}$       (B)  $f$  is even function      (C)  $f$  is an odd function      (D)  $f$  is one-one function
53. What is  $\cos 20^\circ + \cos 100^\circ + \cos 140^\circ$  equal to?  
 (A) 2      (B) 1      (C)  $\frac{1}{2}$       (D) 0
54.  $2^{3n} - 7n - 1$  is divisible by  
 (A) 64      (B) 36      (C) 49      (D) 25
55. Find the modulus and principal amplitude of  $-4$ .  
 (A) 4 and  $\pi$       (B) 2 and  $\pi$       (C)  $i^2$  and  $\pi$       (D) None of these
56. If  $|x - 2| \leq 1$ , then  
 (A)  $x \in (1, 3)$       (B)  $x \in (-1, 3)$       (C)  $x \in [1, 3]$       (D)  $x \in [1, 3)$

57. The number of values of  $r$  satisfying the equation

$${}^{39}C_{3r-1} - {}^{39}C_{r^2} = {}^{39}C_{r^2-1} - {}^{39}C_{3r} \text{ is}$$

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

58. The integer just greater than  $(3 + \sqrt{5})^{2n}$  is divisible by ( $n \in \mathbb{N}$ )

- (A)  $2^{n+2}$  (B)  $2^{n+1}$  (C)  $2^{n-1}$  (D) not divisible by 2

59. If  $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$  are in AP then the value of  $\left(\frac{b+a}{b-a} + \frac{b+c}{b-c}\right)$  is

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

60. The reflection of the point  $(4, -13)$  in the line  $5x + y - 6 = 0$  is

- (A)  $(-1, -14)$  (B)  $(3, 4)$  (C)  $(1, 2)$  (D)  $(-4, 13)$

61. The equation of the chord of the circle  $x^2 + y^2 = 8x$  bisected at the point  $(4, 3)$  is

- (A)  $x = 3$  (B)  $y = 3$  (C)  $x = -3$  (D)  $y = -3$

62. The foci of the hyperbola  $4x^2 - 9y^2 - 1 = 0$  are

- (A)  $(\pm\sqrt{13}, 0)$  (B)  $\left(\pm\frac{\sqrt{3}}{6}, 0\right)$  (C)  $\left(0, \pm\frac{\sqrt{13}}{6}\right)$  (D) None of these

63. The line  $lx + my - n = 0$  will be tangent to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  if

- (A)  $a^2l^2 + b^2m^2 = n^2$  (B)  $al^2 + bm^2 = n^2$  (C)  $a^2l + b^2m = n$  (D)  $a^2l + bm^2 = n$

64. If the vertex of the parabola  $y = x^2 - 16x + k$  lies on x-axis then the value of  $k$  is

- (A) 32 (B) 53 (C) 64 (D) 52

65. The value of  $\lim_{x \rightarrow 0} \frac{\sin|x|}{x}$  is

- (A) 1 (B) -1 (C)  $\infty$  (D) Does not exist

### Assertion and Reason Based Questions (Ar) : [Q. 66 - 72]

- (A) Assertion is true, Reason is true, Reason is a correct explanation of Assertion.  
 (B) Assertion is true, Reason is true, Reason is not a correct explanation of Assertion.  
 (C) Assertion is true, Reason is false.  
 (D) Assertion is false, Reason is true.

66. **Assertion :** If the value of mode and mean is 60 and 66 respectively, then the value of median is 64.

**Reason :** Mode = 3 Median - 2 Mean.

- (A) A (B) B (C) C (D) D

67. **Assertion (A) :** The odds in favour of an event are 3 : 5. The probability of occurrence of the event is  $\frac{5}{8}$ .

**Reason (R) :** Definition of odds in favour of an event A is  $P(A) : P(\bar{A})$

- (A) A (B) B (C) C (D) D

68. **Assertion :** If a die is thrown twice, then the probability of getting 1 in the first throw only is  $\frac{5}{36}$ .

**Reason :**  $P(A \cup B) \leq P(A) + P(B)$

- (A) A (B) B (C) C (D) D

69. **Assertion (A)** : The period of  $\tan 3\theta$  is  $\frac{2\pi}{3}$ .

**Reason (R)** : If  $f(x)$  has period  $T$  then period of  $f(ax + b)$  is  $\frac{T}{|a|}$ ;  $a \neq 0$

(A) A

(B) B

(C) C

(D) D

### Case Based Question—I

Mr. Apple works at a book store. While arranging some books on the book shelf, he observed that there are 5 History books, 3 Mathematics books and 4 science books which are to be arranged on the shelf.

On the basis of this answer the following questions.



70. In how many ways can he select either a History book or a Maths book ?

(A) 8

(B) 7

(C) 9

(D) 15

71. If he selects 2 History books, 1 maths book and 1 science book to arrange them, then find the number of ways in which selection can be made.

(A)  ${}^5C_2 \times {}^3C_1 \times {}^4C_1$

(B)  ${}^5P_2 \times {}^3P_1 \times {}^4P_1$

(C)  ${}^5C_2 \times {}^3C_1 \times {}^4C_1 \times 4!$

(D)  ${}^5P_2 \times {}^3P_2 \times {}^4P_1 \times 4!$

72. Find the number of ways, if the books of same subject are put together.

(A)  $5! 4! 3!$

(B)  $(3!)^2 4! 5!$

(C) 10368

(D) None of these

### Case Based Question—II\_(Q. 73 - 75)

To check the understanding of sets, a Math teacher writes two sets A and B having finite number of elements. The sum of cardinal numbers of two finite sets A and B is 9. The ratio of a cardinal number of the power set A is to a cardinal number of the power set of B is 8 : 1.

On the basis of this answer the following questions.



73. The cardinal number of set A is :  
 (A) 2 (B) 3 (C) 6 (D) 8
74. The cardinal number of set B is  
 (A) 2 (B) 3 (C) 6 (D) 8
75. The maximum value of  $n(A \cup B)$  is  
 (A) 3 (B) 6 (C) 8 (D) 9

## Biology

76. Which taxonomic category shows maximum similarities?  
 (A) Family (B) Genus (C) Species (D) Order
77. Open vascular bundles are characteristic of:  
 (A) Roots (B) Dicot stem (C) Monocot stem (D) Leaves
78. Which cell organelle is not bounded by membrane?  
 (A) Lysosome (B) Ribosome (C) Golgi body (D) Mitochondria
79. Which is true about prokaryotic DNA?  
 (A) Linear (B) Associated with histones  
 (C) Circular and naked (D) Double membrane bound
80. Enzymes differ from ordinary catalysts because they:  
 (A) are non-specific (B) have lower activation energy  
 (C) are consumed (D) increase reaction temperature
81. Crossing over occurs in:  
 (A) Pachytene (B) Zygotene (C) Diplotene (D) Leptotene
82. Which phase has maximum chromosome condensation?  
 (A) Metaphase (B) Anaphase (C) Prophase (D) Telophase
83. C<sub>4</sub> plants minimize photorespiration due to:  
 (A) Large stomata (B) High oxygen affinity of RuBisCO  
 (C) Kranz anatomy (D) Presence of chlorophyll b
84. Respiratory quotient (RQ) of fats is:  
 (A) 1 (B) >1 (C) <1 (D) 0
85. The pacemaker potential is generated by:  
 (A) AV node (B) SA node (C) Purkinje fibers (D) Ventricles
86. Counter current mechanism occurs in:  
 (A) DCT and CD (B) PCT and DCT  
 (C) Loop of Henle and Vasa recta (D) Bowman's capsule
87. Hormone regulating calcium metabolism is:  
 (A) Insulin (B) Thyroxine (C) Parathormone (D) Glucagon

88. Which is not a C<sub>4</sub> plant?  
 Ⓐ Maize                      Ⓑ Sugarcane                      Ⓒ Wheat                      Ⓓ Sorghum
89. Myelin sheath is formed by:  
 Ⓐ Astrocytes                      Ⓑ Glial cells                      Ⓒ Schwann cells                      Ⓓ Axolemma
90. Oxygen dissociation curve shifts to the right due to:  
 Ⓐ Low O<sub>2</sub>                      Ⓑ Low temperature                      Ⓒ High pH                      Ⓓ High CO<sub>2</sub>

The questions 91 to 94 have two statements – Assertion (A) and Reason (R). Of the two statements, mark the correct answer from the options given below:

- A. Both A and R are true and R is the correct explanation of A.  
 B. Both A and R are true but R is not the correct explanation of A.  
 C. A is true but R is false.  
 D. A is false but R is true.
91. A – On acrocentric chromosome, centromere is terminal.  
 R – The position of centromere is constant for a particular chromosome.  
 Ⓐ A                      Ⓑ B                      Ⓒ C                      Ⓓ D
92. A – DNA is associated with proteins in eukaryotic cells.  
 R – DNA wraps around histones forming nucleosomes.  
 Ⓐ A                      Ⓑ B                      Ⓒ C                      Ⓓ D
93. A – Frogs are ureotelic.  
 R – Urea is very toxic and requires a lot of water for excretion.  
 Ⓐ A                      Ⓑ B                      Ⓒ C                      Ⓓ D
94. A – Krebs's cycle occurs in the mitochondrial matrix.  
 R – All enzymes of Krebs's cycle are membrane bound.  
 Ⓐ A                      Ⓑ B                      Ⓒ C                      Ⓓ D

### Case based Questions (95–97)

Read the following passage and answer the given questions:

Nerve impulse is a wave of bioelectric/electrochemical disturbance that passes along a neuron during conduction of an excitation.

Impulse conduction depends upon:

- (i) Permeability of axon membrane (axolemma)  
 (ii) Osmotic equilibrium (electrical equivalence) between the exoplasm and extracellular fluid (ECF) present outside the axon.

The generation of nerve impulse is the temporary reversal of the resting potential in the neuron.

95. A neuron shows polarized state with Na<sup>+</sup> ions outside and K<sup>+</sup> ions inside the membrane. The resting membrane potential is maintained mainly due to  
 Ⓐ Equal permeability of Na<sup>+</sup> and K<sup>+</sup>                      Ⓑ Active transport of Na<sup>+</sup> ions only

- © Greater permeability to  $K^+$  ions than  $Na^+$  ions      ④ Absence of ion channels
96. During depolarization of a neuron, there is  
 ① Influx of  $K^+$  ions      ② Efflux of  $Na^+$  ions      ③ Influx of  $Na^+$  ions      ④ Efflux of  $Ca^{2+}$  ions
97. At a synapse, neurotransmitters are released into the synaptic cleft. Release of neurotransmitter occurs due to  
 ① Opening of  $Na^+$  channels      ② Entry of  $Ca^{2+}$  ions  
 ③ Exit of  $K^+$  ions      ④ Breakdown of vesicles

### Case based question (98–100)

Read the following passage and answer the given questions:

A patient arrives with severe dehydration. His kidneys are conserving as much water as possible. As a result, the hormone ADH is released in higher amounts, increasing water reabsorption in the collecting ducts.

98. Which of the following best explains why ADH increases water reabsorption?  
 ① ADH increases glomerular filtration rate.  
 ② ADH increases permeability of collecting ducts to water.  
 ③ ADH decreases the osmolarity of blood.  
 ④ ADH inhibits sodium reabsorption.
99. In this patient's situation, the kidneys will produce:  
 ① Very dilute urine      ② Very concentrated urine  
 ③ Uric acid instead of urea      ④ No urine at all
100. Which compound is formed in the liver to reduce toxicity before excretion?  
 ① Uric acid      ② Urea      ③ Creatinine      ④ Ammonium chloride