



# Monthly Progressive Test

Class: XII

Subject: PCMB



Test Booklet No.: MPT02

Test Date: 

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Time: 180 mins

Full Marks: 200

## Important Instructions :

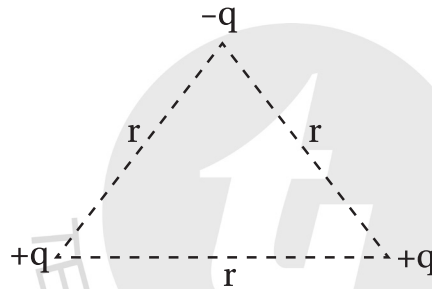
1. The Test is of 180 mins duration and the Test Booklet contains 100 multiple choice questions of single correct option only. There are four sections with four subjects. You have to attempt all 100 questions (Candidates are advised to read all 100 questions). Questions 1 to 25 contain Physics, Questions 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 MPT0210052024.
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

1. Dimensional formula of potential difference  
 (A)  $MLT^2A$                       (B)  $[ML^2T^{-3}A^{-1}]$                       (C)  $MLT^3A$                       (D)  $ML^2T^3$
2. 1 joule = x ev, then x =  
 (A)  $0.625 \times 10^{19}$                       (B)  $0.625 \times 10^{18}$                       (C)  $0.625 \times 10^{17}$                       (D) None of these
3. If 0.5 J of work is done in moving a negative charge of  $-0.5C$  between two points, the potential difference is  
 (A) +10V                      (B) +5V                      (C) -1V                      (D) -5V
4. The magnitude of electrical potential energy of the given charge configuration is



- (A)  $kq^2/r$                       (B)  $kq^2/2r$                       (C) Zero                      (D) None of these
5. Two point charges  $4\mu C$  and  $-2\mu C$  are separated by a distance of 1m in air. At what point on the line joining the two charges is the electric potential is zero? (from  $4\mu C$ )  
 (A)  $\frac{2}{3}m$                       (B)  $\frac{1}{3}m$                       (C)  $\frac{1}{2}m$                       (D)  $\frac{1}{4}m$
6. When a dielectric (K) slab is introduced in between the plates of a charged capacitor with battery connected across the plates, then energy of capacitor becomes  
 (A)  $K \times$  initial energy                      (B)  $\left(\frac{1}{K}\right) \times$  initial energy  
 (C)  $\sqrt{K} \times$  initial energy                      (D) Same as initial energy
7. A capacitor is charged to double its initial potentials. The energy stored in the capacitor becomes x times, where x =  
 (A) 2                      (B) 4                      (C) 1                      (D) 0.5
8. The electric potential V is constant in a region. The  $\vec{E}$  in that region  $|\vec{E}| =$   
 (A) 0                      (B) Positive                      (C) Negative                      (D) None of these

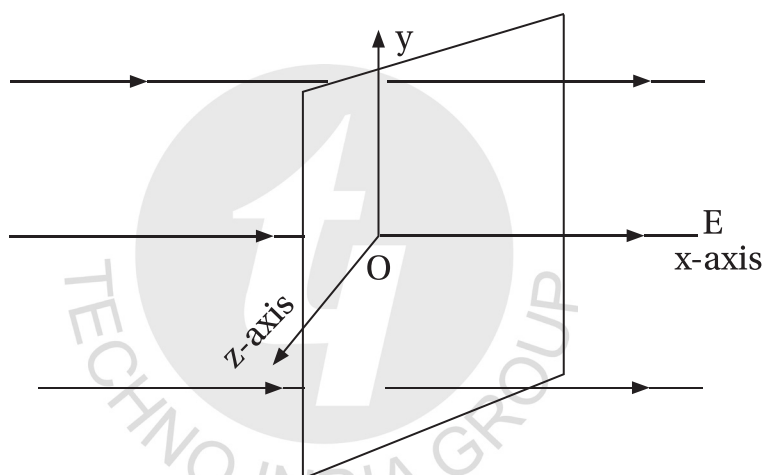
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9. A point charge  $-Q$  is placed at point O as shown below



Then  $V_A - V_B =$

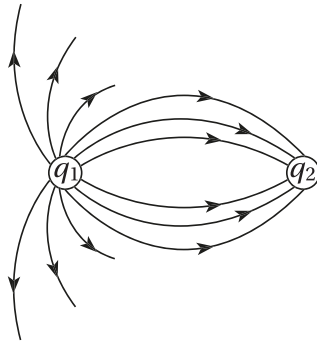
- (A) Positive                      (B) Negative                      (C) Zero                      (D) None of these
10. Two equipotential surfaces can intersect — the statement is  
(A) True                      (B) Sometimes True                      (C) False                      (D) None of these
11. The amount of work done in moving a 100 nC charge between two points 1 cm apart on an equipotential surface.



- (A) 2J                      (B) 3J                      (C) 4J                      (D) 0J
12. The electrostatic potential due to electric dipole at an equatorial point is  
(A) 1 volt                      (B) 2 volt                      (C) -3 volt                      (D) 0 volt
13. Three capacitors of  $1\ \mu\text{F}$ ,  $2\ \mu\text{F}$  and  $3\ \mu\text{F}$  are joined in parallel, then equivalent capacitance is  
(A)  $4\ \mu\text{F}$                       (B)  $6\ \mu\text{F}$                       (C)  $3\ \mu\text{F}$                       (D)  $5\ \mu\text{F}$
14. Two capacitors  $1\ \mu\text{F}$  and  $2\ \mu\text{F}$  are connected in series, then equivalent capacitance is  
(A)  $0.5\ \mu\text{F}$                       (B)  $0.33\ \mu\text{F}$                       (C)  $0.66\ \mu\text{F}$                       (D)  $0.25\ \mu\text{F}$
15. A capacitor is charged through a potential difference of 100V, when 0.1C charge is stored in it. How much energy will it release, when it is discharged.  
(A) 10J                      (B) 5J                      (C) 8J                      (D) 4J

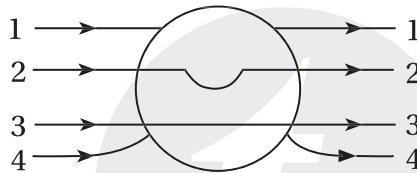
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16.



With reference to the above figure

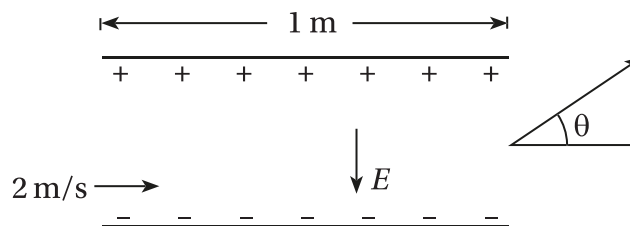
- (A)  $q_1$  must be a positive charge                      (B)  $q_2$  must be a negative charge  
 (C) Magnitude of  $q_1 = 2 \times$  magnitude of  $q_2$       (D) All of these are correct
17. A metallic solid sphere is placed in a uniform electric field. Which path, the lines of force follow as shown in figure?



- (A) 1                      (B) 2                      (C) 3                      (D) 4
18. An infinite sheet carrying a uniform surface charge density  $\sigma$  lies on the  $xy$ -plane. The work done to carry a charge  $q$  from the point  $\vec{A} = a(\hat{i} + 2\hat{j} + 3\hat{k})$  to the point  $\vec{B} = a(\hat{i} - 2\hat{j} + 6\hat{k})$  (where  $a$  is a constant with the dimension of length and  $\epsilon_0$  is the permittivity of free space) is

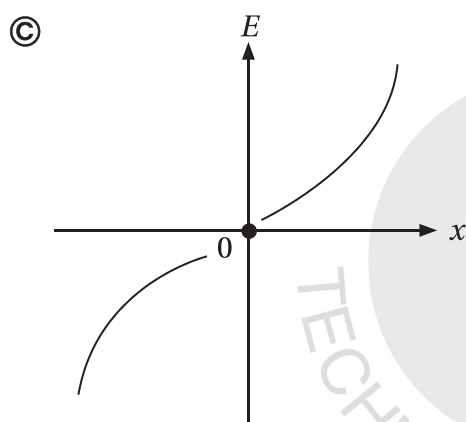
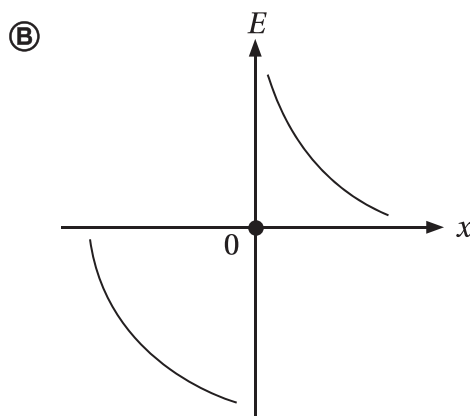
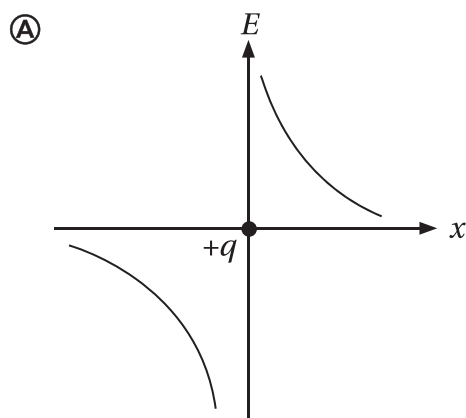
- (A)  $\frac{3\sigma a q}{2\epsilon_0}$                       (B)  $\frac{2\sigma a q}{\epsilon_0}$                       (C)  $\frac{5\sigma a q}{2\epsilon_0}$                       (D)  $\frac{3\sigma a q}{\epsilon_0}$

19. A uniform electric field  $E = (8m/e) \text{ V/m}$  is created between two parallel plates of length 1 m as shown in figure, (where  $m =$  mass of electron and  $e =$  charge of electron). An electron enters the field symmetrically between the plates with a speed of 2 m/s. The angle of the deviation ( $\theta$ ) of the path of the electron as it comes out of the field will be \_\_\_\_\_.



- (A)  $\tan^{-1}(4)$                       (B)  $\tan^{-1}(2)$                       (C)  $\tan^{-1}\left(\frac{1}{3}\right)$                       (D)  $\tan^{-1}(3)$

20. Select the correct graphical variation of  $\vec{E}$  on  $x$ -axis due to a point positive charge.



(D) None of these

21. The kinetic energy of a charged particle decreases by 10J as it moves from a point at potential 100V to a point at potential 200 V.

Then the charge on the particle is

- (A) 0.2 C                      (B) 0.1 C                      (C) 0.5 C                      (D) 0.4 C

22. The electrostatic potential energy of a system consisting of two charges 7 micro coulomb and  $-2$  micro coulomb placed at  $(-9\text{cm}, 0, 0\text{cm})$  and  $(9\text{cm}, 0, 0)$  respectively

- (A) 0.4 J                      (B) 0.2 J                      (C) 0.1 J                      (D)  $-0.7$  J

23. The electric field at a point due to a point charge is 30 N/C and the electric potential at that point is 15 J/C. Then the distance of the point from the charge is

- (A) 1 m                      (B) 0.1 m                      (C) 0.5 m                      (D) 1.5 m

[5]

24. Two identical capacitors have the same capacitance  $C$ . They are charged to potential  $V$  and  $2V$  respectively. The negative ends of the capacitors are connected together. When the positive ends are also connected, the common potential becomes
- (A)  $V$                       (B)  $2V$                       (C)  $1.5V$                       (D)  $3V$
25. When battery across the plates of charged capacitor is put off and dielectric slab is introduced inbetween the plates of the capacitors, then charge on plate
- (A) Increases                      (B) Decreases                      (C) Remains same                      (D) None of these

## Chemistry

26. Consider the reaction  $4A + xB \rightarrow 2C + 5D$ . If rate of reaction with respect to  $A$  is  $4.8 \times 10^{-3}$  and with respect to  $B$  is  $3.6 \times 10^{-3}$ , then what is the value of ' $x$ '?
- (A) 4                      (B) 2                      (C) 3                      (D) 5
27. For an exothermic reaction, enthalpy change is  $-40$  kJ and activation energy is  $25$  kJ. If the potential energy of the product is  $20$  kJ then what is the numerical value of threshold energy?
- (A) 75                      (B) 40                      (C) 65                      (D) 85
28. For the reaction,  $[A + B + C \rightarrow \text{product}]$  the rate expression is given by the equation  $\text{rate} = k[A]^{\frac{1}{2}} [B]^{\frac{1}{2}} [C]^{\frac{1}{4}}$ . What is the order of the reaction?
- (A) 3.25                      (B) 1.25                      (C) 1.75                      (D) 2.25
29. The rate equation of a homogeneous and gaseous reaction is expressed as  $\text{Rate} = k.[A].[B]$ . Suddenly the volume of the vessel is reduced to one - fourth of the original volume. How much time the rate of reaction will increase?
- (A) 16                      (B) 32                      (C) 8                      (D) 4
30. The half life period of a reaction is  $10$  min and in  $20$  min, the concentration changes from  $0.08$  M to  $0.02$  M. The unit of reaction rate constant is
- (A)  $\text{Mol.L}^{-1}.\text{sec}^{-1}$                       (B)  $\text{L.mol}^{-1}.\text{sec}^{-1}$                       (C)  $\text{sec}^{-1}$                       (D)  $\text{L}^2.\text{mol}^{-2}.\text{sec}^{-1}$
31. Molecularity of a reaction
- (A) can be whole number as well as fraction  
(B) can be negative  
(C) can be zero  
(D) always positive whole number

## 32. Catalyst

- (A) can change both equilibrium constant and reaction rate constant  
 (B) can change equilibrium constant but cannot change reaction rate constant  
 (C) cannot change equilibrium constant but can change reaction rate constant  
 (D) cannot change both equilibrium constant and reaction rate constant

33. Consider the reaction  $\frac{2}{3}A_2 + \frac{1}{2}B_2 \rightarrow \frac{5}{4}C_2$ , the correct expression for the rate of reaction will be

- (A)  $\frac{4}{5} \cdot \frac{d[C_2]}{dt} = -\frac{2}{3} \cdot \frac{d[A_2]}{dt} = -\frac{1}{2} \cdot \frac{d[B_2]}{dt}$       (B)  $\frac{4}{5} \cdot \frac{d[C_2]}{dt} = -\frac{2}{3} \cdot \frac{d[A_2]}{dt} = -2 \cdot \frac{d[B_2]}{dt}$   
 (C)  $\frac{4}{5} \cdot \frac{d[C_2]}{dt} = -\frac{3}{2} \cdot \frac{d[A_2]}{dt} = -2 \cdot \frac{d[B_2]}{dt}$       (D)  $\frac{5}{4} \cdot \frac{d[C_2]}{dt} = -\frac{3}{2} \cdot \frac{d[A_2]}{dt} = -2 \cdot \frac{d[B_2]}{dt}$

34. Consider the reaction  $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ . If  $\frac{d[CH_4]}{dt} = 4.82 \times 10^{-5} \text{ mol.L}^{-1} \cdot \text{sec}^{-1}$  then what is the value of  $\frac{d[H_2O]}{dt}$ ?

- (A)  $4.82 \times 10^{-5} \text{ mol.L}^{-1} \text{sec}^{-1}$       (B)  $9.64 \times 10^{-5} \text{ mol.L}^{-1} \text{sec}^{-1}$   
 (C)  $2.41 \times 10^{-5} \text{ mol.L}^{-1} \text{sec}^{-1}$       (D)  $3.21 \times 10^{-5} \text{ mol.L}^{-1} \text{sec}^{-1}$

35. For the reaction  $3A \rightarrow 2B$ , rate of reaction  $+\frac{d[B]}{dt}$  is equal to

- (A)  $-\frac{3}{2} \cdot \frac{d[A]}{dt}$       (B)  $-\frac{2}{3} \cdot \frac{d[A]}{dt}$       (C)  $-\frac{1}{3} \cdot \frac{d[A]}{dt}$       (D)  $+2 \cdot \frac{d[A]}{dt}$

36. Consider the reaction  $A + 2B \rightarrow \text{products}$ . If reaction rate is  $1.2 \times 10^3 \text{ mol.L}^{-1} \cdot \text{s}^{-1}$  and concentrations of A and B are 0.12 and 0.3  $\text{mol.L}^{-1}$  respectively. What is the value of reaction rate constant?

- (A)  $1.1 \times 10^3$       (B)  $1.1 \times 10^4$       (C)  $1.1 \times 10^5$       (D)  $1.1 \times 10^2$

37. The reaction  $X \rightarrow Y$  follows first order kinetics. In 40 minute, the concentration of 'X' changes from 1M to 0.25M, then the correct value of reaction rate constant will be

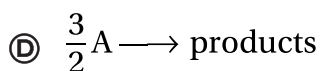
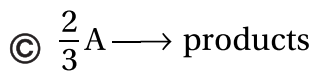
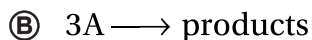
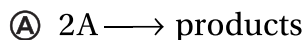
- (A)  $3.465 \times 10^{-3} \text{ min}^{-1}$       (B)  $3.465 \times 10^{-4} \text{ min}^{-1}$   
 (C)  $3.465 \times 10^{-2} \text{ min}^{-1}$       (D)  $3.465 \times 10^{-5} \text{ min}^{-1}$

## 38. Which of the following rate law equation has an overall order of 0.5 for a reaction involving X, Y and Z?

- (A) Rate =  $K \cdot [X] [Y] [Z]$       (B) Rate =  $K \cdot [X]^{0.5} [Y]^{0.5} [Z]^{0.5}$   
 (C) Rate =  $K \cdot [X] [Y]^{-2} [Z]^0$       (D) Rate =  $K \cdot [X]^{1.5} [Y]^{-1} [Z]^0$



39. Rate of a reaction increases by 8 times when concentration of the reactant becomes doubled. The correct expression of the reaction will be



40. In the reaction  $2A + B \longrightarrow$  the concentration of reactant A is tripled and that for B is halved. What is the change of the rate of the reaction ?

(A) decreases by 4.5 times

(B) increases by 4.5 times

(C) decreases by 5.5 times

(D) increases by 5.5 times

41. Which point can act as the limitation of the collision theory ?

(A) all molecules are spherical in shape

(B) with the increase in temperature, number of effective collision increases

(C) potential energy of the activated complexes are always higher than that of reactants and products

(D) all reactant molecules do not take part in effective collisions

42. Activation energy is associated

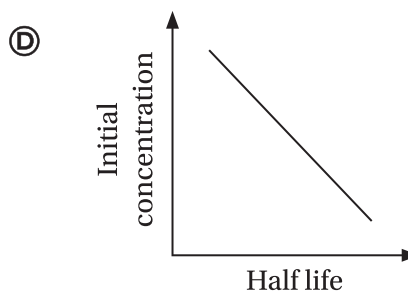
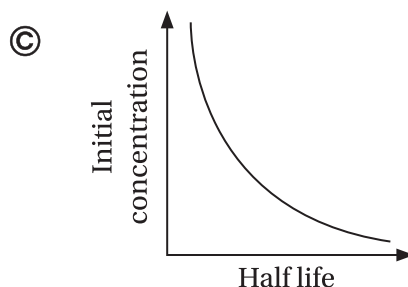
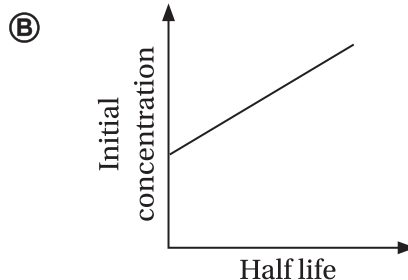
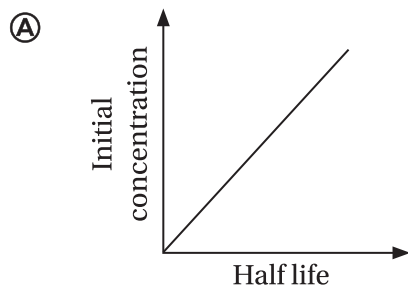
(A) only with reaction rate constant but not with equilibrium constant

(B) only with equilibrium constant but not with reaction rate constant

(C) with both reaction rate constant and equilibrium constant

(D) neither with reaction rate constant nor with equilibrium constant

43. Which is the correct graphical representation of a zero order reaction?



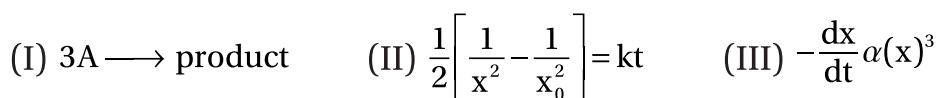
44. Consider the given data for the reaction  $X \xrightarrow{1000K} Y + Z$

Concentration of X in molarity	Rate of decomposition of X
0.1	$2.75 \times 10^{-8}$
0.2	$11 \times 10^{-8}$
0.3	$24.75 \times 10^{-8}$

What is the order of this reaction ?

- (A) 0                      (B) 1                      (C) 2                      (D) 3

45. The correct expression of half life of a reaction is  $t_{50\%} \propto \frac{1}{x_0}$ . The correct equations, related to this reaction are



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

Question number 46 to 50 are **ASSERTION - REASON TYPE**. Select the correct option

OPTION (A) : Assertion and reason both are correct and reason is the correct explanation of assertion

OPTION (B) : Assertion and reason both are correct and reason is not the correct explanation of assertion

OPTION (C) : Assertion is correct but reason is wrong

OPTION (D) : Assertion is wrong but reason is correct

46. **Assertion :** Instantaneous rate of reaction is associated with a single point in the concentration - time graph

**Reason :** In concentration - time graph, instantaneous rate of reaction is calculated by using a tangent on the curved line

47. **Assertion :** The unit of the rate of reaction depends on the physical nature of the reactants and products

**Reason :** In case of reaction rate constants unit of time is multiplied with the unit of concentration

48. **Assertion :** Half life of decay of radium does not depend on the initial amount of the element

**Reason :** Radioactive disintegration causes the formation of atoms of smaller mass than the initial

49. **Assertion :** In case of second order reaction if the initial concentration of the reactant is doubled then half life decreases

**Reason :** In case of second order reactions, half life is inversely proportional to the square of the initial concentration of the reactant

50. **Assertion :** At higher temperature, rate of reaction increases

**Reason :** At higher temperature, number of effective collisions become independent of temperature

## Mathematics

51. If  $A$  is a square matrix, then  $A - A^t$  is

- (A) symmetric      (B) skew-symmetric      (C) scalar      (D) diagonal

52. If a matrix  $A$  is symmetric as well as skew-symmetric, then  $A$  is a

- (A) diagonal matrix      (B) null matrix      (C) unit matrix      (D) triangular matrix

53. If  $A$  is an orthogonal matrix, then  $A^t$  is

- (A)  $A^{-1}$       (B)  $A$       (C)  $A^2$       (D) none of these

54. The multiplicative inverse of  $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$  is

- (A)  $\begin{bmatrix} -\cos\theta & -\sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$       (B)  $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$       (C)  $\begin{bmatrix} -\cos\theta & -\sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$       (D)  $\begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$

55. If  $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ , then  $A^4$  is

- (A)  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$       (B)  $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$       (C)  $\begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$       (D)  $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

56. If  $A$  is an invertible matrix, then  $\det(A^{-1})$  is equal to

- (A) 1      (B)  $|A|$       (C)  $\frac{1}{|A|}$       (D) none of these

57. If  $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$ , then the value of  $|adj A|$  is

- (A)  $a^3$       (B)  $a^6$       (C)  $a^9$       (D)  $a^{27}$

58. The roots of the equation  $\begin{vmatrix} 1-x & 2 & 3 \\ 0 & 2-x & 0 \\ 0 & 2 & 3-x \end{vmatrix} = 0$  are

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

59.  $\begin{vmatrix} 1 & 1 & 1 \\ 4 & 3 & 2 \\ 4^2 & 3^2 & 2^2 \end{vmatrix}$  equals
- (A) 2                      (B) -2                      (C) 1                      (D) 0
60. For a square matrix  $A$  and a non-singular matrix  $B$  of the same order, value of determinant of  $B^{-1}AB$  is
- (A)  $|A|$                       (B)  $|B|$                       (C)  $|A^{-1}|$                       (D)  $|B^{-1}|$
61. If  $A = \begin{bmatrix} 2 & -3 \\ -4 & 1 \end{bmatrix}$ , then  $\text{adj}(3A^2 + 12A)$  is equal to
- (A)  $\begin{bmatrix} 72 & -63 \\ -84 & 51 \end{bmatrix}$                       (B)  $\begin{bmatrix} 72 & -84 \\ -63 & 51 \end{bmatrix}$                       (C)  $\begin{bmatrix} 51 & 63 \\ 84 & 72 \end{bmatrix}$                       (D)  $\begin{bmatrix} 51 & 84 \\ 63 & 72 \end{bmatrix}$
62. Let  $Q = \begin{bmatrix} \cos \frac{\pi}{4} & -\sin \frac{\pi}{4} \\ \sin \frac{\pi}{4} & \cos \frac{\pi}{4} \end{bmatrix}$  and  $X = \begin{bmatrix} \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{bmatrix}$  then  $Q^3 X$  is equal to
- (A)  $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$                       (B)  $\begin{bmatrix} -\frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{bmatrix}$                       (C)  $\begin{bmatrix} -1 \\ 0 \end{bmatrix}$                       (D)  $\begin{bmatrix} \frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} \end{bmatrix}$
63. If  $A = \begin{bmatrix} 1 & 2 & x \\ 3 & -1 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} y \\ x \\ 1 \end{bmatrix}$  be such that  $AB = \begin{bmatrix} 6 \\ 8 \end{bmatrix}$  then
- (A)  $y = 2x$                       (B)  $y = -2x$                       (C)  $y = x$                       (D)  $y = -x$
64. If  $A$  is a  $3 \times 3$  non-singular matrix, such that  $AA^T = A^T A$  and  $B = A^{-1} A^T$ , then  $BB^T$  equals
- (A)  $I + B$                       (B)  $I$                       (C)  $B^{-1}$                       (D)  $(B^{-1})^T$
65. Let  $A = \begin{bmatrix} 5 & 5\alpha & \alpha \\ 0 & \alpha & 5\alpha \\ 0 & 0 & 5 \end{bmatrix}$ . If  $|A^2| = 25$ , then  $|\alpha|$  equals
- (A)  $5^2$                       (B) 1                      (C)  $\frac{1}{5}$                       (D) 5
66. If  $\sin^{-1} \frac{x}{5} + \text{cosec}^{-1} \frac{5}{4} = \frac{\pi}{2}$ , then one value of  $x$  is
- (A) 1                      (B) 4                      (C) 3                      (D) 5

67. The principal value of  $\cos^{-1}\left(-\sin\frac{7\pi}{6}\right)$
- (A)  $\frac{5\pi}{3}$                       (B)  $\frac{7\pi}{6}$                       (C)  $\frac{\pi}{3}$                       (D) none of these
68. The value of  $\cot^{-1}3 + \operatorname{cosec}^{-1}\sqrt{5}$  is
- (A)  $\frac{\pi}{3}$                       (B)  $\frac{\pi}{2}$                       (C)  $\frac{\pi}{4}$                       (D) none of these
69. What type of a relation is  $R = \{(1, 3), (4, 2), (2, 4), (2, 3), (3, 1)\}$  on the set  $A = \{1, 2, 3, 4\}$
- (A) reflexive                      (B) transitive                      (C) symmetric                      (D) none of these
70. The range of the function  $f(x) = \sqrt{(x-1)(3-x)}$  is
- (A)  $[1, 3]$                       (B)  $[0, 1]$                       (C)  $[-2, 2]$                       (D) none of these
71. If  $A$  and  $B$  are two matrices of the order  $3 \times m$  and  $3 \times n$  respectively, and  $m = n$ , then the order of matrix  $(5A - 2B)$  is
- (A)  $m \times 3$                       (B)  $3 \times 3$                       (C)  $m \times n$                       (D)  $3 \times n$
72. Find the values of  $x, y, z$  respectively if the matrix  $A = \begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$  satisfy the equation  $A^T A = I_3$ .
- (A)  $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{6}}, \frac{1}{\sqrt{3}}$                       (B)  $\frac{-1}{\sqrt{2}}, \frac{-1}{\sqrt{6}}, \frac{-1}{\sqrt{3}}$                       (C) both (A) and (B)                      (D) none of these
73. Value of  $k$ , for which  $A = \begin{bmatrix} k & 8 \\ 4 & 2k \end{bmatrix}$  is a singular matrix is
- (A) 4                      (B) -4                      (C)  $\pm 4$                       (D) 0
74. The area of a triangle with vertices  $(-3, 0), (3, 0)$  and  $(0, k)$  is 9 sq. units. The value of  $k$  will be
- (A) 9                      (B) 3                      (C) -9                      (D) 6
75. If  $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$  and  $|A^2| = 25$  then  $\alpha$  is
- (A)  $\pm 3$                       (B)  $\pm 2$                       (C)  $\pm 5$                       (D) 0

## Biology

76. Baker's yeast is
- (A) *Saccharomyces cerevisiae*                      (B) *S. ludwigii*  
 (C) *S. octosporus*                      (D) None of these

77. Which of these is not related to primary sewage treatment?  
Ⓐ Removal of debris by sequential filtration  
Ⓑ Removal of grit by sedimentation  
Ⓒ Physical treatment of sewage  
Ⓓ Activated sludge treatment
78. Rapid decline in a population due to high mortality rate is called—  
Ⓐ Population density                      Ⓑ Population crash  
Ⓒ Population explosion                      Ⓓ All of these
79. Saheli, a female antifertility pill, is used  
Ⓐ Yearly                      Ⓑ Weekly                      Ⓒ Quarterly                      Ⓓ Monthly
80. The number of seminiferous tubules in each testicular lobule is  
Ⓐ 1 to 3                      Ⓑ 10 to 15                      Ⓒ 20 to 30                      Ⓓ above 100
81. Acrosome occurs in the sperm in  
Ⓐ Tail                      Ⓑ Behind the nucleus  
Ⓒ Middle piece                      Ⓓ Tip
82. Amniotic fluid protects the foetus from  
Ⓐ Shock                      Ⓑ Encystment                      Ⓒ Degeneration                      Ⓓ Disease
83. Delivery of the baby during child birth is called  
Ⓐ Gestation                      Ⓑ Implantation                      Ⓒ Parturition                      Ⓓ Insemination
84. Which of the following is not a part of the seminiferous tubules?  
Ⓐ Male germ cells    Ⓑ Sertoli cells                      Ⓒ Leydig cells                      Ⓓ All of the above
85. Which part of the sperm is rich in mitochondria?  
Ⓐ Head                      Ⓑ Neck                      Ⓒ Middle piece                      Ⓓ Tail
86. The onset of puberty in adolescent girls is called—  
Ⓐ Menstruation    Ⓑ Menarche                      Ⓒ Menopause                      Ⓓ Oogenesis
87. IUDs cause  
Ⓐ Increased motility of sperms                      Ⓑ Phagocytosis of sperms  
Ⓒ Decreased motility of sperms                      Ⓓ None of the above
88. GIFT is a type of  
Ⓐ ART                      Ⓑ PID                      Ⓒ IUD                      Ⓓ STD
89. IPM stands for—  
Ⓐ Internal pest management programme

- (B) Internal pest management programme  
 (C) Integrated pest management programme  
 (D) None of the above
90. Mycorrhiza is symbiotic association of plants with which organism?  
 (A) Bacteria                      (B) Herbivores                      (C) Molluscs                      (D) Fungi
91. The nature of intine is—  
 (A) Sporopollenin containing                      (B) Pectocellular  
 (C) Starchy                      (D) Cellulosic
92. The remnant, persistent nucellus, present in seeds of black pepper and beet, is called—  
 (A) Pericarp                      (B) Perisperm                      (C) Epicarp                      (D) Suspensor
93. A typical angiosperm embryo sac at maturity, is—  
 (A) 8-nucleate and 7-celled                      (B) 8-nucleate and 8-celled  
 (C) 9-nucleate and 9-celled                      (D) 9-nucleate and 8-celled
94. Emasculation is done to—  
 (A) Prevent cross pollination                      (B) Prevent fertilisation  
 (C) Prevent self pollination                      (D) Prevent bagging of flowers
95. Banana shows—  
 (A) Polyembryony                      (B) Production of seeds without fertilisation  
 (C) Fruit formation from thalamus                      (D) Parthenocarpy
96. The condition when one or both testes fail to descend down into the scrotal sacs, is called  
 (A) Sterility                      (B) Cryptorchidism                      (C) Epididymis                      (D) None of these
97. What is the site of fertilisation in the fallopian tube?  
 (A) Infundibulum                      (B) Ampulla                      (C) Isthmus                      (D) Fimbriae
98. Which of the following should be banned to minimise female foeticide?  
 (A) Amniocentesis                      (B) IUDs                      (C) IVF                      (D) All of the above
99. Which among the following is not an STD?  
 (A) Gonorrhoea                      (B) Syphilis                      (C) Hepatitis A                      (D) Hepatitis B
100. Streptokinase, produced from the bacterium *Streptococcus*, is used as a \_\_\_\_\_ for patients of myocardial infarction  
 (A) coagulant                      (B) clot buster                      (C) pain killer                      (D) antibiotic

**Space For Rough Works**





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