Monthly Progressive Test

Class: XI

Subject: PCMB

Academic Excellence Programme TECHNO ACE

Test Booklet No.: MPT-04 **Test Date: 30102025**

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 MPT04 30102025.
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 scrible 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. 7. An object of weight W and density ρ is submerged in a fluid of density ρ_1. Its apparent weight will be

Ⓐ $W(\rho - \rho_1)$ Ⓑ $\frac{(\rho-\rho_1)}{W}$ Ⓒ $W\left(1-\frac{\rho_1}{\rho}\right)$ Ⓓ $W(\rho_1 - \rho)$

2. If two capillary tubes of radii r1 and r2 in the ratio 1 : 2 are dipped vertically in water, then the ratio of capillary rises in the respective tubes is

Ⓐ 1 : 4 Ⓑ 4 : 1 Ⓒ 1 : 2 Ⓓ 2 : 1

3. Match the columns I and II

Column - I	**Column - II**
(A) Aceleration due to gravity	(p) $\sqrt{2gR_e}$
(B) Escape speed	(q) $-\frac{GM_eM}{r}$
(C) Total energy of a satellite	(r) GM_e/R^2
(D) gravitational Potential Energy	(s) $-\frac{GM_eM}{2(R+h)}$

Ⓐ A – s, B – q, C – p, D – r Ⓑ A – r, B – p, C – s, D – q Ⓒ A – s, B – q, C – s, D – p Ⓓ A – q, B – s, C – p, D – r

4. If the excess pressure inside a soap bubble of radius r_1 in air is equal to the excess pressure inside air bubble of radius r_2 inside the soap solution, then $r_1 : r_2$ is

Ⓐ 2 : 1 Ⓑ 1 : 2 Ⓒ 1 : 4 Ⓓ $\sqrt{2}$: 1

5. The ratio of radii of gyration of a circular disc and a circular ring of the same radii and mass about a tangential axis perpendicular to plane of disc or ring is

Ⓐ 1 : 2 Ⓑ $\sqrt{5}:\sqrt{6}$ Ⓒ $2:\sqrt{3}$ Ⓓ $\sqrt{2}$: 1

6. A mass M is moving with a constant velocity parallel to the x-axis. Its angular momentum w.r.t. origin

Ⓐ is zero Ⓑ remains constant Ⓒ goes on increasing Ⓓ goes on decreasing

7. A particle of mass M is situated at the centre of a spherical shell having mass M and radius a. The gravitational potential at a point situated at $\frac{a}{2}$ distance from the centre, will be

Ⓐ $\frac{3GM}{a}$ Ⓑ $\frac{2GM}{a}$ Ⓒ $\frac{GM}{a}$ Ⓓ $-\frac{3GM}{a}$

8. The maximum load a wire can withstand without breaking, when its length is reduced to half of its original length, will

Ⓐ be doubled Ⓑ be half Ⓒ be four times Ⓓ remains same

9. For a satellite moving in an orbit around the earth, the ratio of kinetic energy to magnitude of potential energy is

Ⓐ $\frac{1}{\sqrt{2}}$ Ⓑ 2 Ⓒ $\sqrt{3}$ Ⓓ $\frac{1}{2}$

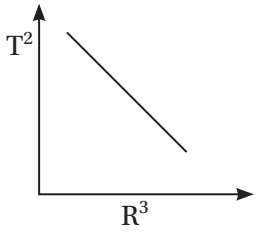
10. Which of the following is not the property of an ideal fluid ?

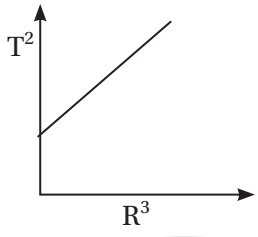
Ⓐ Fluid is incompressible
Ⓑ Fluid is viscous
Ⓒ Fluid flow is irrotational
Ⓓ Fluid flow is streamline

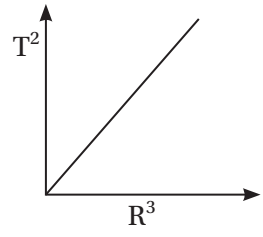
11. A rectangular film of liquid is extended from (4 cm × 2 cm) to (5 cm × 4 cm). If the work done is 3 × 10–4 J, the value of the surface tension of the liquid is

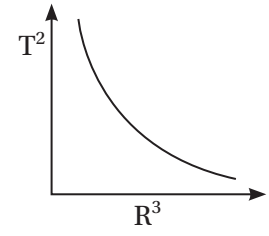
Ⓐ $0.250\ N\ m^{-1}$ Ⓑ $0.125\ N\ m^{-1}$ Ⓒ $0.2\ N\ m^{-1}$ Ⓓ $8.0\ N\ m^{-1}$

12. Which of the following graphs represents the motion of a planet moving about the sun ? (T = Time period, R = Distance between the centres of the sun and planet)

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

Assertion and Reason :

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

A: (A) is correct, (R) is correct; (R) is a correct explanation for (A)

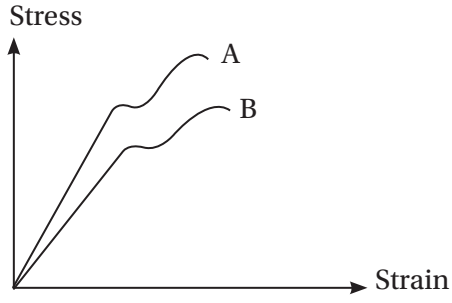
B: (A) is correct, (R) is correct; (R) is not a correct explanation for (A)

C: (A) is correct, (R) is incorrect

D: (A) is incorrect, (R) is correct

13. These questions consists of two statements, each printed as Assertion (A) and Reason (R).

Assertion (A) : The stress~strain graphs for two materials A and B are shown in figure. Young's modulus of A is greater than that of B.



Reason (R) : The Young's modules for small strain is, stress Y strain $Y = \frac{\text{stress}}{\text{strain}}$ = slope of linear portion of stress ~ strain graph.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

14. N division on a main scale of a vernier callipers coincides with (N + 1) divisons on its vernier scale. If each division of main scale is of 'a' unit, then the least count of vernier callipers is

Ⓐ $\frac{a}{N}$ Ⓑ $\frac{a}{N+1}$ Ⓒ $\frac{a}{N-1}$ Ⓓ None of these

Assertion and Reason :

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.

15. **Assertion (A) :** When percentage errors in measurement of mass and velocity are 1% and 2% respectively, the maximum percentage error in kinetic energy (KE) is 5%.

Reason (R) : $KE = \frac{1}{2}mv^2, \frac{\Delta KE}{KE} = \frac{\Delta m}{m} + \frac{2\Delta v}{v}$

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

16. Three uniform spheres of mass M and radius R each are kept in such a way that each touches the other two. The magnitude of gravitational force on any of the spheres due to other two is

Ⓐ $\frac{\sqrt{3}GM^2}{2R^2}$ Ⓑ $\frac{3GM^2}{2R^2}$ Ⓒ $\frac{\sqrt{3}GM^2}{R^2}$ Ⓓ $\frac{\sqrt{3}}{4}\frac{GM^2}{R^2}$

17. The velocity v (in cm/s) of a particle is given in terms of time t (in s) by the equation $v = at + \frac{b}{t+c}$. The dimensions of a, b and c are

	a	b	c
Ⓐ	L^2	T	LT^2
Ⓑ	LT^2	LT	L
Ⓒ	LT^{-2}	L	T
Ⓓ	L	LT	T^2

Assertion and Reason :

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.

18. **Assertion (A):** The acceleration due to gravity on the surface of the Earth decreases with an increase in altitude.
Reason (R): The gravitational force is inversely proportional to the square of the distance from the Earth's center.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

19. **Assertion (A):** A steel wire and a copper wire of the same length and radius are subjected to the same load; the elongation in steel is less than that in copper.
Reason (R): The Young's modulus of steel is greater than that of copper.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Case Based Question :

The Bulk modulus of a spherical object is B, If it is subjected to uniform pressure p then,

20. The fractional decrease in volume is

Ⓐ $\frac{B}{p}$ Ⓑ $\frac{p}{B}$ Ⓒ $\frac{p}{2B}$ Ⓓ $\frac{B}{3p}$

21. The fractional decrease in radius is

Ⓐ $\frac{B}{p}$ Ⓑ $\frac{p}{B}$ Ⓒ $\frac{p}{2B}$ Ⓓ $\frac{B}{3p}$

22. Unit of of Bulk modulus is same as

Ⓐ force Ⓑ volume Ⓒ youngs modulus Ⓓ work done

Body of mass m is raised to a height nR from the earths surface (R = Radius of earth)

23. The weight of the body at that height will be

Ⓐ $\frac{mg}{n}$ Ⓑ $\frac{mg}{1+n}$ Ⓒ $\frac{mg}{(1+n)^2}$ Ⓓ $mg\times\left(\frac{n}{n+1}\right)$

24. Change in potential energy is

Ⓐ $mgR\left(\frac{n}{n-1}\right)$ Ⓑ mgR Ⓒ $mgR\left(\frac{n}{n+1}\right)$ Ⓓ $\frac{mgR}{n}$

25. The kinetic energy required to raise this height from the surface of earth is

Ⓐ $mgR\left(\frac{n}{n-1}\right)$ Ⓑ mgR Ⓒ $mgR\left(\frac{n}{n+1}\right)$ Ⓓ $\frac{mgR}{n}$

Chemistry

26. The density of 2(M) aqueous solution of NaOH is 1.28 g/cm^3. The molality of the solution is [Given that molecular mass of NaOH = 40 g (mole)$^{-1}$]

Ⓐ 1.20 m Ⓑ 1.50 m Ⓒ 1.6 m Ⓓ 1.32 m

27. Arrange the following elements in increasing order of first ionisation enthalpy. Li, Be, B, C, N. Choose the correct answer from the option given :

Ⓐ Li < Be < C < N < B Ⓑ Li < B < Be < C < N

Ⓒ Li < Be < C < B < N Ⓓ Li < Be < N < B < C

28. Maximum number of electrons in a subshell with $l = 3$, and n = 4 is :

Ⓐ 14 Ⓑ 16 Ⓒ 10 Ⓓ 12

29. Amongst the following which one will have maximum "lone pair lone pair" electron repulsion ?

Ⓐ IF_5 Ⓑ SF_4 Ⓒ XeF_2 Ⓓ ClF_3

30. The pH of an aqueous solution of 0.1 M solution of a weak monoprotic acid is 1% ionised :

Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4

31. 2 moles of N_2 is mixed with 6 moles of H_2 in a closed vessel of 1 litre capacity. If 50% N_2 is converted into NH_3 at equilibrium, the value of Kc for the reaction is : $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$.

Ⓐ $\frac{4}{27}$ Ⓑ $\frac{27}{4}$ Ⓒ $\frac{1}{27}$ Ⓓ 27

32. What is the weight of oxygen required for the complete combustion of 2.8 kg of ethylene ?

Ⓐ 2.8 kg Ⓑ 6.4 kg Ⓒ 9.6 kg Ⓓ 96 kg

33. Which of the following options represents correct bond order ?

Ⓐ $O_2^{\ominus} > O_2 > O_2^+$ Ⓑ $O_2^- < O_2 < O_2^+$ Ⓒ $O_2^- > O_2 < O_2^+$ Ⓓ $O_2^- < O_2 > O_2^+$

34. (K_{sp}) AgCl is 2.8×10^{-10} at 25°c. Calculate the solubility of AgCl in 0.1 M $AgNO_3$ (moles/L) :

Ⓐ 2.8×10^{-10} Ⓑ 2.8×10^{-11} Ⓒ 2.8×10^{-9} Ⓓ 5.9×10^{-9}

35. Molar heat capacity of a gas at constant 'T' and 'P' is :

Ⓐ $\frac{3}{2}$ R Ⓑ $\frac{5}{2}$ R

Ⓒ infinity Ⓓ depends on atomly of gas

36. 5 moles of ideal gas at 27°c expands isothermally and reversibly from a volume of 6L to 60 L. The work done in KJ is :

Ⓐ – 14.72 Ⓑ – 28.763 Ⓒ 2.87 Ⓓ 4.72

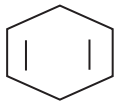
37. Stability of $\overset{\oplus}{C}H_2 - CH = CH_2$ can be explained by :

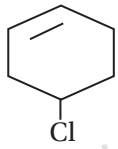
Ⓐ Inductive effect Ⓑ Electromeric effect Ⓒ Resonance Ⓓ Polar effect

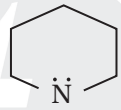
38. Mesomeric effect involves the delocalisation of

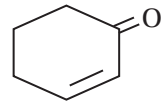
Ⓐ Proton Ⓑ Sigma electrons Ⓒ π-electrons Ⓓ None of these

39. Which of the following compounds shows resonance ?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

40. Correct order of carbon – carbon bond length is :

Ⓐ $C_2H_6 > C_2H_4 > C_2H_2$ Ⓑ $C_2H_6 > C_2H_2 > C_2H_4$ Ⓒ $C_2H_2 > C_2H_4 > C_2H_6$ Ⓓ $C_2H_2 > C_2H_6 > C_2H_4$

Assertion and Reason (Q. No. 41 – Q. No. 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) :** $CH_3COOCH(CH_3)_2$ and $CH_3COOCH_2\ CH_2\ CH_3$ are metamers

Reason (R) : In case of metamerism, the number of carbon atoms around the functional group is defferent

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

42. **Assertion (A) :** 3-methyl pentam 2-one is an optically active molecules
Reason (R) : The third carbon of 3-methyl pentan –2–one is a chiral carbon.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

43. **Assertion (A) :** n-pentane has higher boiling point than neopentane
Reason (R) : Larger surface area is responsible for greater vandewals for of attraction.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

44. **Assertion (A) :** Anthracene and phenanthracene are isomers
Reason (R) : Anthracene and phenanthrace both have 14 – π electrons each.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Case Base Question (Q.45 to Q.47)

Redox is a reaction in which both oxidation and reduction will take place simultaneously. It is obvious that if one substance gives electrons there must be another substance to provide these electron. In some reaction same substance is reduced as well as oxidised, known as disproportion reaction for calculating equivalent mass in redox reaction change in oxidation number is related to n-factor or valence factor. Which is reciprocal of molar ratio.

45. What is the oxidation number of 'Cr' in CrO_5 ?

Ⓐ + 13 Ⓑ + 3 Ⓒ + 5 Ⓓ + 6

46. Oxidation number of iron in $Fe_{0.94}O$ is :

Ⓐ + 2 Ⓑ + 3 Ⓒ $+\frac{200}{94}$ Ⓓ $+\frac{8}{3}$

47. How many moles of $KMnO_4$ reacted with one mole of ferrous oxalate in acidic medium.

Ⓐ $\frac{2}{5}$ Ⓑ $\frac{1}{5}$ Ⓒ $\frac{3}{5}$ Ⓓ $\frac{5}{3}$

Case Base Question (Q.48 to Q.50)

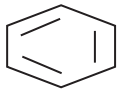
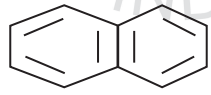
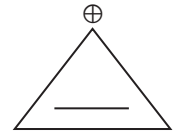
Compounds of hydrogen and carbon is called hydrocarbon. It may be saturated hydrocarbon (alkane) or unsaturated hydrocarbon (alkene or alkyne). The hydrocarbon may be non-cyclic or cyclic. Cyclic hydrocarbon which obeys Huckels rule (4n + 2) a electron is an aromatic. Aromatic compound like benzene, naphthalene etc. obeys Huckles rule. The degree of unsaturation (u) is given by the formula, $U = (C+1) - \frac{(H-N)}{2}$

C = Total no. of Tetravalent atom

H = Total no. of monovalent atom

N = total no. of trivalent atom

48. Which of the following is not aromatic ?

Ⓐ  Ⓑ  Ⓒ  Ⓓ 

49. For a compound to be aromatic which of the following is/are true ?

Ⓐ obey (4n+ 2) electron, Huckel rule Ⓑ Molecule must be planar with Sp^2 hybridisation

Ⓒ High resonance energy Ⓓ All of these

50. Find the degree of unsaturation and total number of structural isomers of C_5H_{10} :

Ⓐ 1, 5 Ⓑ 2, 6 Ⓒ 2, 8 Ⓓ 1, 10

Mathematics

51. If the sum of the distances of a point from two perpendicular lines in a plane is 1, then its locus is

Ⓐ a square Ⓑ a circle Ⓒ a straight line Ⓓ two intersecting lines

52. An equation of a line through the point (1, 2) whose distance from the point (3, 1) has the greatest value is

Ⓐ y = 2x Ⓑ y = x + 1 Ⓒ x + 2y = 5 Ⓓ y = 3x – 1

53. If the vertices of a triangle are A (0, 0), B (3, 0), C (0, 4), then the ortho centre of the triangle is :

Ⓐ $(1, \frac{4}{3})$ Ⓑ (0, 0) Ⓒ (3, 0) Ⓓ (0, 4)

54. The straight lines 4ax + 3by + c = 0 where a + b + c = 0, are concurrent at the point.

Ⓐ (4, 3) Ⓑ $\left(\frac{1}{4}, \frac{1}{3}\right)$ Ⓒ $\left(\frac{1}{2}, \frac{1}{3}\right)$ Ⓓ none of these

55. The equation of the bisector of the acute angle between the lines 2x – y + 4 = 0 and x – 2y = 1 is

Ⓐ x + y + 5 = 0 Ⓑ x – y + 1 = 0 Ⓒ x – y = 5 Ⓓ None of these

56. A circle touches the y axis at the point (0, 4) and cuts the x-axis in a chord of length 6 units. Then find the radius of the circle.

Ⓐ 3 Ⓑ 4 Ⓒ 5 Ⓓ 6

57. Find the number of points (x, y) having integral coordinates satisfying the condition $x^2 + y^2 < 25$.

Ⓐ 81 Ⓑ 69 Ⓒ 71 Ⓓ 59

58. Find the greatest distance of the point P(10, 7) from the circle $x^2 + y^2 - 4x - 2y - 20 = 0$

Ⓐ 5 Ⓑ 10 Ⓒ 15 Ⓓ 20

59. If a line is drawn through a fixed point P(α, β) to cut the circle $x^2 + y^2 = a^2$ at A and B, then find the value of PA.PB.

Ⓐ $\alpha^2 + \beta^2 - a^2$ Ⓑ $\alpha^2 - \beta^2 + a^2$ Ⓒ $\alpha^2 + \beta^2 + a^2$ Ⓓ none of these

60. If the chord of contact of tangents drawn from the point (h, k) to the circle $x^2 + y^2 = a^2$ subtends a right angle at the centre, then $h^2 + k^2 = ?$

Ⓐ a^2 Ⓑ $2a^2$ Ⓒ $3a^2$ Ⓓ $4a^2$

61. If sinθ, cosθ be the roots of $ax^2 + bx + c = 0$, then $b^2 = ?$

Ⓐ $a^2 + 2ac$ Ⓑ $a^2 - 2ac$ Ⓒ $2ac - a^2$ Ⓓ none of these

62. If $x^2 + 2ax + a < 0 \ \forall \ x \in [1, 2]$ then find he values of a

Ⓐ $a \in \left(-\infty, -\frac{4}{5}\right)$ Ⓑ $a \in \left(\frac{4}{5}, \infty,\right)$

Ⓒ $a = \pm\frac{4}{5}$ Ⓓ none of these

63. Find the least positive integer n which will reduce $\left(\frac{(i-1)}{(i+1)}\right)^n$ to a real number.

Ⓐ 2 Ⓑ 4 Ⓒ 6 Ⓓ 0

64. Let $f(x) = (1 + x)(1 + x^6)(1 + x^{11}) \ldots\ldots (1 + x^{101})$

Ⓐ 1041 Ⓑ 1051 Ⓒ 1061 Ⓓ 1071

65. If each term of an infinite G.P is twice the sum of the terms following it, then find the common ratio of the G.P.

Ⓐ $\frac{1}{3}$ Ⓑ $\frac{1}{2}$ Ⓒ $\frac{1}{5}$ Ⓓ $\frac{1}{6}$

Assertion and Reason : (Q. 66 - 69)

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.

66. **Assertion (A) :** If $(1-x)=\sqrt{x^2-2x+1}$ then $x > 1$

Reason (R) : $|x|=\begin{cases} x\ ;\ x \geq 0 \\ -x, x < 0 \end{cases}$

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

67. **Assertion (A) :** Five boys and 5 girls sit alternately around a round table. The number of ways this can be done is 2880.

Reason (R) : The number of circular arrangement of n different things is (n - 1) !

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

68. **Assertion (A) :** The rank of the word 'MILK' is 20.

Reason (R) : The rank of the word 'RANK' is 20.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

69. **Assertion (A) :** The range of signum function is {–1, 0, 1}

Reason (R) : $D_f = \{ x : y = f(x) \text{ is real}\}$

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Case Study Base Question (Q. 70 to 72)

Case I : A point (x_1, y_1) lies out side, on or inside a circle

$S \equiv x^2 + y^2 + 2gx + 2fy + c = 0$

according as $S_1 > , = ,$ or < 0 where

$S_1 = x_1^{\ 2} + y_1^{\ 2} + 2gx_1 + 2fy_1 + c.$

On the basis of the above information answer the following questions.

Let $S \equiv x^2 + y^2 - 4x + 2y - 11 = 0$

70. What is the position of P(1, 2) with respt to the circle S.

Ⓐ Outside Ⓑ on Ⓒ Inside Ⓓ we can't say

71. What is the position of Q (6, 0) with respect to the circle S.

Ⓐ Outside Ⓑ on Ⓒ Inside Ⓓ we can't say

72. If $(0, \lambda)$ is on the circle S then the value of $\lambda^2 + 2\lambda = ?$

Ⓐ 10 Ⓑ 11 Ⓒ 12 Ⓓ we can't say

Case II : Combination from identical objects (Q. 73-75)

(i) The number of combinations of n identical objects taking r objects ($r \leq n$) at a time = 1

(ii) The number of combinations of zero or more objects from n identical objects = n + 1

(iii) The number of combinations of atleast one out of $a_1 + a_2 + ... + a_n$ objects, where a_1 alike of one kind, a_2 are alike of second kind, a_3 are alike of third kind, ... , a_n are alike of n^{th} kind =
$(a_1 + 1)(a_2 + 1)(a_3 + 1) ... (a_n + 1) - 1$.
On the basis of this answer the following questions.

Consider the letters : A,A,A,A,A,A + B,B,B,B,B + C,C,C,C + D,D,D + E,F

73. The number of ways in which A,A,A can be selected from A,A,A,A,A

Ⓐ $^5C_3$ Ⓑ $^5P_3$ Ⓒ $\frac{5!}{3!}$ Ⓓ none of these

74. The number of combinations of zero or more objects from (A,A,A,A,A,A + B,B,B,B,B + C,C,C,C + D,D,D) is

Ⓐ 840 Ⓑ 360 Ⓒ 540 Ⓓ none of these

75. Find the number of ways in which one or more letters can be selected from the letters.

(A,A,A,A,A,A + B,B,B,B,B + C,C,C,C + D,D,D + E,F)

Ⓐ 2879 Ⓑ 3359 Ⓒ 3050 Ⓓ none of these

Biology

76. During light reaction of photosynthesis, which of the following phenomenon is observed during cyclic phosphorylation, as well as non-cyclic phosphorylation?

Ⓐ Release of O_2 Ⓑ Formation of ATP
Ⓒ Formation of NADPH Ⓓ Involvement of PSI and PSII pigment systems

77. A photosynthetic plant is releasing ^{18}O instead of the normal oxygen. The plant must have been supplied with:

Ⓐ Ozone Ⓑ water with ^{18}O Ⓒ glucose with ^{18}O Ⓓ carbondioxide with ^{18}O

78. The CO_2 acceptor in C3 plants is:

Ⓐ PEP Ⓑ PGA Ⓒ ATP Ⓓ RuDP

79. Which one is a C4 plant?

Ⓐ Papaya Ⓑ Pea Ⓒ Potato Ⓓ Maize

80. At a temperature above 350 C:

Ⓐ Rate of respiration will decline earlier than that of photosynthesis.
Ⓑ Rate of photosynthesis will decline earlier than that of respiration.
Ⓒ Both will decline simultaneously.
Ⓓ There is no such fixed pattern.

81. In which one of the following processes, CO_2 is not released?

Ⓐ Lactate fermentation Ⓑ Aerobic respiration in plants
Ⓒ Aerobic respiration in animals Ⓓ Alcoholic fermentation

82. Chemiosmotic Theory of ATP Synthesis in chloroplasts and mitochondria, is based on:

Ⓐ Membrane potential Ⓑ Accumulation of sodium ions
Ⓒ Accumulation of potassiumium ions Ⓓ Proton gradient

83. In glycolysis, during oxidation, electrons are removed by:

Ⓐ Glyceraldehyde 3-phosphate Ⓑ NAD

Ⓒ Molecular oxygen Ⓓ ATP

84. Which of the following would yield maximum energy?

Ⓐ Aerobic respiration in germinating seeds Ⓑ Fermentation by yeast

Ⓒ Anaerobic respiration in human muscle cells Ⓓ Glycolysis in a sprinter

85. R.Q is ratio of:

Ⓐ CO_2 produced to substrate consumed Ⓑ CO_2 produced to O_2 consumed

Ⓒ O_2 consumed to water produced Ⓓ O_2 consumed to CO_2 produced

86. PGA , as the first CO_2 fixation product, was discovered during photosynthesis of:

Ⓐ Alga Ⓑ Bryophytes Ⓒ Gymnosperms Ⓓ Angiosperms

87. In photosystem I, the first electron acceptor is:

Ⓐ Ferredoxin Ⓑ Fe-S protein Ⓒ Cytochromes Ⓓ Plastocyanin

88. Cholorophyll –a molecule, at its carbon atom 3 of the pyrrole ring II, has one of the following:

Ⓐ Methyl group Ⓑ Carboxylic group

Ⓒ Mg Ⓓ Aldehyde group

89. What is the role of NAD+ in cellular respiration?

Ⓐ It functions as an enzyme

Ⓑ It functions as an electron carrier.

Ⓒ It is a nucleotide source for ATP synthesis.

Ⓓ It is the final electron acceptor for anaerobic respiration

90. During which stage, in the complete oxidation of glucose, are the greatest number of ATP molecules formed from ADP?

Ⓐ Glycolysis Ⓑ Krebs cycle

Ⓒ Electron Transport Chain Ⓓ Conversion of pyruvic acid to Acetyl CoA

Assertion and Reason Based Question :

Directions: 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. **Assertion (A) :** Glycolysis occurs in the mitochondria of cells.

Reason (R) : Glycolysis is shown by all living organisms.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

92. **Assertion (A) :** When carbohydrates are used as respiratory substrates, R.Q will be one

Reason (R) : Equal amounts of CO_2 and O_2 are consumed and evolved, respectively.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

93. **Assertion (A) :** ETS is present in the inner mitochondrial membrane.

Reason (R) : Fermentation takes place under anaerobic conditions in many prokaryotes and unicellular eukaryotes.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

94. **Assertion (A) :** Chlorophyll a is a universal pigment present in plants.

Reason (R) : In PSI, chlorophyll a has an absorption peak at 700 nm.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Read the given passage and answer the following questions (95-97)

'Kranz' means 'wreath' and is a reflection of the arrangement of cells. The particularly large cells around the vascular bundles of the C4 plants are called bundle sheath cells, and the leaves which have such anatomy, are said to have Kranz anatomy. The bundle sheath cells may form several layers around the vascular bundles. In addition, these plants show tolerance to higher temperatures. Plants adapted to dry tropical regions show C4 pathway.

95. In C4 plants, Calvin cycle operates in:

Ⓐ Stroma of bundle sheath chloroplasts Ⓑ Grana of bundle sheath chloroplasts

Ⓒ Grana of mesophyll chloroplasts Ⓓ Stroma of mesophyll chloroplasts

96. The first CO_2 acceptor in C4 plants is:

Ⓐ PEP Ⓑ OAA Ⓒ PGA Ⓓ None of the above

97. A process that makes an important difference between C3 and C4 plants is:

Ⓐ Transpiration Ⓑ Glycolysis Ⓒ EMP pathway Ⓓ Photorespiration

Read the given passage and answer the following questions (98-100):

Glycolysis is the metabolic pathway that converts glucose into pyruvate. It occurs in the cytosol. The free energy released during the biochemical reactions in glycolysis is used to generate ATP. It is also called the EMP pathway.

98. Link between glycolysis and Krebs cycle is:

Ⓐ Oxaloacetate Ⓑ PEP Ⓒ Pyruvate Ⓓ Acetyl CoA

99. End product of glycolysis is:

Ⓐ Pyruvic acid Ⓑ Acetyl CoA Ⓒ PEP Ⓓ PGA

100. Out of 36 ATP molecules produced per glucose molecule, during respiration:

Ⓐ 2 are produced outside glycolysis and 34 during respiratory chain.

Ⓑ 2 are produced outside mitochondria and 34 inside mitochondria

Ⓒ 2 during glycolysis and 32 during Krebs cycle

Ⓓ All are formed inside mitochondria