
PART - I

IQ (MENTAL ABILITY)

This section contains 20 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

1. **Direction :** Read the following information carefully to answer the questions that follow.

I. A, B, C, D, E and F are the 6 members of a family.

II. F is the granddaughter of E.

III. D is the grandmother of A.

IV. C is mother of F and wife of B.

V. B's mother is D.

VI. There are two married couples in the family.

Take out the true statement

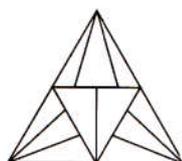
(1) A is sister of F (2) A is F's brother

(3) D has two grandsons (4) None of above

2. If each of the twelve digits on a watch is replaced by English vowels a, e, i, o, u in sequence (1 by a, 2 by e, and so on), the hour hand will be between which pair of vowels at 9 : 30 am?

(1) ae (2) ei (3) io (4) ou

3. Find the number of triangles in the following diagram



(1) 22 (2) 23 (3) 19 (4) 20

4. **Direction :** Read the following information carefully and answer the question given below.

The outer border of width 1 cm of a cube with side 5 cm is painted yellow on each side and the remaining space enclosed by this 1 cm path is painted pink. This cube is now cut into 125 smaller cubes of each side 1 cm. The smaller cubes so obtained are now separated.

How many smaller cubes have one face coloured pink and an adjacent face yellow?

(1) 0 (2) 1 (3) 2 (4) 4

5. Markandey is Rajiv's mother's father. Markandey has three brothers. One of them has grandson Abhi. Rajan is son of Abhi. Rajan is related to Rajiv as -

- (1) Brother (2) Nephew (3) Cousin (4) Uncle

6. Aman is 16th from the left end in a row of boys and Vivek is 18th from the right end. Gagan is 11th from Aman towards the right and 3rd from Vivek towards the right end. How many boys are there in the row?

- (1) 40 (2) 42 (3) 48 (4) 41

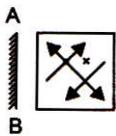
7. A class starts at 10 : 00 am lasts till 1 : 27 pm. Four periods are held during this interval. After every period, 5 min rest are given to the students. The exact duration of each period is

- (1) 40 min (2) 48 min
(3) 51 min (4) 53 min

8. If the day before yesterday was Wednesday, when will Sunday be?

- (1) Today
(2) Tomorrow
(3) Day after tomorrow
(4) Two days after tomorrow

9. **Direction :-** Which of the answer figure is exactly the mirror image of the given figure, when the mirror is placed on the line AB?



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

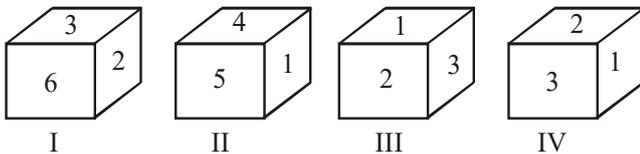
10. On what dates of December, 1984 did Sunday fall?

- (1) 6th, 13th, 20th and 27th
(2) 7th, 14th, 21st and 28th
(3) 2th, 9th, 16th, 23rd and 30th
(4) 1st, 8th, 15th and 22nd

11. A policeman left his police post and proceeded South 4 km on hearing a loud sound from point A. On reaching the place, he heard another sound and proceeded 4 km to his left to the point B. From B he proceeded left to reach another place C, 4 km away. In which direction, he has to go to reach his police post?

- (1) North (2) South (3) East (4) West

12. From the given four positions of a single dice, find the digit at the face opposite to the face having digit 6.



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

13. A solid cube of 4 inches has been painted red, green, and black on pair of opposite faces. It has been cut into one inch cubes. How many cubes have only one face painted that too only red?

- (1) 4 (2) 8
(3) 18 (4) 24

14. **Direction :-** The question given below consists of five or six statements followed by option consisting of three statements put together in a specific order. Choose the option which indicate a valid argument containing logically related statements that is, where the third statement is a conclusion drawn from the preceding two statements.

A : All synopses are poets

B : Some synopses are mentors

C : Some X are not mentors

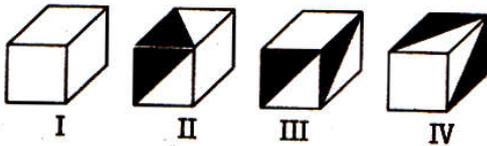
D : All X are poets

E : All synopses are mentors

F : All synopses are X

- (1) ACB (2) AEC
(3) FEC (4) DFA

15. **Direction :** In the question given below an unfolded dice is given in the left side while in the right side, four answer choice are given in the form of complete dices. You are required to select the correct answer choices which is/are formed by folding the unfolded dice.



- (1) I and II (2) II and III
 (3) I and III (4) I and IV

16. **Direction :** In the question below are given three statements followed by four conclusions numbered I, II, III and IV. You have to take the statements to be true even, if they seem to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts.

Statements

- Some desk are mirrors
- Some mirrors are combs
- Some combs are pins

Conclusions

- I. Some pins are desks
- II. Some combs are desks
- III. Some pins are mirrors
- IV. Some pins are either desks or mirrors

- (1) None follows
 (2) Only II follows
 (3) Only I follows
 (4) Only IV follows

17. **Direction :** Read the following information carefully to answer the question that follow. Five ships J, K, L, M and N are to be unloaded on 5 consecutive days beginning from Monday to Friday.

- I. Each ship takes exactly one day to unload
- II. K must be unloaded before (not necessarily immediately before) the days on which M and N are unloaded.
- III. L cannot be unloaded on Tuesday.
- IV. M is the second ship to be unloaded after J is unloaded.

If K, M and N are to be unloaded one immediately after the other, the two days on which J can be unloaded are

- (1) Monday and Tuesday
- (2) Monday and Friday
- (3) Tuesday and Wednesday
- (4) Wednesday and Friday

18. If in a certain code, language 'monday is a holiday' is written as 'sa da pa na' and 'then enjoy a holiday' is written as 'da na ta ka', then how will 'monday' be written in that language?

- (1) sa
- (2) pa
- (3) 'sa' or 'pa'
- (4) Data inadequate

19. If in a certain code language 'TORCH' is coded as 'GLIXS', how would you code 'MANUAL' in the same language?

- (1) CBFMZN (2) OZEOZN
- (3) OZFMZN (4) NZMFZO

20. **Direction :** In the following series, replace the question mark (?) with the suitable option.

180, 100, 60, 40, 30, ?

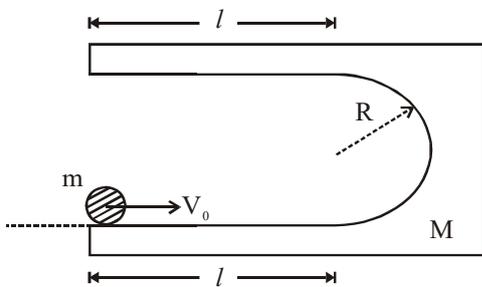
- (1) 23 (2) 24
- (3) 25 (4) 20

PART-II

SECTION-A : PHYSICS

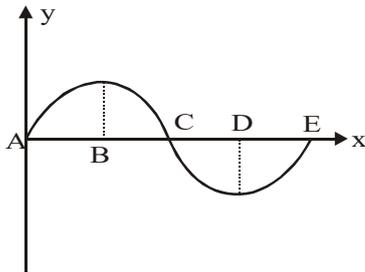
This section contains 20 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

21. An earth satellite is moved from one stable circular orbit to another higher stable circular orbit. Which one of the following quantities increases for the satellite as a result of the change?
- (1) gravitational force
 - (2) gravitational potential energy
 - (3) angular velocity
 - (4) linear orbital speed
22. A particle of mass m moving with a velocity v_0 enters a stationary object of mass M (free to move) as shown in the diagram. All surfaces are frictionless and system shown in the diagram is lying in a horizontal plane. Time taken by particle of mass m to cross the object of mass M is



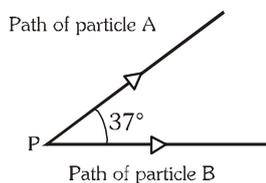
- (1) $\frac{2l + \pi R}{V_0}$
- (2) $\log e \frac{l + R}{V_0}$
- (3) $\frac{l}{V_0} \log e \frac{l + \pi R}{l}$
- (4) $\frac{\pi R}{V_0} \log e \left(\frac{l + \pi R}{\pi R} \right)$

23. A wave is travelling along positive x direction. Displacement of particle at any time t is shown. Select the correct statement.

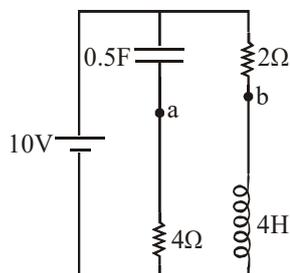


- (1) at E particle's velocity is zero
 (2) at D particle has zero velocity.
 (3) particle between B & C are stationary
 (4) None of these
24. Two particles A and B start moving simultaneously from a point P on straightline paths. Their paths make an angle of 37° with each other as shown in the figure. One of them moves with uniform speed of 10 m/s and the other with uniform speed 8 m/s.

Distance between the particles 40 s after they leave point P is closest to

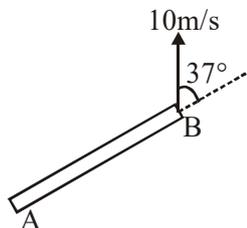


- (1) 192 m (2) 240 m (3) 320 m (4) 426 m
25. Regarding the given circuit, the correct statement is :-

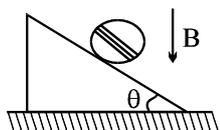


- (1) $(V_a - V_b)$ is increasing with time
 (2) $(V_a - V_b)$ is decreasing with time
 (3) $(V_a - V_b) = 10 \text{ V}$
 (4) $(V_a - V_b) = \text{zero}$

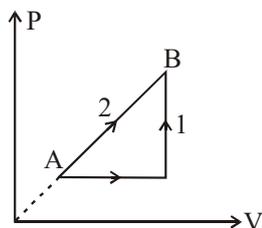
26. A uniform bar AB of length $L = 2\text{m}$ is moving in space such that velocity of end B is 10m/s at an angle 37° with length of bar and end A is having minimum possible velocity. Angular velocity of bar is



- (1) 3 rad/s (2) 4 rad/s
 (3) 5 rad/s (4) 8 rad/s
27. In the figure shown a coil of single turn is wound on a sphere of radius R and mass m . The plane of the coil is parallel to the plane and lies in the equatorial plane of the sphere. Current in the coil is i . The value of B if the sphere is in equilibrium is



- (1) $\frac{mg \cos \theta}{\pi i R}$ (2) $\frac{mg}{\pi i R}$
 (3) $\frac{mg \tan \theta}{\pi i R}$ (4) $\frac{mg \sin \theta}{\pi i R}$
28. A diatomic gas of a certain mass gets from state A to state B on two ways shown in the figure. The ratio of the amounts of heat absorbed in the two processes is $Q_2 : Q_1$ can be :-



- (1) $54 : 49$ (2) $49 : 54$
 (3) $1 : 1$ (4) None of these

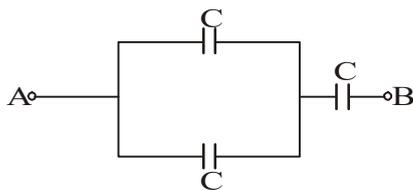
29. The time period of a simple pendulum is given

by $T = 2\pi\sqrt{\frac{\ell}{g}}$. In an experiment, the length of the

pendulum is increased by 1%, while the acceleration due to gravity is also increased by 2%. The time period will

- (1) increase by 0.5%
- (2) decrease by 0.5%
- (3) increase by 1%
- (4) decrease by 1%

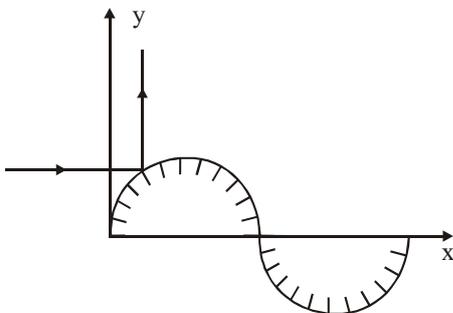
30. In the network shown we have three identical capacitors. Each of them can withstand a maximum 100 V potential difference. What maximum voltage can be applied across A and B so that no capacitor gets spoiled?



- (1) 150 V
- (2) 120 V
- (3) 180 V
- (4) 200 V

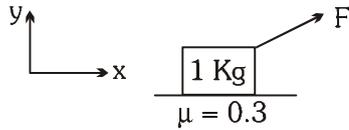
31. Equation of a reflecting surface is defined as

$y = \frac{2L}{\pi} \sin \frac{\pi x}{L}$. A ray of light incident on this surface in first quadrant parallel to X axis becomes parallel to Y axis just after reflection. Find X co-ordinate of the point of incidence.



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

32. A force $\vec{F} = \hat{i} + 4\hat{j}$ acts on block shown. The force of friction acting on the block is :



- (1) $-\hat{i}$ (2) $-1.8\hat{i}$ (3) $-2.4\hat{i}$ (4) $-3\hat{i}$
33. Consider the following fusion reaction ${}_1\text{H}^2 + {}_1\text{H}^3 \rightarrow 2\text{He}^4$. If 20 MeV of energy is released per fusion reaction. Mass of ${}_1\text{H}^2$ consumed per day is 0.1 gm. What is the (approx) power of the reactor in MW?
- (1) 2 (2) 1 (3) 4 (4) 3
34. Mass centers of a system of three particles of masses 1, 2, 3 kg is at the point (1 m, 2 m, 3 m) and mass center of another group of two particles of masses 2 kg and 3 kg is at point (-1 m, 3 m, -2 m). Where a 5 kg particle should be placed, so that mass center of the system of all these six particles shifts to mass center of the first system?
- (1) (1 m, -3 m, 2 m) (2) (3 m, 3 m, 2 m)
 (3) (-1 m, 2 m, 3 m) (4) (3 m, 1 m, 8 m)
35. A monochromatic light is just able to ionise a hypothetical one electron atom in its ground state, having energy levels defined by $E_n = -\frac{17}{n^2}$ eV where n is principal quantum number. In an experimental set-up same light is incident on a metal plate and it was found out that electrons have 2eV as maximum kinetic energy. If the work function of metal is 5α eV, find the value of α .
- (1) 3 (2) 2 (3) 4 (4) 5
36. A slightly conical wire of length L and radii a and b stretched by two forces f applied parallel to length in opposite directions and normal to end faces. If Y denotes the Young's modulus, the extension produced is
- (1) $\frac{FL}{\pi(a^2 + b^2)Y}$ (2) $\frac{FL}{\pi(a^2 - b^2)Y}$
 (3) $\frac{FL}{\pi abY}$ (4) None of these

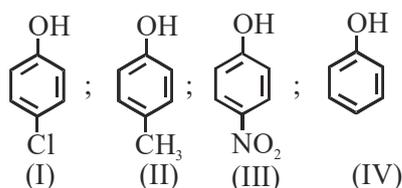
37. We can compensate backlash error by
- (1) Measuring the objects in ascending order of their sizes.
 - (2) Measuring the objects in descending order of their sizes.
 - (3) Either (1) or (2)
 - (4) It is not possible as it is random error.
38. On the superposition of two harmonic oscillations represented by $x_1 = a \sin(\omega t + \phi_1)$ and $x_2 = a \sin(\omega t + \phi_2)$ a resulting oscillation with the same time period and amplitude is obtained. The value of $\phi_1 - \phi_2$ is :-
- (1) 120°
 - (2) 90°
 - (3) 60°
 - (4) 15°
39. In standard YDSE, if intensity of the two slits S_1 and S_2 be I_0 and $4I_0$ respectively, then the intensity ratio $\frac{I_{\max}}{I_{\min}}$ will be.
- (1) 8
 - (2) 7
 - (3) 9
 - (4) 10
40. Suppose a voltmeter of resistance 660Ω reads the voltage of a very old cell to be 1.32 volt while a potentiometer reads its voltage to be 1.44 volt. The internal resistance of the cell is :-
- (1) 30Ω
 - (2) 60Ω
 - (3) 6Ω
 - (4) 0.6Ω

SECTION-B : CHEMISTRY

This section contains 20 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

41. Which one of the following compound is reduced with Zn-Hg/HCl to give the corresponding hydrocarbon?
- (1) $\text{CH}_3\text{COCH}_2\text{CH}_3$
 - (2) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$
 - (3) $\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$
 - (4) $\text{CH}_3\text{CH}_2\text{COOH}$
42. If both sp mixing and Hund's rule are ignored, then which of the following order(s) is correct?
- (1) $\text{O}_2^+ > \text{O}_2$ (order of stability)
 - (2) O_2 and O_2^{-1} both will be paramagnetic
 - (3) C_2 will have one σ and one π bond and is paramagnetic
 - (4) None of these

43. $C_6H_5NH_2 + Br_2 \text{ Water} \rightarrow \text{Product}$
Product of above reaction is
- (1) 2-bromoaniline
 - (2) 4-bromoaniline
 - (3) 2, 4, 6-tribromoaniline
 - (4) 2, 6-dibromoaniline
44. When a mixture consisting of 10 moles of SO_2 and 16 moles of O_2 were passed over a catalyst, 8 mole of SO_3 were formed at equilibrium. The number of moles of SO_2 and O_2 which did not enter into reaction were
- (1) 2, 12
 - (2) 12, 2
 - (3) 3, 10
 - (4) 10, 3
45. Copper crystallises in a structure of face centered cubic unit cell. The atomic radius of copper is 1.28 Å. What is axial length on an edge of copper.
- (1) 2.16 Å
 - (2) 3.62 Å
 - (3) 3.94 Å
 - (4) 4.15 Å
46. Aniline behaves as a weak base. When 0.1 M, 50 ml solution of aniline was mixed with 0.1 M, 25 ml solution of HCl the pH of resulting solution was 8. Then the pH of 0.01 M solution of aniliniumchloride will be ($K_w = 10^{-14}$)
- (1) 6
 - (2) 6.5
 - (3) 5
 - (4) 5.5
47. Which one of the following reagent can be used to distinguish between compounds CH_3CHO and $PhCHO$?
- (1) Tollen's reagent
 - (2) Lucas test
 - (3) Fehling's solution
 - (4) NH_2OH
48. Arrange the following compounds in order of decreasing acidity : [GOC-M]



- (1) II > IV > I > III
- (2) I > II > III > IV
- (3) III > I > II > IV
- (4) III > I > IV > II

49. What is produced in Ostwald process and contact process respectively?

- (1) $\text{HNO}_3, \text{H}_2\text{SO}_4$ (2) $\text{H}_2\text{SO}_4, \text{HNO}_3$
(3) $\text{Cl}_2, \text{H}_2\text{SO}_4$ (4) HNO_3, HCl

50. Which one of the following compound does not give butane when react with $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{MgX}$.

- (1) PhOH (2) CH_3X
(3) CH_3COOH (4) $\text{CH}_3\text{C} \equiv \text{CH}$

51. How many moles of sucrose should be dissolved in 500 gms of water so as to get a solution which has a difference of 104°C between boiling point and freezing point.

- ($K_f = 1.86 \text{ K Kg mol}^{-1}$, $K_b = 0.52 \text{ K Kg mol}^{-1}$)
(1) 1.68 (2) 3.36 (3) 8.40 (4) 0.840

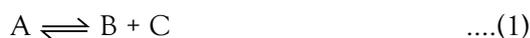
52. For an electron, with $n = 3$ has only one radial node. The orbital angular momentum of the electron will be

- (1) 0 (2) $\sqrt{6} \frac{h}{2\pi}$
(3) $\sqrt{2} \frac{h}{2\pi}$ (4) $3 \left(\frac{h}{2\pi} \right)$

53. Which is an ore of iron?

- (1) Bauxite (2) Galena
(3) Magnetite (4) Borax

54. For the reaction (1) and (2) :



Given, $K_{p_1} : K_{p_2} :: 4 : 1$

If the degree dissociation of A and D be same then the total pressure at equilibria (1) and (2) are in the ratio

- (1) 3 : 1 (2) 36 : 1 (3) 16 : 1 (4) 0.5 : 1

55. The rate constant for the reaction $\text{A} \rightarrow \text{B}$ is $2 \times 10^{-4} \text{ Its mol}^{-1} \text{ min}^{-1}$. The concentration of A at which rate of the reaction is $(1/12) \times 10^{-5} \text{ M sec}^{-1}$ is:

- (1) 0.25 M (2) $(1/20)\sqrt{5/3} \text{ M}$
(3) 0.5 M (4) None of these

56. For the hypothetical reaction
- $$A_2(g) + B_2(g) \rightleftharpoons 2AB(g)$$
- If $\Delta_r G^\circ$ and $\Delta_r S^\circ$ are 20 kJ/mol and $-20 \text{ JK}^{-1} \text{ mol}^{-1}$ respectively at 200 K.
- $\Delta_r C_p$ is $20 \text{ JK}^{-1} \text{ mol}^{-1}$ then $\Delta_r H^\circ$ at 400 K is :
- (1) 20 kJ/mol (2) 7.98 kJ/mol
 (3) 28 kJ/mol (4) None of these
57. Which species has maximum magnetic moment?
- (1) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$
 (2) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$
 (3) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 (4) $[\text{CoCl}_4]^{2-}$
58. Molecular formula $\text{C}_4\text{H}_{10}\text{O}$ represent :
- (1) Two primary alcohol
 (2) One secondary alcohol
 (3) One tertiary alcohol
 (4) All of these
59. A cell $\text{Cu} | \text{Cu}^{++} || \text{Ag}^+ | \text{Ag}$ initially contains 2M Ag^+ and 2M Cu^{++} ions in 1L electrolyte. The change in cell potential after the passage of 10 amp current for 4825 sec is :
- (1) - 0.00738 V (2) - 1.00738 V
 (3) - 0.0038 V (4) none
60. Which one of the following statements is incorrect for $\text{S}_{\text{N}}2$ reaction ? [Alkyl halide-E]
- (1) The rate of reaction is independent of the concentration of nucleophile
 (2) Nucleophile attacks the carbon from the side opposite to the leaving group is attached
 (3) In single step the bond formation and bond breaking takes place
 (4) The rate of reaction \propto [substrate] [nucleophile]

Attempt any one of the section C or D

SECTION-C : MATHEMATICS

FOR ADMISSION IN ENGINEERING STREAM

This section contains 20 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

61. Identify the statement which is incorrect

- (1) the equation of the director circle of the ellipse, $4x^2 + 9y^2 = 36$ is $x^2 + y^2 = 13$
- (2) the sum of the focal distances of the point $(4, 0)$ on the ellipse $\frac{x^2}{16} + \frac{y^2}{25} = 1$ is 8
- (3) the point of intersection of any tangent to a parabola and the perpendicular to it from the focus lies on the tangent at the vertex
- (4) the line through focus and $(at_1^2, 2at_1)$ on $y^2 = 4ax$, meets it again at the point $(at_2^2, 2at_2)$ if $t_1t_2 = -1$

62. C_1 is a circle of radius 2 touching x-axis and y-axis. C_2 is another circle of radius greater than 2 and touching the axes as well as the circle C_1 .

Statement – 1 : Radius of circle

$$C_2 = \sqrt{2}(\sqrt{2}+1)(\sqrt{2}+2)$$

Statement – 2 : Centres of both circles always lie on the line $y = x$.

- (1) **Statement – 1** is True, **Statement – 2** is True, **Statement – 2** is a correct explanation for **Statement – 1**
- (2) **Statement – 1** is True, **Statement – 2** is True; **Statement – 2** is NOT a correct explanation for **Statement – 1**
- (3) **Statement – 1** is True, **Statement – 2** is False
- (4) **Statement – 1** is False, **Statement – 2** is True

63. **Statement – 1** : If $x + y = k$ is a normal to the parabola $y^2 = 12x$, then k is 9.

Statement – 2 : Equation of normal to the parabola $y^2 = 4ax$ is $y - mx + 2am + am^3 = 0$

(1) **Statement – 1** is True, **Statement – 2** is True, **Statement – 2** is a correct explanation for **Statement – 1**

(2) **Statement – 1** is True, **Statement – 2** is True ; **Statement – 2** is NOT a correct explanation for **Statement – 1**

(3) **Statement – 1** is True, **Statement – 2** is False

(4) **Statement – 1** is False, **Statement – 2** is True

64. Given that $5 \cos^2 \alpha - 2 \sin \alpha - 2 = 0$,

$\left(\frac{5\pi}{4} < \alpha < \frac{7\pi}{4}\right)$, the value of $\cot \frac{\alpha}{2}$ is

(1) 1 (2) -1

(3) 2 (4) none of these

65. Let $f(x) = \min\{\tan 3x, \cot 3x\}$, then number of points in $(0, 2\pi) \cap \text{Domain of } f(x)$, where $f(x)$ is non-differentiable is :

(1) 6 (2) 12

(3) 24 (4) none of these

66. If $|z| \geq 4$, then the least value of $\left|z + \frac{1}{z}\right|$ is $\frac{\lambda}{4}$, then the value of $\cos(\lambda\pi)$ is -

(1) 0 (2) -1 (3) 1 (4) $\frac{1}{2}$

67. The number of solution(s) of the equation $\cos^{-1}(x) = \sin(\{x\})$ (Where $\{.\}$ denotes fractional part of x) is equal

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

68. The term independent of x in the expansion of

$\left(x - \frac{1}{x}\right)^4 \left(x + \frac{1}{x}\right)^3$ is:

(1) -3 (2) 0 (3) 1 (4) 3

69. The image of the point (1, 6, 3) in the line

$\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ is -

(1) (1, 2, 3) (2) (1, 3, 5)

(3) (1, 0, 7) (4) none of these

70. The point of intersection of the curves whose parametric equations are

$x = t^2 + 1, y = 2t$ and $x = 2s, y = 2/s$ is given by:

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

71. If $\cos y = x \cos(k + y)$ and $\frac{dy}{dx} = \frac{\sin k}{1 + x^2 - \lambda x \cos k}$, then the value of λ is

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

72. A rod of length 2 units moves so that one end is on x-axis and other end on $y + x = 0$. Then the equation of locus of the mid-point of the rod is

- (1) $x^2 + 5y^2 + 4xy - 1 = 0$
 (2) $x^2 + 5y^2 + 4xy + 1 = 0$
 (3) $x^2 + 5y^2 - 4xy - 1 = 0$
 (4) none of these

73. If $f(x) = e^{g(x)}$ and $g(x) = \int_2^x \frac{dt}{1 + 4t^2}$, then $f'(2) =$

- (1) 0 (2) 1/17
 (3) 3/17 (4) 2/17

74. If α, β are the roots of the quadratic equation, $x^2 - 2p(x - 4) - 15 = 0$ then the set of values of p for which one root is less than 1 & the other root is greater than 2 is:

- (1) $(7/3, \infty)$ (2) $(-\infty, 7/3)$
 (3) $x \in \mathbb{R}$ (4) none

75. $\int \frac{x + \sqrt[3]{x^2} + \sqrt[6]{x}}{x(1 + \sqrt[3]{x})} dx$ equals

- (1) $\frac{3}{2}x^{2/3} + 6 \tan^{-1} \sqrt[6]{x} + c$
 (2) $\frac{3}{2}x^{2/3} + 6 \tan^{-1} \sqrt{x} + c$
 (3) $\frac{3}{2}x^{2/3} + \tan^{-1} x + c$
 (4) $\frac{3}{2}x^{2/3} + 6 \tan^{-1} x^{1/3} + c$

76. Let 'P' be a point which does not lie outside the triangle ABC, $A \equiv (3, 2)$, $B \equiv (0, 0)$, $C \equiv (0, 4)$ and satisfies $d(P, A) \leq \text{maximum}\{d(P, B), d(P, C)\}$, then maximum distance of P from side BC, where $d(P, A)$ gives the distance between P & A, is

- (1) $\frac{3}{4}$ (2) $\frac{4}{3}$ (3) 3 (4) 0

77. Five identical, unbiased dice are rolled simultaneously. Probability that the A.M of the outcomes is less than 3 is equal to

- (1) $\frac{{}^{13}C_5 - 4 \cdot {}^9C_4}{6^5}$ (2) $\frac{{}^{14}C_5 - 4 \cdot {}^9C_4}{6^5}$
 (3) $\frac{{}^{14}C_5 - 5 \cdot {}^9C_4}{6^5}$ (4) $\frac{{}^{13}C_5 - 5 \cdot {}^9C_4}{6^5}$

78. The number of 5 digit numbers of the form $xyzyx$ in which $x < y$ is:

- (1) 350 (2) 360 (3) 380 (4) 390

79. The function $f(x) = \int_0^x \sin\left(\frac{\pi t^2}{2}\right) dt$ has critical

points in $x \in \left[1, \frac{12}{5}\right]$. If local minimum and local

maximum of $f(x)$ occurs at $x = x_1$ & $x = x_2$ respectively then $[x_1 + x_2]$ is equal to (where $[.]$ denotes greatest integer function).

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

80. If $f(x)$ is continuous function $\forall x \in \mathbb{R}$ and the

range of $f(x)$ is $(2, \sqrt{26})$ and $g(x) = \left[\frac{f(x)}{a}\right]$ is

continuous $\forall x \in \mathbb{R}$, where $[.]$ denotes greatest integer function. Then least positive integral value of a is:

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

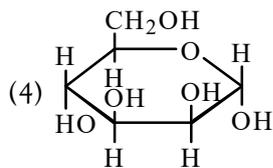
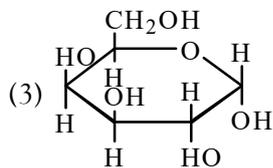
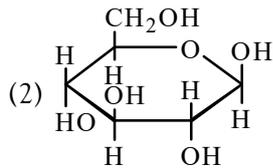
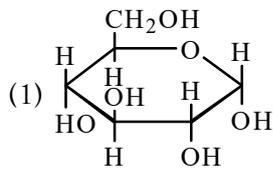
SECTION-D : BIOLOGY

FOR ADMISSION IN MEDICAL STREAM

This section contains 20 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

81. Choose the correctly matched pair.
- (1) Chipko movement - Amrita devi
 - (2) Catalytic converters - Incomplete burning of fuel
 - (3) Polyblend - Fine powder of plastic
 - (4) FOAM - Radioactive pollution
82. Meristematic cells are characterised by how many of the following features
Large Nucleus, dense cytoplasm, thin walled, Vacoules present, wider lumen
- (1) Three
 - (2) Two
 - (3) Five
 - (4) One
83. Which among the following is main cause of biodiversity loss.
- (1) Habitat loss and fragmentation
 - (2) Alien species invasion
 - (3) Coevolution
 - (4) Exploitation
84. Select among the given members, how many of them have pyrenoids in their chloroplast
Chlorella, *Ectocarpous*, *Anthoceros*, *Marchantia*, *Ficus*, *Spirogyra*
- (1) Six
 - (2) Three
 - (3) Two
 - (4) Four
85. Brush border is characteristic feature of the cells of
- (1) Bowman's capsule
 - (2) PCT
 - (3) Ascending limb of loop of Henle
 - (4) DCT
86. Calculate the total number of ATP produced by complete oxidation of 2 molecules of acetyl Co-A.
- (1) 24
 - (2) 12
 - (3) 36
 - (4) 48

87. Which of the following is the structure of α -D-glucose?



88. Observe the given DNA segment
 5'ATGCTCTCAGTCCCGTACACGTAG 3'
 3'TACGAGAGTCAGGGCATGTGCACT 5'
 If C is replaced by G at the 18th position, then what will be the number of amino acids in the polypeptide chain formed by the above DNA segment.

- (1) Five (2) Six
 (3) Seven (4) Zero

89. Liver cirrhosis is caused by :

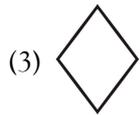
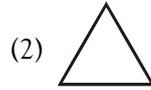
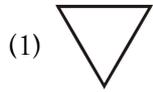
- (1) Excess alcoholism
 (2) No alcohol
 (3) Due to bacterial infection
 (4) Due to viral infection

90. Match the **correct** one

- (1) Ctenophora – Triploblastic
 (2) Nematoda – Flame cells
 (3) Annelida – True coelom
 (4) Porifera – Tissue level of organization

-
91. Group of nerve fibre in CNS called :-
(1) Nerve (2) Tract
(3) Neuron (4) Ganglia
92. A student observing a flower, he found that stamens are arranged in 2 bundles, among them one of the bundle contain nine stamens whereas another bundle contain only one stamen. Help him to identify the name of flower
(1) *Gloriosa*
(2) *Tulip*
(3) Pea
(4) China rose
93. Which one of the following is used in the manufacture of alcohol ?
(1) Bacteria (2) Water molds
(3) Yeasts (4) Slime molds
94. What will be the total number of ATP and NADPH+ H⁺ required to produce 36 molecules of glucose by the palisade parenchyma of Mango.
(1) 36 and 12 (2) 108 and 36
(3) 432 and 144 (4) 72 and 24
95. Which of the following combination of gases was used by Miller and Urey.
(1) H₂, NH₃, CH₄, H₂O
(2) H₂, N, C
(3) C, H, O
(4) None
96. Find out the frequency of offsprings showing Ist homozygous dominant and IInd heterozygous dominant traits, in F₂ generation of dihybrid cross
(1) $\frac{1}{4}$ (2) $\frac{1}{8}$
(3) $\frac{1}{16}$ (4) Zero
97. The technique used for separation of different sized fragments of DNA molecules is called
(1) Elution
(2) Gel electrophoresis
(3) Western blotting
(4) Northern blotting

98. In an ecosystem major conduit of energy takes place by grazing food Chain, Select the correct representation of pyramid of biomass for this ecosystem



(4) None

99. Mark the reproductive event in human beings which does not occur prior to zygote formation

(1) Implantation (2) Insemination

(3) Gametogenesis (4) Fertilisation

100. Most of the amphibians have two pairs of limbs except

(1) Bufo (2) Amphiuma

(3) Ambyostoma (4) Ichthyophis

SPACE FOR ROUGH WORK