Pre-Board -1 Exam (2025-26)

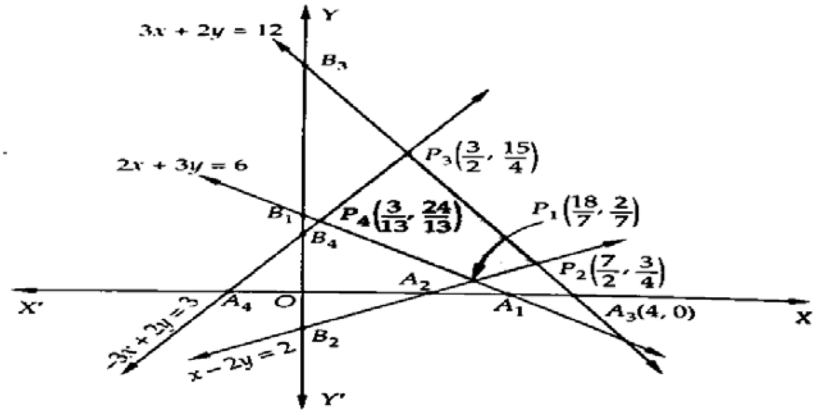
Class-XII

Time: 3 hrs. **Subject-Mathematics** **MM-80**

INSTRUCTIONS:

1. This Question paper contains-five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 very Short Answer (VSA)-type questions of 2 mark each.
4. Section C has 6 Short Answer (SA)-type questions of 3 mark each.
5. Section D has 4 Long Answer (LA)-type questions of 5 mark each.
6. Section E has 3 source based/case based/passage based/integrated units of assessment (4 marks each) with sub parts.

SECTION A (20 MARKS)

1.	The function $f(x) = \begin{cases} \frac{\sin^2 3x}{x^2}, & x \neq 0 \\ \frac{\lambda}{2} & , x = 0 \end{cases}$ is continuous at $x = 0$, then λ is equal to a) 3 b) 6 c) 12 d) 18
2.	$A = \left[a_{ij}\right]_{m \times n}$ is a square matrix , if (a) m $<$ n (b) m $>$ n (c) m = n (d) None of these
3.	If A is singular matrix, then $A\ (Adj\ A)$is (a) A unit matrix (b) A null matrix (c) A symmetric matrix (d) none of these.
4.	The corner points of the feasible region determined by the following system of linear inequalities 2x+y≤ 10 x + 3y ≤ 15 x ≥ 0 y ≥ 0 are (0,0) (5,0) (3,4) and (0,5) Let Z= px + qy, where p, q > 0. Condition on p and q , so that the maximum occurs at both (3,4) and (0,5) is (a) p=q (b) p=2q (c) p=3q (d) q=3p
5.	Let A (1,3), B (0,0) and C(k,0) be three points such that area of triangle ABC is 3 sq units. Then the value of k is (a) ± 2 (b) 0 (c) 2 (d) 1
6.	If A is a square matrix of order 3 and $\|A\|$=2, then $\|-AA^T\|$ is equal to (a) 2 (b) -4 (c) -3 (d) 1
7.	Based on the given shaded region as the feasible region in the graph, at which point(s) is the objective function Z = 5x + 2y maximum?  (a) P₁ (b) P₂ (c) P₃ (d)P₄

8. Direction cosines of the line $\frac{x-1}{2} = \frac{1-y}{3} = \frac{2z-1}{12}$ are

(a) $\frac{2}{7}, \frac{3}{7}, \frac{6}{7}$ (b) $\frac{2}{\sqrt{157}}, -\frac{3}{\sqrt{157}}, \frac{12}{\sqrt{157}}$ (c) $\frac{2}{7}, -\frac{3}{7}, -\frac{6}{7}$ (d) $\frac{2}{7}, -\frac{3}{7}, \frac{6}{7}$

9. If two vectors $\vec{a}$ $and\ \overrightarrow{b}$ are such that $|\vec{a}| = 2$, $|\vec{b}| = 5,\ \vec{a}.\vec{b} = 8$ then the value of $|\vec{a} - \vec{b}\,|$ is

(a) $\sqrt{13}$ (b) 13 (c) 169 (d) 3

10. The function $f(x) = \sin^{-1}(\frac{2x}{1+x^2})$ then $f'(1)$ is?

(a) 1 (b) 0 (c) -1 (d) $\frac{1}{2}$

11. If P(A) = $\frac{4}{5}$ and P$(A \cap B)$ = $\frac{7}{10}$, then P$(\frac{B}{A})$ is equal to

(a) $\frac{1}{10}$ (b) $\frac{1}{8}$ (c) $\frac{7}{8}$ (d) $\frac{17}{20}$

12. The degree of the differential equation is $\left(1 + \left(\frac{dy}{dx}\right)^2\right)^3 = \left(\frac{d^2y}{dx^2}\right)^4$ is

(a) 2 (b) 3 (c) 6 (d) 4

13. If A is a square matrix of order 3 has $|A|$=4, then the value of $|A\ adj\ A|$ is equals to

a) 32 b) 16 c) 64 d) None of these

14. The integrated factor of the differential equation: (1+x^2) $\frac{dy}{dx} + y = e^{tan^{-1}x}$ is

$\frac{1}{e^{tan^{-1}x}}$ (b) $2\,e^{tan^{-1}x}$ (c) $3e^{tan^{-1}x}$ (d) $e^{tan^{-1}x}$

15. Direction cosines of the vector $\overrightarrow{AB}$ joining the point $A(-1, -2, 3)$ and $B(1, 2, -1)$ is

a) $\langle\frac{1}{3}, \frac{2}{3}, \frac{-2}{3}\rangle$ b) $\langle 2, 4, -4\rangle$ c) $\langle\frac{2}{\sqrt{6}}, \frac{4}{\sqrt{6}}, \frac{-4}{\sqrt{6}}\rangle$ d) $\langle\frac{-1}{\sqrt{3}}, \frac{-2}{3}, \frac{1}{3}\rangle$

16. Find the projection of the vector $\hat{\imath}$ -$\hat{\jmath}$ + $3\hat{k}$ on the vector $\hat{\imath}$ -2$\hat{\jmath}$ + $5\hat{k}$

(a) $\frac{18}{\sqrt{30}}$ (b) $\frac{14}{30}$ (c) $\frac{7}{15}$ (d) $\frac{14}{\sqrt{30}}$

17. The value of the integral

$\int_{-\pi}^{\pi} sin^{-1}x dx$ is

a) π b) $-\pi$ c) 0 d) 2π

18. The position vectors of two points A and B are respectively $6\vec{a} + 2\vec{b}$ and $\vec{a} - 3\vec{b}$. If the point C divides AB internally in the ratio 3: 2 then the position vector of C is ?

a) $3\vec{a} - \vec{b}$ b) $3\vec{a} + \vec{b}$ c) $\vec{a} + \vec{b}$ d) $\vec{a} - \vec{b}$

QUESTION19 & 20 BASED ON REASONING AND ASSERTION

In the following questions a statement of Assertion (A) is followed by a statement of Reason(R). Pick the correct option:

a) Both (A) and (R) are True and R is the correct Explanation of (A)
b) Both (A) and (R) are True and R is not the correct Explanation of (A)
c) (A) is True but (R) is False
d) (A) is False but (R) is True

19. **Assertion (A):** Let N be the set of all natural numbers and R be a relation in N defined by R= {(a,b): a is a multiple of b}. Then R is reflexive and transitive but not symmetric.

Reason (R): A relation R is an equivalence relation if R is reflexive and symmetric only.

20. **Assertion (A):** A balloon, which always remains spherical, has a variable radius. The rate, at which its volume is increasing with the radius when the radius is 10 cm, is 400 π $cm^3/\ cm$.

Reason (R): Rate of change of volume (v) of balloon with respect of radius (r) is $\frac{dv}{dr} = \left(\frac{4}{3}\pi\right).3r^2$

SECTION B (10 MARKS)

21. Find the value of $\cot^{-1}(-1) + \operatorname{cosec}^{-1}(-\sqrt{2})$.

OR

Find the value of $\cos^{-1}\left(cos\frac{13\pi}{6}\right)$.

22. Show that $f(x) = (x-1)e^x + 1$ *is a strictly increasing function for all* $x > 0$.

23. Find the maximum profit that a company can make, if the profit function is given by $p(x) = 41 + 72x - x^2$ where x is the number of units and p(x) is the profit in rupees.

OR

The volume of a cube is increasing at a constant rate .Prove that the increase in surface area varies inversely as the length of the edge of the cube.

24. Evaluate: $\int_0^{\frac{\pi}{2}} x\cos x\, dx$.

25. At what points in the interval $[0\,, 2\,\pi]$, does the function $\sin 2x$ attain its maximum value?

SECTION C (18 MARKS)

26. Find : $\int \frac{3x+1}{(x-2)^2(x+2)}dx$

27. The probabilities of a specific problem being solved independently by A and B are $\frac{1}{2}\, and\, \frac{1}{3}$ respectively. If both try to solve the problem independently, find the probability that

(i) The problem is solved

(ii) Exactly one of them solves the problem.

28. $Evaluate$: $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{cotx}}$

OR

$Evaluate$: $\int x\tan^{-1}x\, dx$

29. Solve the differential equation: $(1+x^2)\frac{dy}{dx} + y = e^{\tan^{-1}x}$

OR

Solve the differential equation x dy - y dx = $\sqrt{x^2+y^2}$ dx

30. Solve the following Linear Programming Problem graphically:

Maximize: Z = $100x + 120y$

Subject to : $5x + 8y \le 200, 5x + 4y \le 120, x, y \ge 0$

OR

Solve the following Linear Programming Problem graphically:

$Minimise : z = 4x + 6y$

$subject\ to\ the\ constraints$

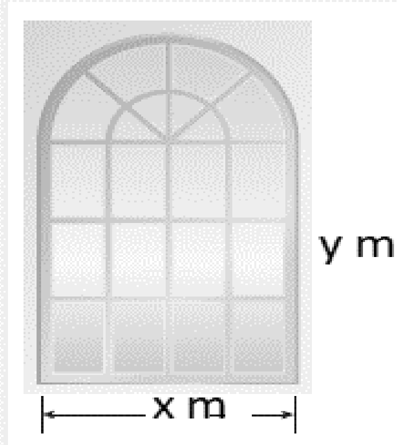
$x + 2y \ge 80, \quad 3x + y \ge 75\ , \quad x \ge 0, y \ge 0$

31. If $x = 3sint - sin3t$ *and* $y = 3cost - cos3t$ *find* $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{3}$

SECTION D (20 MARKS)

32. Make a rough sketch of the region $\{(x,y): 0 \le y \le x^2 + 1, 0 \le y \le x + 1, 0 \le x \le 2\}$ and find the area of the region using integration.

33. Let A ={1,2,3,4,5,6,7,8,9} and R be a relation in A × A, defined by (a, b) R (c, d) ⇔ a+d= b+c for all (a,b) and (c, d) ∈ $A\ X\ A$. Prove that R is an equivalence relation. Also

	find the equivalence class of (2, 5). **OR** Consider f:$R_+ \to [-9,\infty)$ given by f(x) =$5x^2+6x-9$. Prove that f is bijective.
34.	Using matrix method solve the following system of linear equations: $x + 3y + 4z = 8$ $2x + y + 2z = 5$ $5x + y + z = 7$
35.	Find the shortest distance between the lines whose equations are given as: $L_1: \vec{r} = \hat{\imath} + \hat{\jmath} + \boldsymbol{\lambda}(2\hat{\imath} - \hat{\jmath} + \hat{k})$ $L_2: \vec{r} = 2\hat{\imath} + \hat{\jmath} - \hat{k} + \boldsymbol{\mu}(3\hat{\imath} - 5\hat{\jmath} + 2\hat{k})$ **OR** Show that the lines $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ and $\frac{x-2}{1} = \frac{y-4}{3} = \frac{z-6}{5}$ intersect also find their point of intersection.
	SECTION E (12 MARKS) This section comprises of 3 case –study/passage based questions of 4 marks each with sub-parts. The first two case study questions have three sub parts (i), (ii) , (iii) of marks 1,1,2 respectively. The third case study question has two sub parts of 2 marks each.
36.	Dr. Rohan residing in Delhi went to see an apartment of 3BHK in Noida. The window of the house in the form of a rectangle surrounded by a semicircular opening having a perimeter of the window 10 m as shown in the figure  (i) If x and y represents the length and breadth of the rectangular region, then what is the relation between the variables. (ii) Dr. Rohan is interested in maximize the area of the whole window. For this to happen what should be value of x? OR (ii) For maximum value of area, find the breadth of the rectangular part of the window. (iii) Find the maximum area of window.
37.	A particle is acted upon by constant forces $\overrightarrow{F_1} = 4\hat{\imath} + \hat{\jmath} - 3\hat{k}$ and $\overrightarrow{F_2} = 3\hat{\imath} + \hat{\jmath} - \hat{k}$ is displaced from the point $\overrightarrow{d_1} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$ to the point $\overrightarrow{d_2} = 5\hat{\imath} + 4\hat{\jmath} + \hat{k}$. Now answer the following questions:

	(i) Find the magnitude of $\overrightarrow{F_1}+\overrightarrow{F_2}$ (ii) Find the scalar product of $\overrightarrow{F_2}\ with\ \overrightarrow{d_1}$. (iii) Find the total work done by the forces. OR (iii)Find a unit vector perpendicular to the plane containing $\overrightarrow{d_1}\ and\ \overrightarrow{d_2}$
38.	Mahindra Tractors is India’s leading farm equipment manufacturer. It is the largest tractor selling factory in the world. This factory has two machine A and B. Past record shows that machine A produced 60% and machine B produced 40% of the output(tractors). Further 2% of the tractors produced by machine A and 1% produced by machine B were defective. All the tractors are put into one big store hall and one tractor is chosen at random. TractorJunction (i) Find the total probability of chosen tractor (at random) is defective. (ii) If in random choosing, chosen tractor is defective, then find the probability that the chosen tractor is produced by machine ‘A’

KENDRIYA VIDYALAYA SANGTHAN DEHRADUN REGION
PRE-BOARD EXAMINATION 2025-26
SUBJECT- PHYSICS
CLASS –XII

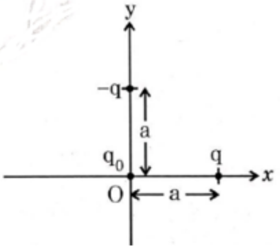
TIME: 3 HOUR **MAXIMUM MARKS: 70**

General Instructions:

(1) There are 33 questions in all. All questions are compulsory.
(2) This question paper has five sections: Section A, Section B, Section C, Section D and Section E.
(3) All the sections are compulsory.
(4) **Section A** contains **sixteen questions, twelve MCQ and four assertion reasoning based of 1 mark each**, **Section B** contains **five questions of two marks each**, **Section C** contains **seven questions of three marks each**, **Section D** contains **two case study-based questions of four marks each** and **Section E** contains **three long answer questions of five marks each**.
(5) There is no overall choice. However, an internal choice has been provided in two questions in Section B, one question in Section C and all three questions in Section E. You have to attempt only one of the choices in such questions.
(6) Use of calculators is not allowed.
(7) You may use the following values of physical constants where ever necessary.
i. $c = 3 \times 10^8$ m/s ii. $m_e = 9.1 \times 10^{-31}$ kg iii. $m_p = 1.7 \times 10^{-27}$ kg iv. $e = 1.6 \times 10^{-19}$ C
v. $\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1} vi. $h = 6.63 \times 10^{-34}$ J s vii. $\varepsilon_0 = 8.854 \times 10^{-12}$ $C^2N^{-1}m^{-2}$

SECTION A

1.	Two charges +q each are kept '2a' distance apart. A third charge -2q is placed midway between them. The potential energy of the system is: **(a)** $q^2/8\pi\varepsilon_0 a$ **(b)** $-6q^2/8\pi\varepsilon_0 a$ **(c)** $-7q^2/8\pi\varepsilon_0 a$ **(d)** $9q^2/8\pi\varepsilon_0 a$	1
2.	Kirchhoff's current law $\sum I = 0$ and voltage law $\sum IR = \sum E$ (where symbols have their usual meanings) are respectively based on: **(a)** conservation of momentum and conservation of charge. **(b)** conservation of energy and conservation of charge. **(c)** conservation of charge and conservation of momentum. **(d)** conservation of charge and conservation of energy.	1
3.	A capacitor and an inductor are connected in series across an ac source of voltage of variable frequency. The frequency is increased continuously. The nature of the circuit before and after the resonance will be: **(a)** inductive only **(b)** capacitive only **(c)** capacitive and inductive respectively **(d)** inductive and capacitive respectively	1
4.	The electric field E associated with an electromagnetic wave is represented by: $E_y = E_0 \sin(kx - \omega t)$ Which one of the following statements is correct? **(a)** The wave is propagating along +X-axis. **(b)** The wave is propagating along +Z-axis. **(c)** The magnetic field **B** of the wave is acting along +Y-axis. **(d)** The magnetic field **B** of the wave is acting along -X-axis.	1
5.	A point object is placed in air at a distance of 4R on the principal axis of a convex spherical surface of radius of curvature R separating two mediums, air and glass. As the object is moved towards the surface, the image formed is: **(a)** always real **(b)** always virtual **(c)** first virtual and then real **(d)** first real and then virtual	1
6.	Two coherent light waves, each having amplitude 'a', superpose to produce an interference pattern on a screen. The intensity of light as seen on the screen varies between: **(a)** 0 and $2a^2$ **(b)** 0 and $4a^2$ **(c)** a^2 and $2a^2$ **(d)** $2a^2$ and $4a^2$	1

7.	The potential energy of an electron in the second excited state in hydrogen atom is: **(a)** -3·4 eV **(b)** -3·02 eV **(c)** -1·51 eV **(d)** -6·8 eV	**1**
8.	Three charges q, -q and q_0 are placed as shown in figure. The magnitude of the net electrostatic force on charge q_0 at point O is: ($k = 1 / 4\pi\varepsilon_0$)  **(a)** Zero **(b)** $2kqq_0 / a^2$ **(c)** $\sqrt{2}kqq_0 / a^2$ **(d)** $kqq_0 / \sqrt{2}a^2$	**1**
9.	Whenever a magnet is moved either towards or away from a conducting coil, an emf is induced whose magnitude is independent of the: **(a)** number of turns in the coil **(b)** resistance of the coil **(c)** speed with which the magnet is moved **(d)** area of the coil	**1**
10.	The average value of voltage of 220 V ac mains during its positive half cycle will be: **(a)** 156 V **(b)** 198 V **(c)** 220 V **(d)** zero	**1**
11.	The radius of ${}_{13}X^{27}$ nucleus is R. The radius of ${}_{53}Y^{125}$ nucleus will be: **(a)** 5R / 3 **(b)** $R(13 / 53)^{1/3}$ **(c)** $(5R / 3)^{1/3}$ **(d)** $(13R / 53)^{1/3}$	**1**
12.	A bar magnet of pole strength (m) and magnetic moment (M) is cut perpendicular to its axis in two equal halves. The new pole strength (m') and magnetic moment (M') of each part are respectively? **(a)** m and M **(b)** m and M/2 **(c)** m/2 and 2M **(d)** 2m and M/2	**1**

For Questions 13 to 16, two statements are given one labelled Assertion (A) and other labelled Reason (R). Select the correct answer to these questions from the options as given below.

(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

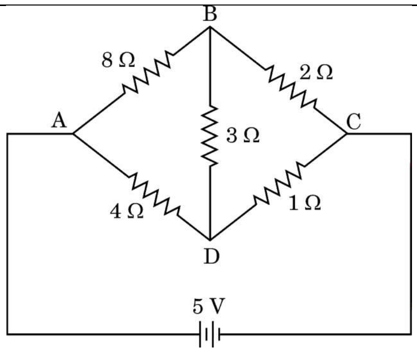
(c) Assertion is true but Reason is false.

(d) Both Assertion and Reason are false.

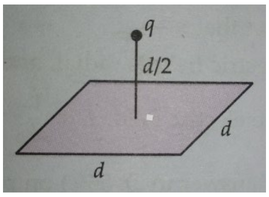
13.	**Assertion (A):** The image of an object placed between f and 2f from a convex lens can be seen on a screen. If the screen is removed, image is not formed. **Reason (R):** Rays from a given point on the object placed between f and 2f, after passing through a convex lens, do not converge on a point in space.	**1**
14.	**Assertion (A):** The total energy of an electron in hydrogen atom is negative. **Reason (R):** The centripetal force is provided by electrostatic force.	**1**
15.	**Assertion (A):** In Young's double slit experiment all fringes are of equal width. **Reason (R):** The fringe width depends upon wavelength of light used, distance of screen from plane of slits and slit separation.	**1**
16.	**Assertion (A):** If there exists coulomb attraction between two bodies, both of them may not be charged. **Reason (R):** The coulomb attraction between two bodies varies linearly with distance.	**1**

SECTION B

17.	Explain the following, giving proper reason: **(a)** During charging of a capacitor, displacement current exists in the capacitor. But there is no displacement current when it gets fully charged. **(b)** Infrared waves are also known as heat waves.	**2**
18.	The figure shows a network of resistors connected across a battery. Find the current supplied by the battery of emf 5 V and internal resistance 2/3 Ω.	**2**



19. A point charge 'q' is at a distance of $\frac{d}{2}$ directly above the centre of a square of side d, as shown in figure. Find the electric flux through the square. **2**



If the point charge is now moved to a distance 'd' from the centre of the square and the side of the square is doubled, explain how the electric flux will be affected.

20. **(1)** Derive the expression for the force per unit length acting between two long straight parallel conductors carrying steady currents 'I_1' and 'I_2' are separated by a distance 'd'. Mention the nature of this force if currents in both the conductors are flowing in the same direction. **2**

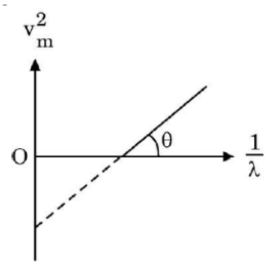
Or

(2) The susceptibility of a magnetic material is 0.9853. Identify the type of magnetic material. Draw the modification of the field pattern on keeping a piece of this material in a uniform magnetic field.

21. **(1)** Briefly explain Geiger-Marsden experiment. Show the variation of the number of particles scattered (N) with scattering angle (θ) in this experiment. What is the main conclusion that can be inferred from this plot? **2**

Or

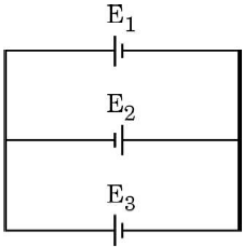
(2) The figure shows v^2_m versus $1/\lambda$ graph for photoelectrons emitted from a surface where v_m is the maximum speed of electrons and λ is the wavelength of incident radiation. Using this graph and Einstein's photoelectric equation, obtain the expression for Planck's constant and work function of the surface.



SECTION C

22. With the help of suitable diagram, explain briefly the two important processes involved in the formation of a p-n junction. Define the terms depletion region and potential barrier. **3**

23. Three batteries E_1, E_2 and E_3 of emfs and internal resistances (4 V, 2 Ω), (2 V, 4 Ω) and (6 V, 2 Ω) respectively are connected as shown in the figure. Find the values of the currents passing through batteries E_1, E_2 and E_3. **3**



24. **(a)** Define the term 'mass defect'. **3**
(b) Draw the graph showing the variation of binding energy per nucleon with mass number A of nuclei (2 < A < 170). Use this graph to explain the release of energy in nuclear fission.

25. Explain with the help of a suitable diagram, the phenomena on which an optical fibre works. Write any two uses of optical fibre. **3**

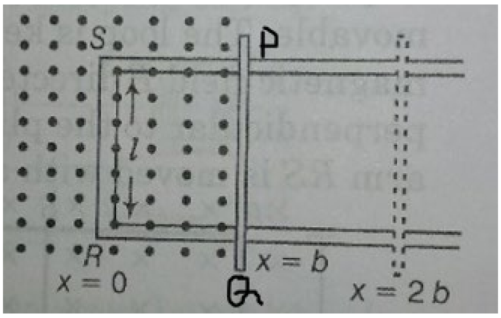
26. State Huygens principle of secondary wavelets. Use it to draw a diagram showing the passage of a plane wavefront from a denser into a rarer medium. Hence verify the Snell's law of refraction. **3**

27. **(1)** A galvanometer is converted into a voltmeter of range (0-V) volt using a resistor of 9900 Ω. If a resistor of 4900 Ω is used, the range becomes half, i.e. (0-V/2) volt. Calculate: **3**
(a) resistance of the galvanometer
(b) resistance required to convert it into a voltmeter of range (0-2V) volt.

Or

(2) A solenoid has a core of material with relative permeability 200. The windings of the solenoid are insulated from the core and carry a current of 1A. If the number of turns is 2000 per metre, calculate:
(a) magnetic intensity **(b)** magnetic field and **(c)** magnetisation

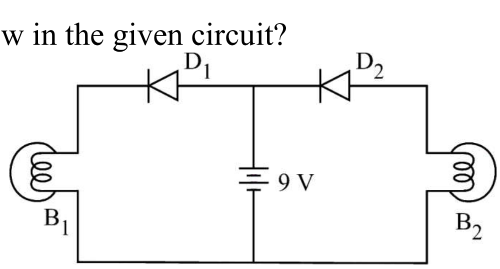
28. Figure below shows a rectangular conductor PQRS in which the conductor PQ is free to move in a uniform magnetic field B perpendicular to plane of paper. The field extents from x = 0 to x = b and is zero for x > b. Assume that only the arm PQ possess resistance r. When the arm PQ is pulled outwards from x = 0 to x = 2b, and then moved back to x = 0 with constant speed v, Find the expressions for the flux and the induced emf. Sketch the variation of these quantities with distance. **3**



SECTION D

29. The process of converting AC into DC is called rectification and the device used is called a rectifier. When AC signal is fed to a junction diode during positive half cycle, the diode is forward biased and current flows through it. During the negative half cycle, the diode is reverse biased and it does not conduct. Thus, the AC signal is rectified. The p-n junction diodes can be used as half-wave and full-wave rectifiers. **4**

(i) Which bulb / bulbs will glow in the given circuit?



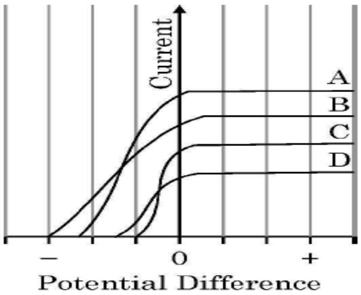
(a) B_1 only **(b)** B_2 only **(c)** Both B_1 and B_2 **(d)** Neither B_1 nor B_2

(ii) The output in a half-wave rectifier is:
(a) unidirectional without ripple **(b)** steady and continuous
(c) unidirectional with ripple **(d)** steady but discontinuous

(iii) In a p-n junction diode, the majority charge carriers on p-side and on n-side are, respectively:
(a) electrons, electrons **(b)** electrons, holes **(c)** holes, holes **(d)** holes, electrons

(iv) If the frequency of the half-wave rectifier is 50 Hz, the frequency of full-wave rectifier is:
(a) 25 Hz **(b)** 50 Hz **(c)** 100 Hz **(d)** 200 Hz

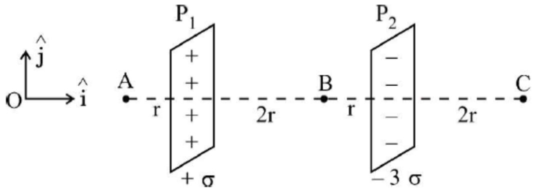
30. The phenomena of ejection of the electrons from the surface of a metal when a radiation of suitable frequency is incident on it is called photoelectric effect. Figure shows the variation of photoelectric current measured in a photo cell circuit as a function of the potential difference between the plates of the photo cell when light beams A, B, C and D of different wavelengths are incident on the photo cell. Examine the given figure and answer the following questions: **4**



(i) Which light beam has the highest frequency and why?
(ii) Which light beam has the longest wavelength and why?
(iii) What is the effect on threshold frequency and stopping potential on increasing the frequency of incident beam of light? Justify your answer.

SECTION E

31. **(1) (a)** Two large plane sheets P_1 and P_2 having charge densities $+\sigma$ and -3σ respectively are arranged parallel to each other as shown in figure. Find the net electric field (**E**) at points A, B and C. **5**

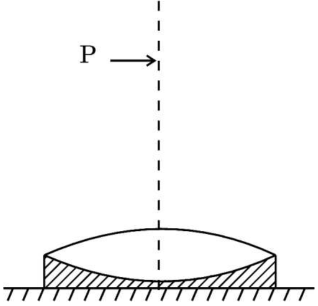


(b) An electric dipole of dipole moment **p** = (0.8 **i** + 0.6 **j**) 10^{-29} Cm is placed in an electric field **E** = 1.0 x 10^7 **k** V/m. Calculate the magnitude of the torque acting on it and the angle it makes with the X-axis, at this instant.

Or

(2) (a) A parallel plate capacitor A of capacitance C is charged by a battery to a potential 'V'. The battery is disconnected and an uncharged identical capacitor B is connected across it. Calculate for the capacitor A the new value of the:
(i) charge **(ii)** potential difference **(iii)** energy stored
Justify your answers.
(b) Draw the equipotential surfaces for:
(i) a point charge, and
(ii) an electric dipole.

32. **(1) (a)** What are the two main considerations for designing the objective and eyepiece lenses of an astronomical telescope? Obtain the expression for magnifying power of the telescope when the final image is formed at infinity. **5**

	(b) A ray of light is incident at an angle of 45° at one face of an equilateral triangular prism and passes symmetrically through the prism. Calculate: **(i)** the angle of deviation produced by the prism. **(ii)** the refractive index of the material of the prism. **Or** **(2) (a)** Derive the lens maker's formula for a double convex lens. **(b)** The figure below shows an equiconvex lens (of refractive index 1.50) in contact with a liquid layer on top of a plane mirror. A small needle with its tip on the principal axis is moved along the axis until its inverted image is found at the position of the needle. The distance of the needle from the lens is measured to be 45.0 cm. When the liquid is removed and the experiment is repeated, the new distance is 30.0 cm. Find the refractive index of the liquid.  	
33.	**(1) (a) (i)** Draw a labelled diagram of a step-down transformer. State the principle of its working. **(ii)** Express the turn ratio in terms of voltages. **(iii)** Find ratio of primary and secondary currents in terms of turn ratio in an ideal transformer. **(b)** How much current is drawn by the primary coil of a transformer connected to 220 V supply when it delivers power to a 110 V-550 W refrigerator? **Or** **(2) (a)** Write Biot-Savart's law in vector form. Use it to derive the expression for the magnetic field at a point on the axis of a current carrying circular loop of radius 'R'. **(b)** Define the terms **(i)** current sensitivity and **(ii)** voltage sensitivity of a moving coil galvanometer. Why does increasing the current sensitivity not necessarily increase voltage sensitivity?	**5**

Pre-Board Examination (2025-26)
Subject-Biology
Class-XII

MM: 70 **Time: 3 hours**

General Instructions:

(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions.
(iii) Section–A has 16 questions of 1mark each; Section–B has 5 questions of 2 marks each; Section C has 7 questions of 3 marks each; Section–D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
(iv) There is no overall choice. Answer all 33 questions. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

Section -A

Q. No. 1 to 12 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

Q. No.	Question	Marks
1.	The sequence of nitrogenous bases in a segment of a coding strand of DNA is - 5′ – AATGCTAGGCAC – 3′. Choose the option that shows the correct sequence of nitrogenous bases in the mRNA transcribed by the DNA. A. 5′ – UUACGAUCCGUG – 3′ B. 5′ – AAUGCUAGGCAC – 3′ C. 5′ – UUACGUACCGUG – 3′ D. 5′ – AACGUA GGCAGC – 3′	1
2.	How many pollen grains and ovules are likely to be formed in the anther and the ovary of an angiosperm bearing 50 microspore mother cells and 50 megaspore mother cells respectively? A. 100, 25 B. 200, 50 C. 50, 50 D. 200, 100	1
3.	The process of splicing in eukaryotes represents the dominance of the: A. DNA world B. RNA world C. Protein world D. Lipid world	1
4.	A characteristic property that distinguishes a malignant tumor from a benign tumor is**:**	1

A. Metamorphosis
B. Metastasis
C. Metabolism
D. Metagenesis

5. About 15 mya during human evolution, the primates which used to walk like gorillas and chimpanzees were: 1
A. *Australopithecine* and *Neanderthal*
B. *Dryopithecus* and *Ramapithecus*
C. *Homo erectus* and *Homo sapiens*
D. *Homo habilis* and *Homo erectus*

6. Which of the following statements related to HIV infection is incorrect? 1
A. HIV infection leads to a progressive decrease in the number of $CD4^+$ T-lymphocytes.
B. The DNA formed by reverse transcriptase integrates into the host genome and directs viral replication.
C. Antiretroviral therapy (ART) completely eliminates HIV from the body in the early stages of infection.
D. Opportunistic infections in AIDS occur because of the suppression of the immune system.

7. A man whose father was colour-blind marries a woman who had a colour-blind mother and normal father. What percentage of male children of this couple will be colour-blind? 1
A. 25%
B. 0%
C. 50%
D. 75%

8. Which of the following evidences does not favour the Lamarckian concept of inheritance of acquired characters? 1
A. Lack of pigment in cave-dwelling animals
B. Melanisation in peppered moth
C. Absence of limbs in snakes
D. Presence of webbed toes in aquatic birds

9. In angiosperms, the development of the female gametophyte occurs in a definite sequence. Identify the correct sequence. 1

	I (Stage in ovule before meiosis)	**II (Product of meiosis)**	**III (Surviving haploid spore)**	**IV (Fusion of gametes)**
A.	Megaspore mother cell	4 Megaspores	Functional megaspore	Embryo sac
B.	Megaspore mother cell	Embryo sac	Zygote	Ovule
C.	Megaspore mother cell	Megaspores	Egg cell	Endosperm
D.	Nucellus	Megaspores	Embryo sac	Seed formation

10. Use the given information to select the amino acid attached to the 3′ end of tRNA during the process of translation, if the coding strand of the structural gene being transcribed has the nucleotide sequence TAC. 1

Codons for the amino acids:

- AUC – Isoleucine
- AUG – Methionine
- UAC – Tyrosine

	- GUA – Valine Options: A. Isoleucine B. Methionine C. Tyrosine D. Valine	
11.	The sequence that controls the copy number of the linked DNA in the vector, is termed A. Selectable marker B. Recognition site C. Palindromic sequence D. Ori site	1
12.	Seminal plasma in humans is rich in: A. fructose and calcium but has no enzymes B. glucose and certain enzymes but has no calcium C. fructose and certain enzymes but poor in calcium D. fructose, calcium and certain enzymes.	1

Question No. 13-16 consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is false and R is true.

13.	**Assertion:** Exine of a pollen grain is made up of sporopollenin which is resistant to high temperatures, strong acids or alkali as well as enzymatic degradation. **Reason: S**poropollenin is absent in the region of germ pores.	1
14.	**Assertion (A):** Darwin's finches represent divergent evolution. **Reason (R):** They evolved from different ancestral species present on the Galápagos Islands.	1
15.	**Assertion (A):** In organ transplantation, donor and recipient should be genetically as close as possible. **Reason (R):** In immunosuppression, immune system rejects the transplanted organ.	1
16.	**Assertion (A):** Bt toxin kills insects by creating pores in their gut epithelium. **Reason (R):** The Bt toxin is active in plant cells and directly damages insect nervous tissue when eaten.	1

Section-B

17.	***Attempt either option A or B.*** A. Why are some seeds referred to as apomictic seeds? Mention one advantage and one disadvantage to a farmer who uses them. **OR** B. In many flowering plants, self-pollination is prevented to maintain genetic diversity. Explain how dioecy and self-incompatibility act as out breeding devices in such plants.	2

18. The length of DNA in a human diploid cell is about 2 metres, yet it fits inside a nucleus of only ~6 µm diameter. How is this extremely long DNA efficiently packaged within the nucleus? 2

19. The table below shows a hypothetical blood report of a patient suffering from frequent sneezing, watery eyes, and breathing difficulty. 2

Test description	**Observed value**	**Unit**	**Reference range**
Total leukocyte count	9000	Per microliter	4400–11,000
Neutrophils	58	%	55–70
Lymphocytes	30	%	20–40
Eosinophils	12	%	1–4
Basophils	2	%	0.5–1
IgE antibody concentration	380	IU/mL	< 150

A. Looking at the values, suggest which condition the patient is suffering from? Explain the immune mechanism behind this condition.

B. Name the chemicals responsible for causing the symptoms.

20. ***Attempt either option A or B.*** 2

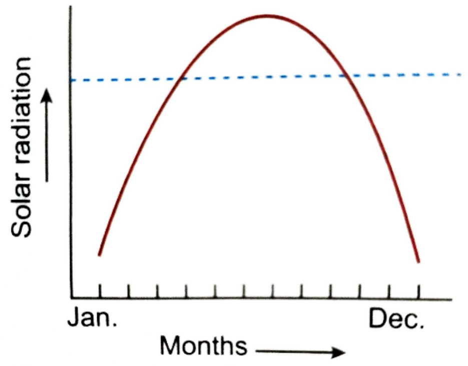
A. A patient with ADA deficiency requires periodic infusion of genetically engineered lymphocytes. Explain why such periodic infusion is required and also suggest a permanent cure for such ADA deficiency.

OR

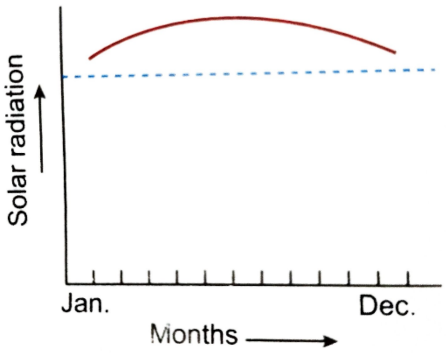
B. Describe in brief any two techniques that can be utilised to transfer recombinant DNA into the host cell directly without using any vector.

21. ***Attempt either option A or B.*** 2

A. Study the given graphs (X) and (Y) depicting the annual variation in solar radiation on earth from January to December and answer the under mentioned questions.



(X)



(Y)

(i) Compare the graphs (X) and (Y) above and identify which of the two regions – (X) and (Y), will show greater biological diversity giving suitable reasons?

(ii) Construct a flow chart showing connection between a grazing food chain and detritus food chain.

For visually impaired students

(i) What is primary productivity? Why does it vary in different types of ecosystems?

(ii) Construct a flow chart showing connection between a grazing food chain and detritus food chain.

OR

B. Use the information provided in the table given below to answer the following questions.

Trophic Level	**Net Production (KJ m^{-2} y^{-1})**	**Respiration (KJ m^{-2} y^{-1})**
Top carnivore	50	35
Carnivores	420	378
Herbivores	4490	4041
Producers	45000	40,367

(i) Calculate the gross primary productivity.

(ii) Analyse the trend in the net production from producers to top carnivore. Give reason for your observation.

Section - C

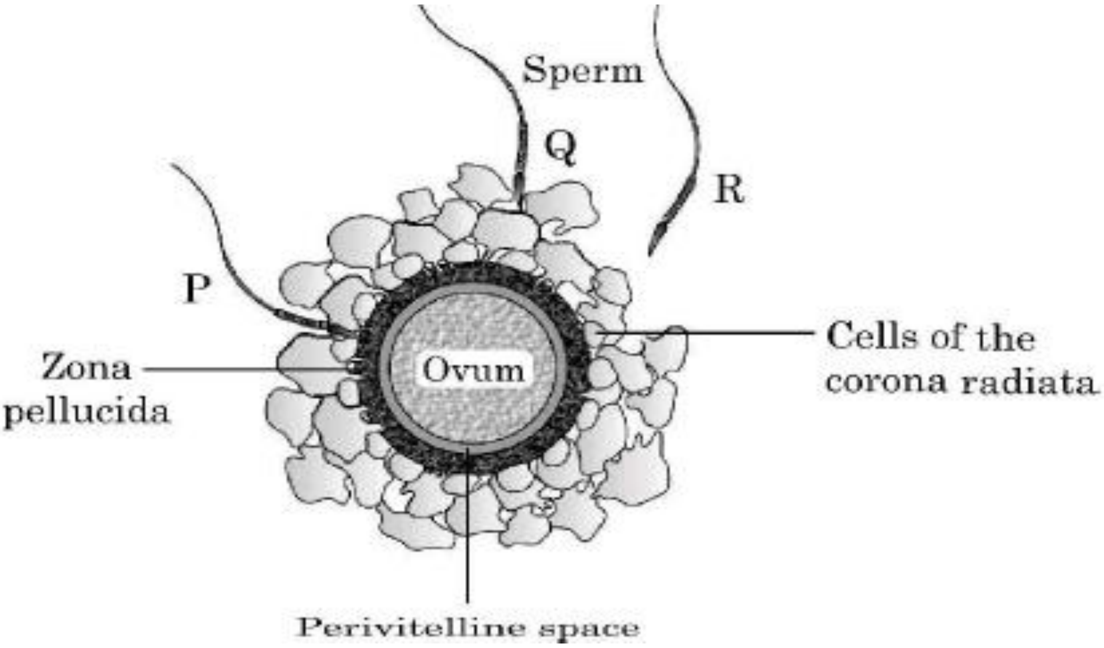
22. Suggest suitable reproductive health measures for the following cases with justification: 3

A. Ramesh and his wife live in a rural area with very little awareness about sexually transmitted infections (STIs). Which government programme could help them, and how?

B. Anita and Raj want to conceive but are facing difficulty due to blocked fallopian tubes. Which assisted reproductive technology (ART) would be most suitable for them?

C. Doctors suspect that a developing foetus may have a chromosomal abnormality. Which prenatal diagnostic technique would help confirm this, and how?

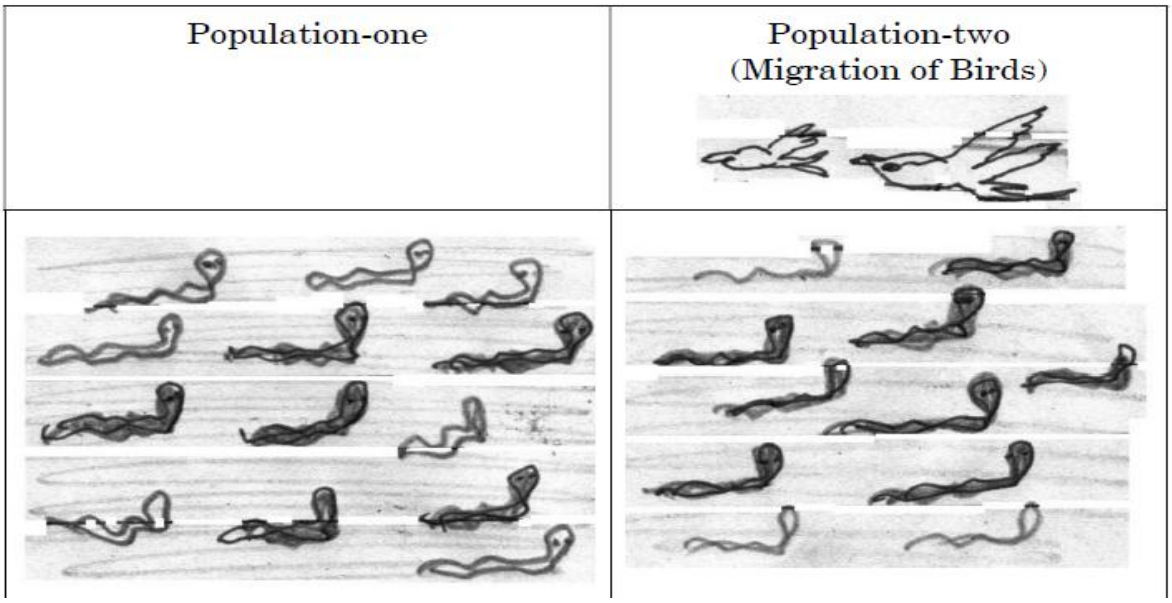
23 Given below is the diagram of a human ovum surrounded by sperms. Observe it carefully and answer the following: 3

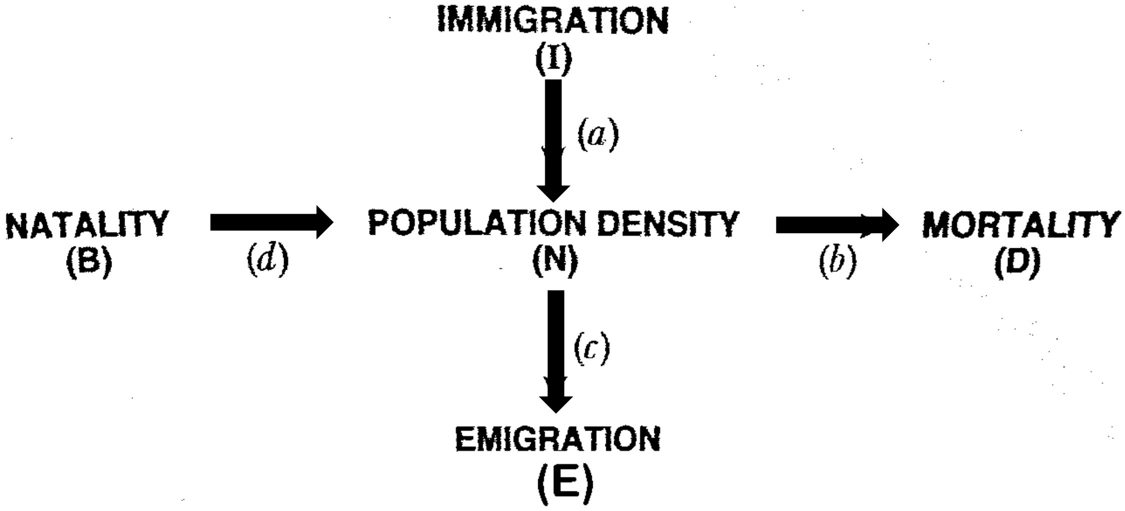


A. Compare the fate of sperms ‘P’, ‘Q’, and ‘R’ shown in the diagram.

B. Write the role of the zona pellucida in this process.

C. Analyse the changes that occur in the ovum after the entry of a sperm.

	--- ***For visually impaired students*** Parturition is induced by a complex neuroendocrine mechanism. Explain.	
24.	In rabbits, if the allele for long fur (**F**) is dominant over short fur (**f**), and the allele for black coat colour (**B**) is dominant over brown coat (**b**). These two genes assort independently. If two heterozygous rabbits (**FfBb × FfBb**) are crossed, determine the probability of obtaining an offspring with **short fur and brown coat**. Find the probability using a Punnett square.	3
25.	A population of snakes lived in a desert with brown sand. Study the drawings given below showing the change in the population from 'one' to 'two' over time and answer the questions that follow. Brown snakes and grey snakes are represented by alleles A/a (Dominant/recessive).  A. If the frequency of the recessive trait is 9% in population-one, work out the frequency of homozygous dominant and heterozygous dominant snakes. B. Name the mechanism of evolution that must have operated so that Population –two evolved from population-one. --- ***For visually impaired students*** A. How does the study of fossils help to understand evolution? B. How did SL Miller provide an experimental evidence in favour of Oparin and Haldane's hypothesis? Explain.	3
26.	Biogas is considered a clean and sustainable fuel. Enumerate its major gaseous components, name the main bacteria involved in its production and explain the processes that are used to transform organic waste into biogas?	3
27.	Explain the process of RNA interference (RNAi). How is this biological process exploited to develop resistance in plants against nematode infection?	3
28.	The given flow chart depicts the four basic processes that regulate population density in a given area.	3



A. Which of the above represents the increase or decrease of population?

B. If N is the population density at time t, then what would be its density at time (t+1)? Write the formula.

C. In a barn there were 30 rats. 5 more rats enter the barn and 6 out of the total rats were eaten by the cats. If 8 rats were born during the time period under consideration and 7 rats left the barn, calculate the resultant population at time (t+1).

D. If a new habitat is just being colonized, out of the four factors affecting the population growth, which factor contributes the most?

For visually impaired students

A. It is possible that a species may occupy more than one trophic level in the same ecosystem at the same time. Explain with the help of one example.

B. If N is the population density at time t, then what would be its density at time (t+1)? Write the formula.

C. In a barn there were 30 rats. 5 more rats enter the barn and 6 out of the total rats were eaten by the cats. If 8 rats were born during the time period under consideration and 7 rats left the barn, calculate the resultant population at time (t+1).

D. If a new habitat is just being colonized, out of the four factors affecting the population growth, which factor contributes the most?

Section - D

29. Given below is a set of information about some events and structures in human reproduction: 4

Label	Event/Structure description
P	Spermatogonia undergo repeated mitotic divisions to produce primary spermatocytes.
Q	Secondary oocyte is released from the ovary during ovulation
R	Corpus luteum secretes progesterone after ovulation.
S	Foetus grows in the uterus.

On the basis of the information provided above, answer the following questions:

A. How many spermatozoa will be produced from one primary spermatocyte? How many secondary oocytes are released by a single primary oocyte?

B. (i) Which of the above (P, Q, R, S) is directly responsible for maintaining pregnancy in the female? Justify.

(ii) Which one of the events (P, Q, R, S) is regulated by the surge of luteinising hormone (LH)?

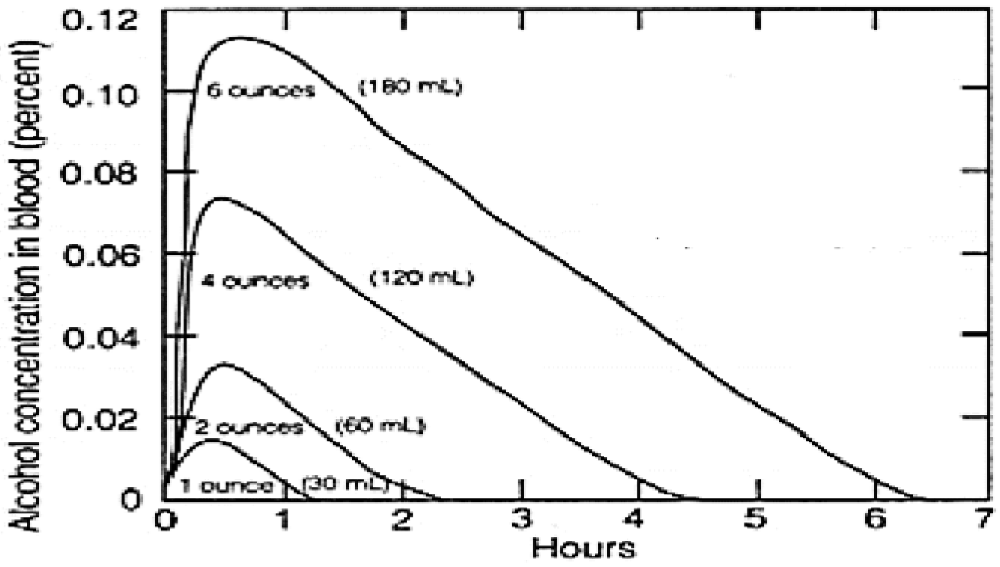
Attempt either subpart C or D:

C. How does luteinising hormone (LH) regulate the process of spermatogenesis?

OR

D. When do spermatogenesis and oogenesis initiate in human males and females respectively?

30. The graph below shows the percent blood alcohol concentration by quantity of alcohol over time. Study the graph and answer the questions that follow: 4



A. With reference to the above graph, during which time the concentration of alcohol in blood will be highest and what pattern is observed regarding alcohol concentration in blood later?

B. "The addictive potential of alcohol, pull the user into a vicious circle leading to its regular use (abuse) from which he/she may not be able to get out." Justify the statement.

Attempt either subpart C or D:

C. What is the average rate of processing of alcohol by the body, as shown in the above graph? Name the main organ where 90% of the absorbed alcohol is metabolised in the body.

OR

D. What are the most common warning signs of alcohol abuse among youth?

For visually impaired students

A. Alcohol is not a traditional nutrient. Why?

B. "The addictive potential of alcohol, pull the user into a vicious circle leading to its regular use (abuse) from which he/she may not be able to get out." Justify the statement.

Attempt either subpart C or D:

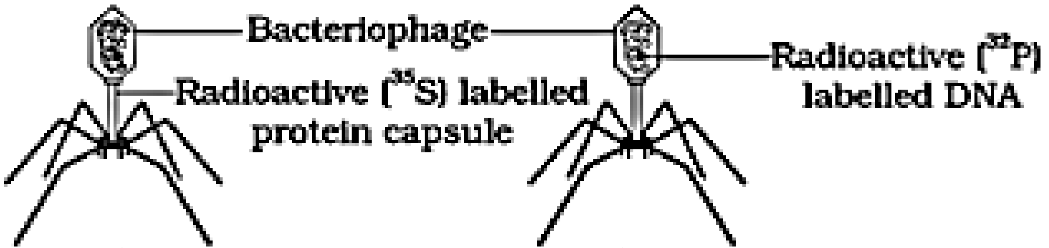
C. What do you understand by Dependence?

OR

D. What are the most common warning signs of alcohol abuse among youth?

Section -E

31. A. A revolutionary experiment was performed in the field of molecular biology by Hershey-Chase. An important type of raw material used in the above experiment is given below: 5


Bacteriophage
Radioactive (^{35}S) labelled protein capsule
Radioactive (^{32}P) labelled DNA

: Fig.I Fig.II

Draw the part of the above experiment showing results in which a centrifuge was used.

B. What observations in the above experiment provided an unequivocal proof that DNA is the genetic material?

C. You are repeating the Hershey-Chase experiment and are provided with two isotopes: ^{32}P and ^{15}N (in place of ^{35}S in the original experiment). How do you expect your results to be different if hypothetically ^{15}N is radioactive?

For visually impaired students

A. Absence of lactose in the culture medium affects the expression of a *lac* operon in *E. coli*. Why and how? Explain.

B. What observations in the Hershey-Chase experiment provided an unequivocal proof that DNA is the genetic material?

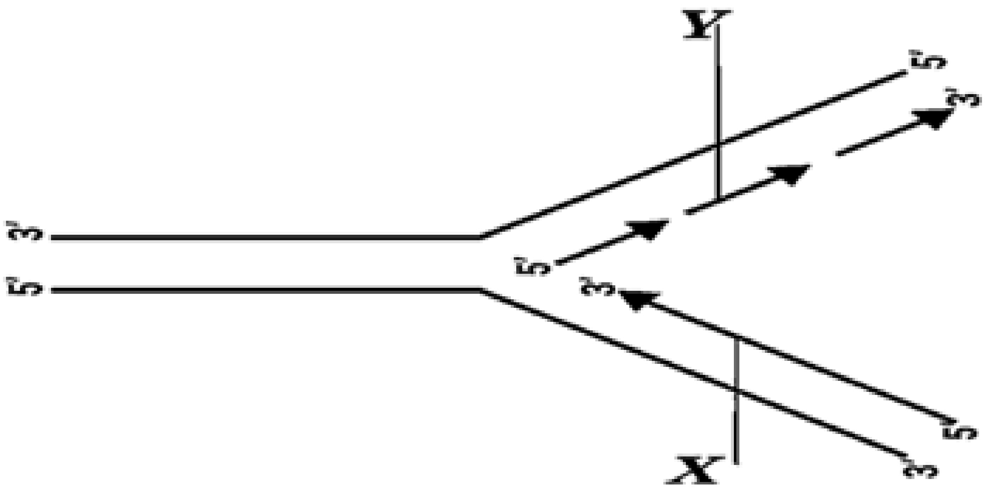
C. You are repeating the Hershey-Chase experiment and are provided with two isotopes: ^{32}P and ^{15}N (in place of ^{35}S in the original experiment). How do you expect your results to be different if hypothetically ^{15}N is radioactive?

OR

A. State the contribution of Meselson and Stahl in proving the semi-conservative nature of DNA replication.

B. Deoxyribonucleoside triphosphates (dNTPs) play a dual role in DNA replication. Explain. Name the enzyme that uses them during replication.

C. The diagram below shows a replication fork. Study it and answer the following:



(i) Identify strands X and Y.

(ii) Why is strand Y synthesised in fragments?

For visually impaired students

A. State the contribution of Meselson and Stahl in proving the semi-conservative nature of DNA replication.

B. Deoxyribonucleoside triphosphates (dNTPs) play a dual role in DNA replication. Explain. Name the enzyme that uses them during replication.

C. (i) How were the two methodologies Expressed Sequence Tags (ESTs) and Sequence annotation which were involved in human genome project, different from each other?
   (ii) Expand YAC.
   (iii) Which was the last chromosome sequenced of the 24 human chromosomes sequenced under Human Genome Project?

32. Microbes and enzymes are central to recombinant DNA technology. 5

A. Name one bacterium that is the source of restriction enzymes used in genetic engineering. State its significance.

B. How is DNA isolated in purified form from a bacterial cell?

C. A plasmid vector contains both ampicillin and tetracycline resistance genes. Foreign DNA is inserted in the tetracycline resistance gene.
   (i) What will be the effect on tetracycline resistance?
   (ii) How can recombinants be distinguished from non-recombinants?

OR

Gel electrophoresis is an important tool in biotechnology.

A. What is the principle of gel electrophoresis?

B. Draw a neat, labelled diagram showing the separation of DNA fragments by gel electrophoresis.

C. How are the separated DNA fragments visualized and recovered for use in recombinant DNA experiments?

33. Justify the following statements with suitable examples: 5

A. Predators play an important role in maintaining species diversity in a community.

B. Prey species have evolved special adaptations against predation.

C. Parasitism can significantly affect the survival and reproduction of the host.

D. Commensalism may benefit one species without harming the other.

E. Certain orchids employ sexual deceit to achieve pollination.

OR

A. Certain species of cuckoo lay eggs in the nests of crows, and these eggs closely resemble those of the host in size and colour. Name this interaction and describe how it illustrates the concept of co-evolution.

B. Study the tabulated data of the approximate number of individuals (N) of certain animal populations and maximum support of their habitat. Answer the questions given below.

Species	**Population size (N)**	**K**
Rabbit	500	1000
Deer	200	300
Housefly	10000	50000
Elephant	20	50

   (i) Which population is likely to face resource competition? Justify your answer.
   (ii) If the housefly population grows by 10%, what will be the new population size of housefly in the given area at the given time?
   (iii) Explain why populations rarely grow beyond their carrying capacity with reference to the above examples.

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FIRST PRE BOARD (2025-26)
REGIONAL OFFICE DEHRADUN

CHEMISTRY THEORY (043)

Max. Marks:70 **Time: 3 hours**

GENERAL INSTRUCTIONS:

Read the following instructions carefully.

(a) There are **33** questions in this question paper with internal choice.
(b) SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
(c) SECTION B consists of 5 short answer questions carrying 2 marks each.
(d) SECTION C consists of 7 short answer questions carrying 3 marks each.
(e) SECTION D consists of 2 case-based questions carrying 4 marks each.
(f) SECTION E consists of 3 long answer questions carrying 5 marks each.
(g) All questions are compulsory.
(h) Use of log tables and calculators is not allowed.

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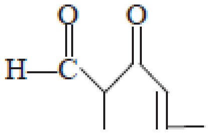
	SECTION A	
	The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.	
1	K_H value for Ar(g), CO_2(g), HCHO(g) and CH_4(g) are 40.39, 1.67, 1.83×10^{-5} and 0.413 respectively. Arrange these gases in the order of their increasing solubility. (a) $HCHO < CH_4 < CO_2 < Ar$ (b) $HCHO < CO_2 < CH_4 < Ar$ (c) $Ar < CO_2 < CH_4 < HCHO$ (d) $Ar < CH_4 < CO_2 < HCHO^+$	1
2	Which one has highest molar conductivity? (a) $[Pt(NH_3)_2\,Cl_2]$ (b) $[Co(NH_3)_4\,Cl_2]\,Cl$ (c) $K_4[Fe(CN)_6]$ (d) $[Cr(H_2O)_6]\,Cl_3$	1
3	Toluene reacts with Br_2 in presence of sunlight to give (a) o–Bromo toluene (b) p–bromo toluene (c) Benzyl bromide (d) All of these	1
4	A primary alkyl halide would prefer to undergo ______________. (a) S_N1 reaction (b) S_N2 reaction (c) α–Elimination (d) Racemisation	1
5	Choose the amide which on reduction with $LiAlH_4$ gives secondary amine. (a)Ethanamide (b)N-Methylethanamide (c)N,N-diethylethanamide (d) Benzamide	1

6



The IUPAC name of above compound is

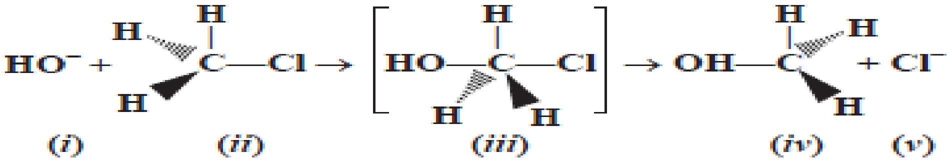
(a) 2-Formyl hex-2-en-3-one
(b) 5-methyl-4-oxo hex-2-en-5al
(c) 3-keto-2-methyl hex-5en-al
(d) 3-keto-2-methyl hex-4-en-1-al

1

7 Phenol can be distinguished from ethanol by the reactions with ________
(a) Nitrogen
(b) Na
(c) Neutral $FeCl_3$
(d) All the above

8 Which of the following is not a consequence of lanthanide contraction?
a) From La+3 to Lu+3, the ionic radii changes from 106 pm to 85 pm
b) As the size of the lanthanide ions decreases the basic strength increases
c) The basic character of oxides and hydroxides decreases with increase in atomic number
d) The atomic radii of 4d and 5d series is similar

9 Consider the following reaction and answer the questions



Which of the statements are correct about above reaction?
(a) (i) and (v) both are nucleophiles.
(b) In (iii) carbon atom is sp^3 hybridised.
(c) In (iii) carbon atom is sp^2 hybridised.
(d) (i) and (v) both are electrophiles

10 Proteins are found to have two different types of secondary structures viz. α-helix and β-pleated sheet structure. α-helix structure of protein is stabilised by :
(a) Peptide bonds
(b) van der Waals forces
(c) Hydrogen bonds
(d) Dipole-dipole interactions

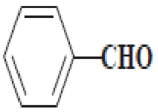
11 Match the terms given in Column I with the units given in Column II.

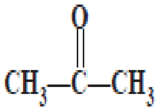
Column I	Column II
(a) Λ_m	(i) S cm^{-1}
(b) E_{Cell}	(ii) m^{-1}
(c) k	(iii) S cm^2 mol^{-1}
(d) G*	(iv) V

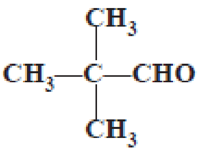
(a) Λ_m – S cm^2 mol^{-1}, E_{Cell} – V, k – m^{-1}, G* – S cm^{-1}
(b) Λ_m – S cm^2 mol^{-1}, E_{Cell} – V, k – S cm^{-1}, G* – m^{-1}
(c) Λ_m – S cm^2 mol^{-1}, E_{Cell} – m^{-1}, k – S cm^{-1}, G* – V
(d) Λ_m – m^{-1}, E_{Cell} – V, k – S cm^{-1}, G* – S cm^2 mol^{-1}

12 Which of the following compounds do not undergo aldol condensation?

(a) CH_3-CHO

(b)


(c)

$CH_3-\overset{\overset{O}{\|}}{C}-CH_3$

(d)

$CH_3-\underset{CH_3}{\overset{CH_3}{\overset{|}{\underset{|}{C}}}}-CHO$

(a) a
(b) b & d
(c) a ,b & c
(d) b & d

13 Assertion: D (+) – Glucose is dextrorotatory in nature.
Reason: ‘D’ represents its dextrorotatory nature.

Select the most appropriate 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.

14 Assertion: Λ_m for weak electrolytes shows a sharp increase when the electrolytic solution is diluted. i
Reason: For weak electrolytes degree of dissociation increases with dilution of solution.

Select the most appropriate 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.

15 Assertion:Acetanilide is less basic than aniline.
Reason: Acetylation of aniline results in decrease of electron density on nitrogen.
Select the most appropriate 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.

16 Assertion: When a solution is separated from the pure solvent by a semipermeable membrane, the solvent molecules pass through it from pure solvent side to the solution side.
Reason: Diffusion of solvent occurs from a region of high concentration solution to a region of low concentration solution.

Select the most appropriate 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.

SECTION B

This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.

17 a.On mixing liquid X and liquid Y, volume of the resulting solution decreases. What type of deviation from Raoult's law is shown by the resulting solution? What change in temperature would you observe after mixing liquids X and Y? 1

b. What happens when we place the blood cell in water (hypotonic solution)? Give reason. 1

18 Write the state of hybridization, shape and IUPAC name of the complex $[Co(NH_3)_6]^{3+}$. (Atomic no. of Co = 27). 2

19 Following data were obtained for the given reaction. X + Y → Product 2

Exp.	[X]/M	[Y]/M	Initial Rate M min^{-1}
1.	0.1 M	0.2 M	0.05
2.	0.2 M	0.2 M	0.10
3.	0.1 M	0.1 M	0.05

(i) Find the order of reaction with respect to X and Y

(j) (ii) Find the rate constant.

20 Explain

a. Carbylamine reaction 1

b. Hoffmann bromamide reaction 1

21 Write chemical equations when: 1

(i) ethyl chloride is treated with aqueous KOH.

(ii) chlorobenzene is treated with CH_3COCl in presence of anhydrous $AlCl_3$ 1

OR

Account for the following: 1

(i) The boiling point of ethanol is higher than that of methanol.

(ii) Phenol is a stronger acid than an alcohol. 1

SECTION C

This section contains 7 questions with internal choice in one question. The followingquestions are short answer type and carry 3 marks each.

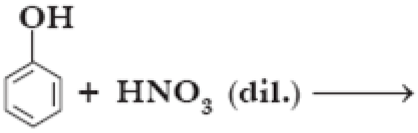
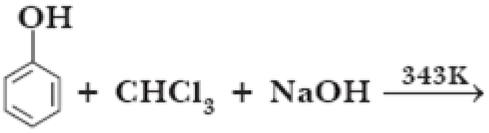
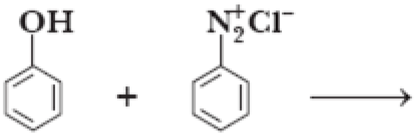
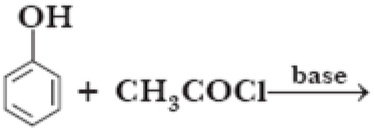
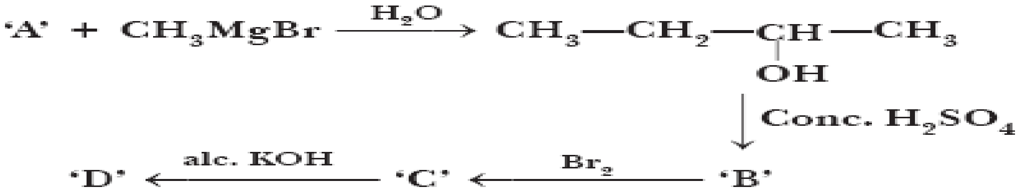
22 Give reasons for the following:

(k) The transition metals generally form coloured compounds. 1

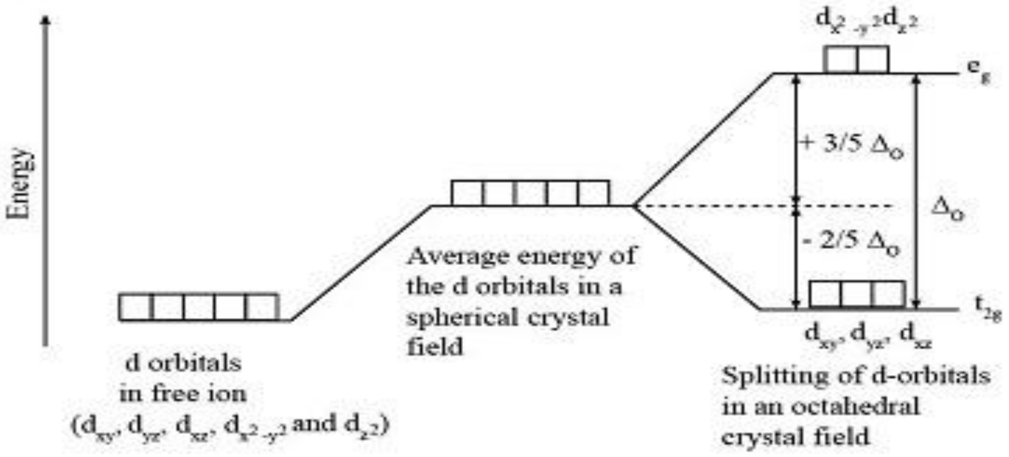
(ii) E⁰ value for $(Mn^{3+}|Mn^{2+})$ is highly positive than that for $(Cr^{3+}|Cr^{2+})$ couple. 1

(iii) Zr and Hf have almost similar atomic radii. 1

23 (i)Complete the following reaction and also write the mechnism 2

	$CH_2=CH_2 + H_2O \xrightarrow{\text{conc } H_2SO_4}$? (ii) Out of o-nitro phenol and p-nitro phenol which is steam volatile and why.	1
	OR	
	Complete any three of the following (a)  (b)  (c)  (d) 	1 1 1
24	(i) Calculate e.m.f. and ΔG for the following cell: Mg (s) /Mg^{2+}(0. 001 M) // Cu^{2+}(0. 0001 M)/Cu(s) Given :E^0 Mg^{2+}/Mg= -2.37V. E^0 $Cu^{2+/}$Cu = +0.34 V) (ii) Write charging reaction of lead storage battery	2 1
25	When a chromite ore(A) is fused with sodium carbonate in free excess of air and the product is dissolved in water, a yellow solution of compound (B) is obtained. After treatment of this yellow solution with sulphuric acid, compound (C) can be crystallised from the solution. When compound (C) is treated with KCl, orange crystals of compound (D) crystallise out. Identify A to D and also explain the reactions	1 1 1
26	(i)Write the structural formulae of the organic compounds 'A', 'B', 'C' and 'D' in the following sequence of reactions:  (ii) Why Grignard reagent is prepared under anhydrous condition	1 1 1
27	Distinguish between the following: (i) Acetone and ethanal (ii) 2-Pentanone and 3-pentanone (iii) Phenol and benzoic acid	1 1 1
28	Calculate the amount of $CaCl_2$ (molar mass 111 g mol^{-1}) which must be added to 500 g of water to lower the freezing point by 2K, assuming $CaCl_2$ is completely dissociated. (K_f = 1.86 K kg mol^{-1})	3
	SECTION D	

<table>
<tr><td></td><td><i>The following questions are case-based questions. Each question has an internal choice and carries 4 (2+1+1) marks each. Read the passage carefully and answer the questions that follow.</i></td><td></td></tr>
<tr><td>29</td><td>Observe the diagram of splitting of d-orbitals in octahedral field and answer the questions based on the diagrams and related studied concepts.


Energy
$d_{x^2-y^2}, d_{z^2}$
e_g
$+ 3/5\ \Delta_o$
Δ_o
$- 2/5\ \Delta_o$
t_{2g}
d_{xy}, d_{yz}, d_{xz}
d orbitals in free ion ($d_{xy}, d_{yz}, d_{xz}, d_{x^2-y^2}$ and d_{z^2})
Average energy of the d orbitals in a spherical crystal field
Splitting of d-orbitals in an octahedral crystal field

(a) What is crystal field splitting anergy? How is the crystal field splitting energy for octahedral (Δ_0) and tetrahedral (Δt) complexes related?

(b) Arrange the following complex ions in the increasing order of Crystal field splitting energy

[CrCl6] 3- , [CrCN6] 3- , [Cr(NH3)6] 3+

(c) What is electronic configuration of d5 ion if $\Delta\ 0 < P$?</td><td>2

1

1</td></tr>
<tr><td>30</td><td>Simplest electrolytic cell consist of two copper strips dipping in an aqueous solution of $CuSO_4$. DC voltage is applied between two electrodes. Many metals like Na, Mg, Al etc. are produced on large scale by electrochemical reduction of their respective cations where no suitable reducing agent are available for this purpose. Sodium and magnesium are produced by electrolysis of fused chlorides and aluminium is produced by electrolysis of Al_2O_3 in presence of bauxite.

(a) Write the reaction taking place at anode when acidified $CuSO_4$ is electrolysed using copper electrodes?

(b) What is sign of $\Delta G°$ in electrolytic cell?

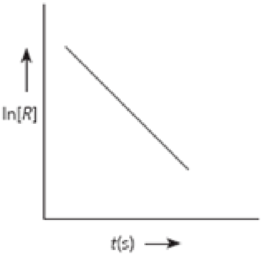
(c) Why are highly reactive metals obtained by electrolytic reduction and not by chemical reduction of molten ores and not from aqueous solutions?

<i>Or</i>

What will be products of electrolysis at cathode and anode in electrolysis of NaCl(aq) using platinum electrodes?</td><td>1

1

2</td></tr>
<tr><td></td><td>SECTION E</td><td></td></tr>
<tr><td></td><td>The following questions are long answer types and carry 5 marks each. All questionshave an internal choice</td><td></td></tr>
<tr><td>31</td><td>i. Write a reaction which shows that all the carbon atoms in glucose are linked in a straight chain.
ii. Name one water soluble vitamin which is a powerful antioxidant.
iii. Name the products of hydrolysis of lactose.
iv. Mention one important function of nucleic acids in our body.</td><td>5*1</td></tr>
</table>

	v. Write name of two types of RNA molecules which perform different functions?	
	OR	
	i. Write down the structures and names of the products formed when D-glucose is treated with Bromine water ii. What you understand by secondary structure of proteins iii. Which component of starch is insoluble in water? iv. What is meant by the denaturation of a protein? v. Name the bases present in RNA. Which one of these is not present in DNA?	5*1
32	(a)How will you convert the following: (i) Propanone to Propan-2-ol (ii) Ethanal to 2-Hydroxypropanoic acid (iii) Toluene to Benzoic acid (b) (i) Aniline does not undergo Friedel–Crafts Reaction. (ii) p-methyl aniline is more basic than p-nitroaniline	5*1
	OR	
	(a) Account for the following: (i) Cl—CH_2COOH is a stronger acid than CH_3COOH. (ii) Carboxylic acids do not give reactions of carbonyl group. (b) An organic compound ‘A’ on treatment with aqueous ammonia and heating forms compound ‘B’ which on heating with Br_2 and KOH forms a compound ‘C’ of molecular formula C_6H_7N. Write the structure and IUPAC names of A, B and C.	5*1
33	(a)For a chemical reaction $R \rightarrow P$, the variation in the concentration, ln[R] vs. time (s) plot is given as shown in figure (i) Predict the order of the reaction. (ii) What is the slope of the curve? (iii) Write the unit of rate constant for this reaction.  (b) Show that the time required for 99% completion is double of the time required for the completion of 90% reaction.	1 1 1 2
	OR	
	(a)For a reaction A + B → P, the rate is given by Rate = $k[A]\ [B]^2$ (i) How is rate reaction affected if the concentration of ‘B’ is doubled. (ii) What is overall order of reaction if ‘A’ is present in large excess? (b) A first order reaction takes 23.1 minutes for 50% completion. Calculate the time required for 75% completion of this reaction. log 2 = 0.301 log 3 = 0.4771, log 4 = 0.6021	1 1 3

Pre Board Examination (2025-26)

Class :XII Subject & Code : Computer Science(083) Time : 03 Hrs. Max. Marks : 70

General Instructions:

- This question paper contains 37 questions.
- All questions are compulsory. However, internal choices have been provided in some questions. Attempt only one of the choices in such questions.
- The paper is divided into 5 Sections- A, B, C, D and E.
- Section A consists of 21 questions (1 to 21). Each question carries 1 Mark.
- Section B consists of 7 questions (22 to 28). Each question carries 2 Marks.
- Section C consists of 3 questions (29 to 31). Each question carries 3 Marks.
- Section D consists of 4 questions (32 to 35). Each question carries 4 Marks.
- Section E consists of 2 questions (36 to 37). Each question carries 5 Marks.
- All programming questions are to be answered using Python Language only.
- In-case of MCQ, text of the correct answer should also be written.

Q.No.	SECTION A (21 x 1 = 21 Marks)	Marks

1. State True or False
“Variable declaration is implicit in Python.” — 1

2. What will be the output of the following code? — 1

```
import statistics
print(statistics.mode([5, 8, 5, 10, 8, 5, 10]))
```

3. Given the following dictionaries dict_exam={"Exam":"AISSCE", "Year":2025} dict_result={"Total":500, "Pass_Marks":165} Which statement will merge the contents of both dictionaries? — 1

(a) dict_exam.update(dict_result) (b) dict_exam + dict_result
(c) dict_exam.add(dict_result) (d) dict_exam.merge(dict_result)

4. Consider the given expression: — 1

not True and False or True

Which of the following will be correct output if the given expression is evaluated?

(a) True (b) False
(c) NONE (d) NULL

5. Select the correct output of the code: — 1

```
a = "Year 2022 at All the best"
a = a.split('2')
b = a[0] + ". " + a[1] + ". " + a[3]
print (b)
```

(a) Year . 0. at All the best
(b) Year 0. at All the best
(c) Year . 022. at All the best
(d) Year . 0. at all the best

6. What will the following expression be evaluated to in Python? — 1

print(15.0 / 4 + (8 + 3.0))

(a) 14.75 (b)14.0 (c) 15 (d) 15.5

7. What will be the output of the following Python statement? — 1

print('CS2025'[::-2])

a) 520 b) C22 c) 50S d) 25

8. What will be the possible outputs of the following code? — 1

```
import random
L = [10, 30, 50, 70]
Lower = random.randint(2, 2)
Upper = random.randint(2, 3)
for K in range(Lower, Upper+1):
    print(L[K], end="@")
```

(a) 50@ (b) 50@70@ (c) 10@30@ (d) Both (a) and (b)

9. Which of the following statement(s) would give an error after executing the following code? 1

```
S="Welcome to class XII"                # Statement 1
print(S)                                # Statement 2
S="Thank you"                           # Statement 3
S[0]= '@'                               # Statement 4
S=S+"Thank you"                         # Statement 5
```

(a) Statement 3
(b) Statement 4
(c) Statement 5
(d) Statement 4 and 5

10. Write the output of the following code: 1

```
for k in range(2,10,3):
   print(k, end='-')
```

(a) 2-5-8- (b) 2-5-8 (c) 2-3-4-5-6-7-8-9- (d) 2-5-8-11-

11. Which of the following constraints prevents a field from being left blank? 1

(a) UNIQUE (b) CHECK (c) DEFAULT (d) NOT NULL

12. A relation named Employee exists with 4 columns and 5 records. If two more columns are added, what is the new degree of the relation? 1

a) 5 (b) 6 c) 7 d) 4

13. Which SQL command is used to modify structure of a table? 1

a) UPDATE b) ALTER c) MODIFY d) CHANGE

14. What will be the output of the following Python code? 1

```
x = 10
print(x, end='--')
def multiply():
    global x
    x = x * 2
    print(x, end='++')
multiply()
print(x)
```

(a) 10--20++20 (b) 10--20++10 (c) 10--10++20 (d) 20--20++20

15. Which function should be used to display the total number of records from table in a database? 1

(a) sum(*) (b) total(*) (c) count(*) (d) return(*)

16. The SELECT statement when combined with_______________clause, returns records without repetition. 1

(a) DESCRIBE (b) UNIQUE (c) DISTINCT (d) NULL

17. Which of the following network devices is used to connect different networks and also performs data routing between them? 1

(a) Switch (b) Hub (c) Router (d) Repeater

18. You work in a company that allows you to work from home. Recently you encountered a problem in your laptop and you called the IT head of your company to resolve the problem. He asked you to give him remote access of your laptop. 1

Which network protocol will be used in this connection?

(a) FTP (b) VOIP (c) PPP (d) TELNET

19. Software used to view web pages is known as ____________. 1

(a) Web server (b) Website
(c) Web browser (d) Web hosting

Q 20 and 21 are ASSERTION AND REASONING based questions. Mark the correct choice as

(a) Both A and R are true and R is the correct explanation for A
(b) Both A and R are true and R is not the correct explanation for A
(c) A is True but R is False
(d) A is false but R is True

20. **Assertion (A):** A primary key must be unique and cannot have NULL values. 1
Reasoning (R): The primary key uniquely identifies each row in the table.

21. **Assertion (A):** In Python, the finally block is always executed, whether an exception occurs or not. 1
Reason (R): The finally block is used to write the code that must be executed before a program terminates, such as closing files or releasing resources.

SECTION B (7 X 2 = 14 Marks)

22. Explain the term **Dynamic Typing** in Python with the help of example. 2

OR

Differentiate between **mutable** and **immutable** data types in Python with one suitable example each.

23. Rao has written a code to input a number and check whether it is prime or not. His code is having errors. Rewrite the correct code and underline the corrections made. 2

```
Def prime():
    n=int(input("Enter number to check :: ")
    for i in range (2, n//2):
        if n%i=0:
            print("Number is not prime \n")
            break
        else:
          print("Number is prime \n”)
```

24. Answer using Python built-in methods/functions only : 2

I. Write a Python statement to convert all characters of string S to uppercase.
II. Write a Python statement to count the number of elements in list L.

OR

Predict the output of the following Python code:

```
quote = "Knowledge is the power, but enthusiasm pulls the switch."
print(quote.replace("the", "your"))
print(quote.split()[3])
```

25. Write a function count_even() in Python that accepts a list of integers as input and returns the count of even numbers present in the list. 2

OR

Write a Python function update_marks() that accepts a dictionary Marks with student names as keys and their marks as values, along with a name and new_mark. The function should update the student’s mark if the name exists, otherwise print "Student not found".

26. Predict the output of the Python code: 2

```
data = {'A':90,'B':75,'C':60,'D':95}
sel = [ ]
for k in data:
 if data[k]>80:
   sel.append(k)
print(sel)
```

27. Write suitable commands to do the following in MySQL. 2

I. To list all the tables in a database LIBRARY.
II. To remove a database EXAM from system.

OR

Differentiate between count() and count(*) functions in SQL with appropriate example.

28. Expand the following terms: SMTP, VOIP, HTTPS, PPP — 2

OR

Define the term Network Topology and mention the advantages of using STAR topology.

SECTION C (3 X 3 = 9 Marks)

29. Write a method COUNTLINES() in Python to read lines from text file “TESTFILE.TXT“ and display the lines which are not starting with any vowel. — 3

OR

Write a function ETCount() in Python, which should read the text file “TESTFILE.TXT” and then print the count of occurrences of words ending with character ‘n’.

30. A list contains following record of course details for a University: **[Course_name, Fees, Duration]** — 3

Course=[["MCA", 200000, 3] , ["MBA", 500000, 2] , ["BA", 100000, 3]]

Write the following user defined functions to perform given operations on the stack named **'Univ'** :

(i) **Push_element( )** - To push an object containing the Course_name, Fees and Duration of a course, which has fees greater than 100000 to the stack.

The stack should contain

["MBA", 500000, 2]
["MCA", 200000, 3]

(ii) **Pop_element( )** - To pop the object from the stack and display it. Also, display “Underflow” when there is no element in the stack.

31. Predict the output of the Python code given below: — 3

```
s = 'Computer@Science'
n = len(s)
m = ''
for i in range(0, n):
    if (s[i] >= 'a' and s[i] <= 'm'):
        m = m + s[i].upper()
    elif (s[i] >= 'n' and s[i] <= 'z'):
        m = m + s[i-1]
    elif (s[i].isupper()):
        m = m + s[i].lower()
    else:
        m = m + ‘$$’
print(m)
```

OR

Predict the output of the Python code given below:

```
cities = ["Delhi", "Kolkata", "Chennai", "Mumbai", "Pune", "Agra", "Bhopal"]
result = []
for city in cities:
    if len(city) % 2 == 0:
        result.append(city[-2:].upper())
print(result)
```

SECTION D (4 X 4 = 16 Marks)

32. Consider the table Teacher as given below: — 4

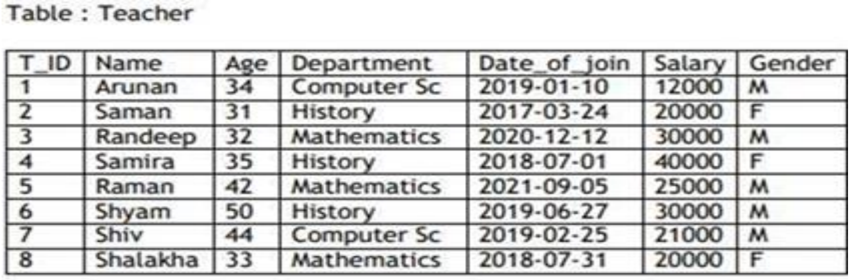


Table : Teacher

T_ID	Name	Age	Department	Date_of_join	Salary	Gender
1	Arunan	34	Computer Sc	2019-01-10	12000	M
2	Saman	31	History	2017-03-24	20000	F
3	Randeep	32	Mathematics	2020-12-12	30000	M
4	Samira	35	History	2018-07-01	40000	F
5	Raman	42	Mathematics	2021-09-05	25000	M
6	Shyam	50	History	2019-06-27	30000	M
7	Shiv	44	Computer Sc	2019-02-25	21000	M
8	Shalakha	33	Mathematics	2018-07-31	20000	F

A. Write the following queries

I. To print Name of teachers working in Computer Science department.

II. To display the details of female employees getting salary less than 20000.

III. To display average **salary** of male and female teachers.
IV. To count the number of teachers in each department.

OR

B. Predict the output of the following
I. SELECT Department, avg(salary) FROM Teacher GROUP BY Department;
II. SELECT MAX(Date_of_Join),MIN(Date_of_Join) FROM Teacher;
III. SELECT Name from Teacher where Department like ‘%ry’;
IV. SELECT Name, Age FROM Teacher where Salary between 25000 and 40000;

33. Kaustubh is working in a mall as a data analyst. The company stores the data in a CSV file named “Product.csv‟ that contains columns pid, pname and price to store Product id, Product name and Product price respectively. 4

Help him to efficiently maintain the data by creating the following user-defined functions
i. add() – To accept and add data of a Product to the CSV file.
ii. search()- To display the records of the Product whose price is more than 20000 and product name starting with a vowel.

34. Your friend Satish is working in a company to manage the employee related issues. Help him by writing SQL queries to get desired information from the tables. 4

Table **Employees**

Empid	Firstname	Lastname	Address	City
010	Ravi	Kumar	Raj nagar	GZB
105	Harry	Waltor	Gandhi nagar	GZB
152	Sam	Tones	33 Elm St.	Paris
215	Sarah	Ackerman	440 U.S. 110	Upton
244	Manila	Sengupta	24 Friends street	New Delhi
300	Robert	Samuel	9 Fifth Cross	Washington
335	Ritu	Tondon	Shastri Nagar	GZB
400	Rachel	Lee	121 Harrison St.	New York
441	Peter	Thompson	11 Red Road	Paris

Table **EmpSalary**

Empid	Salary	Benefits	Designation
010	75000	15000	Manager
105	65000	15000	Manager
152	80000	25000	Director
215	75000	12500	Manager
244	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
400	32000	7500	Salesman
441	28000	7500	salesman

Write the SQL commands for the following:
I. To show first name, last name and address of all employees who lives in Paris or Upton.
II. To display the details of Employees table in descending order of First name.
III. To display the first name, last name and salary of all employees from the tables Employee and EmpSalary, who are working as Manager.
IV. To increase salary of all Clerks by Rs.1000.

OR

To print maximum and minimum salary for each designation.

35. You are working on a project that involves managing **inventory** records of a store in a MySQL database. Assume the database is named **STOREDB**, the user is **admin**, and the password is **admin123**. The MySQL is available on a local computer, not a remote computer. The table **INVENTORY** in the database has following columns: 4

- ProductID (INTEGER, Primary Key)
- ProductName (VARCHAR(100))
- Price (FLOAT(8,2))
- PurchaseDate (DATE)

Your task is to create a Python program that adds Rs. 100 to the price of the products that have string “soap” in their product name.

SECTION E (2 X 5 = 10 Marks)

36. A file, PASSENGERS.DAT, stores the records of passengers using the following structure : [PNR, PName, BRDSTN, DESTN, FARE] where : 5

PNR – Passenger Number (string type)
PName – Passenger Name (string type)
BRDSTN – Boarding Station Name (string type)
DESTN – Destination Station Name (string type)
FARE – Fare amount for the journey (float type)

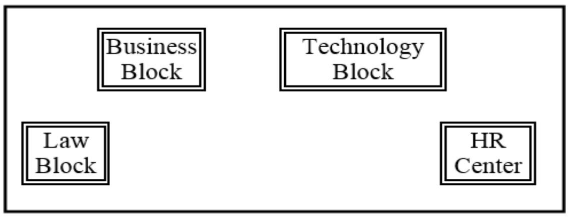
Write user defined functions in Python for the following tasks :

(i) Create( ) – to input data for passengers and write it in the binary file PASSENGERS.DAT.

(ii) SearchDestn(D) –to read contents from the file PASSENGERS.DAT and display the details of those Passengers whose DESTN matches with the value of D.

(iii) UpdateFare( ) – to increase the fare of all passengers by 5% and rewrite the updated records into the file PASSENGERS.DAT.

37. MyPace University is setting up its academic blocks at Naya Raipur and is planning to set up a network. The University has 3 academic blocks and one Human Resource Center as shown in the diagram below: 5



Center to Center distances between various blocks/center and the no. of computers in blocks are as follows:

Law Block to business Block	40m
Law block to Technology Block	80m
Law Block to HR center	105m
Business Block to technology Block	30m
Business Block to HR Center	35m
Technology block to HR center	15m

Law Block	15
Technology Block	40
Business Block	25
HR Center	115

I. Suggest the most suitable place (i.e., Block/Center) to install the server of this University with a suitable reason.

II. Suggest an ideal layout for connecting these blocks/centers for a wired connectivity.

III. Which device will you suggest to be placed/installed in each of these blocks/centers to efficiently connect all the computers within these blocks/centers.

IV. The University wants to establish a high-speed wired connection to its placement center situated 04 KM away from the main campus. Which cable should be used for this connection?

V. a. The university is planning to connect its admission office in Delhi, which is more than 1250 km from university. Which type of network out of LAN, MAN, or WAN will be formed? Justify your answer.

OR

b. What is the use of SMTP?

PRE-BOARD EXAMINATION (2025-26) SET-4

ENGLISH CORE-Code No. 301

CLASS-XII

Time allowed: 3 Hrs. **Maximum Marks: 80**

General Instructions

Read the following instructions very carefully and follow them:

i. This question paper has 13 questions. All questions are compulsory.
ii. This question paper contains three sections:
   Section A: Reading Skills
   Section B: Creative Writing Skills
   Section C: Literature
iii. Attempt all questions based on specific instructions for each part. Write the correct question.
iv. Separate instructions are given with each question/part, wherever necessary.
v. Adhere to the prescribed word limit while answering the questions.

SECTION A: READING SKILLS (22 marks)

1. Read the following passage. **12 Marks**

1.Behavioural scientists have spent a lot of time studying what makes us happy. We know happiness can predict health and longevity, and happiness scales can be used to measure social progress and the success of public policies. But happiness isn't something that just happens to you.

2. Happiness often comes from within. Learn how to tame negative thoughts and approach every day with optimism. Don't try to stop negative thoughts. Telling yourself "I have to stop thinking about this," only makes you think about it more. Treat yourself like a friend. When you are feeling negative about yourself, ask yourself what advice would you give a friend who was down on herself. Now try to apply that advice to you. Socratic questioning is the process of challenging and changing irrational thoughts. Studies show that this method can reduce depression symptoms. The goal is to get you from a negative mind-set to a more positive one.

3. Optimism is part genetic, part learned. Optimism doesn't mean ignoring the reality of a dire situation. After a job loss, for instance, many people may feel defeated and think, "I'll never recover from this." An optimist would acknowledge the challenge in a more hopeful way, saying, "This is going to be difficult, but it's a chance to rethink my life goals and find work that truly makes me happy."

4. Generosity makes people happier. Several studies have found that people who behaved generously were happier compared to people who made selfish decisions. In fact, just thinking about being generous and kind triggers a happiness reaction in our brains.

5. Behaviours and habits we engage in do matter—from gratitude to kindness to mindfulness—and that they can lead to an enduring happiness boost. It is important to choose activities that fit our personality and interests. Activities fit us better when they feel natural, enjoyable, and aligned with our values, rather than driven by guilt or other people's expectations. Choose activities that are virtuous and meaningful, rather than obsessing about feeling good all the time. Hedonism won't necessarily make you happy, even if you feel good in the moment. If we pursue pleasure, it shouldn't be at the expense of living a meaningful life. We also need to pursue a purpose, and practice forgiveness, gratitude, and generosity—those give us a sense of competence, autonomy, and connection, which are core human needs. People who invest more effort into their new habits see greater improvements in their well-being. "People can create for themselves a steady inflow of engaging, satisfying, connecting, and uplifting positive experiences, thereby increasing the likelihood that they remain in the upper range of their happiness potentials," Sheldon and Lyubomirsky.

Answer the following questions based on the passage above.

i. Statement I: Happiness is something that happens to you. **1**

Statement II: Happiness often comes from within.

(a) Both statements are false.

(b) Statement I is false and Statement II is true.

(c) Statement I is true and Statement II is false.

(d) Both statements are true.

ii. Mention two ways by which one can tame negative thoughts, as given in the passage.

(a) ______________________________ (b)______________________________ **2**

iii. Socratic Questioning- **1**

(1) Reduces depression symptoms

(2) Gives a positive mindset

(3) Makes one generous

(4) Challenges irrational thoughts

A. 1,2 & 3 B. 2&4 C. 1,2,3&4 D. 1,2& 4

iv. Hedonism refers to- **1**

(a)The belief that you are not successful

(b)The belief that pleasure is the most important thing in life

(c) The belief that it is not wrong to achieve happiness through unfair means

(d) The belief that happiness is a temporary emotion

v. The passage emphasizes- **1**

(a) The need for developing activities that fit oneself

(b)The need to be optimistic

(c) The need to create positive experiences for oneself

(d)The need to do surveys on happiness scales

A. 1&2 B. Only 1 C. 1,2,3&4 D. 1,2 &3

vi. The core human needs according to the passage are: **1**

(a) Competence, autonomy, and connection

(b) Generosity and optimism

(c) Forgiveness, gratitude and generosity

(d) Kindness, happiness and positive experiences

vii. How would an optimist deal with a difficult situation? **2**

viii. What does Sheldon and Lyubomirsky opine about happiness? **1**

ix. Assertion (A): It is important to choose activities that fit our personality and interests. **1**

Reason (R): Our activities make us obsessed about feeling good all the time.

(a)(A) is true and (R) is the correct explanation of it.

(b) (A) is true but (R) is not the correct explanation of it.

(c)(A) is false but (R) is true.

(d) Both (A) and (R) are false.

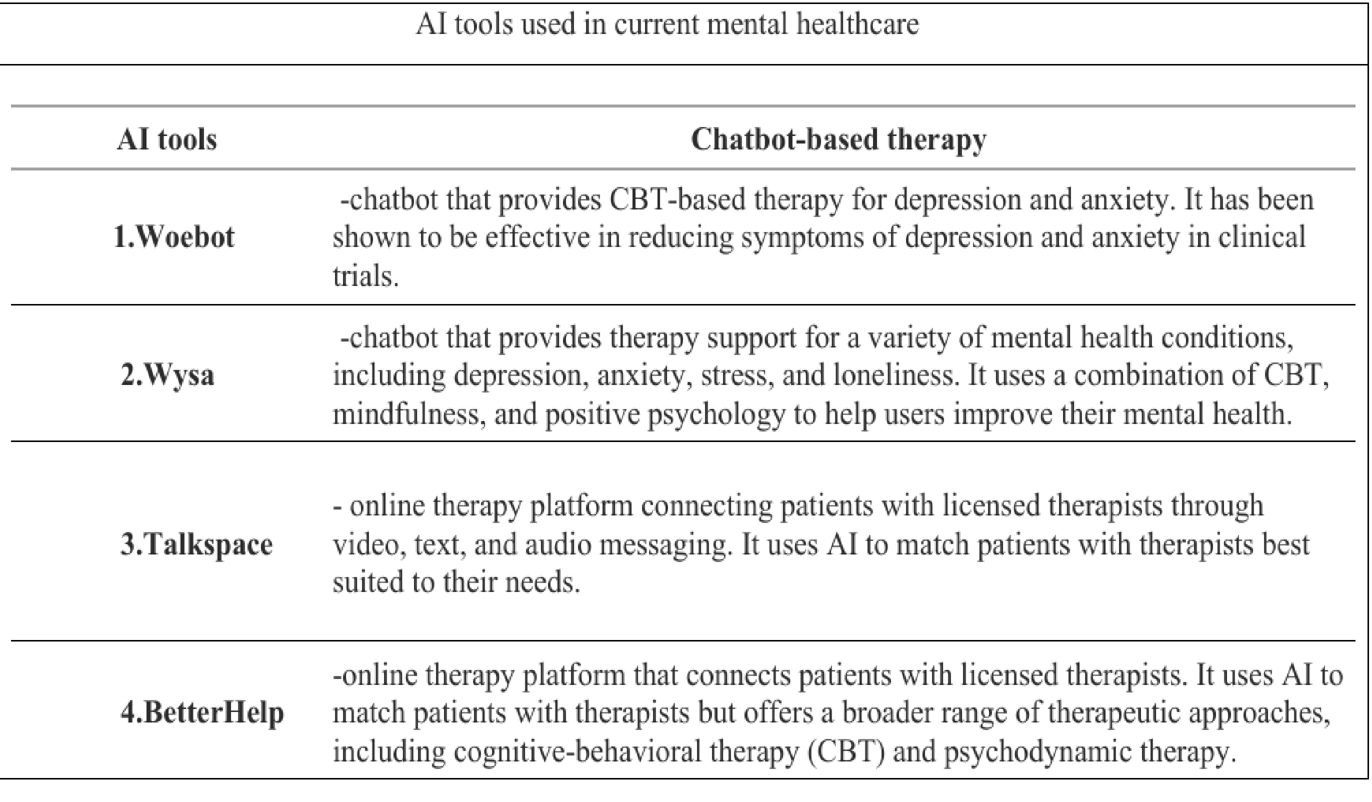
x. After a job loss many people feel defeated. A man with a positive mind would------------- **1**

2. Read the passage given below and answer the questions that follow. 10 Marks

1. AI-driven tools have made significant strides in analysing speech, text, and facial expressions to identify early signs of mental health disorders. Natural Language Processing (NLP) techniques enable extracting valuable insights from written or spoken words. For example, sentiment analysis can identify nuanced changes in an individual's emotional condition by examining social media posts, chat logs, or written diaries.

2. Moreover, voice analysis can detect alterations in speech patterns, encompassing variations in pitch, tone, and rhythm, which might potentially serve as indicators of anxiety, depression, or other mental health conditions. Facial expression analysis, often coupled with computer vision, can provide insights into an individual's emotional state. AI systems can detect micro-expressions and subtle changes in facial features that may indicate underlying psychological conditions.

3. This technology benefits remote mental health monitoring through video consultations or mobile apps. The current trend in this domain involves advancing AI algorithms capable of discerning and comprehending these subtle indicators with notable precision. As AI systems continue to improve, they hold the potential to provide early warning signs of mental health disorders, allowing for timely intervention and support. Table below highlights specific AI tools used in current mental healthcare.



AI tools used in current mental healthcare

AI tools	Chatbot-based therapy
1.Woebot	-chatbot that provides CBT-based therapy for depression and anxiety. It has been shown to be effective in reducing symptoms of depression and anxiety in clinical trials.
2.Wysa	-chatbot that provides therapy support for a variety of mental health conditions, including depression, anxiety, stress, and loneliness. It uses a combination of CBT, mindfulness, and positive psychology to help users improve their mental health.
3.Talkspace	- online therapy platform connecting patients with licensed therapists through video, text, and audio messaging. It uses AI to match patients with therapists best suited to their needs.
4.BetterHelp	-online therapy platform that connects patients with licensed therapists. It uses AI to match patients with therapists but offers a broader range of therapeutic approaches, including cognitive-behavioral therapy (CBT) and psychodynamic therapy.

Answer the following questions, based on the passage above:

i. Complete the following suitably. **1**

________________techniques enable extracting valuable insights from written or spoken words.

ii. Suppose you are offered undesirable food by a host and you were dumbfounded. How would AI driven tools read your feelings? **1**

(a) voice analysis

(b)facial expression analysis

(c)written or spoken words

(d)social media posts, chat logs

iii. How does technology benefit remote mental health monitoring? Give two modes. **2**

iv) Paragraph 3 contains words- 'precision' and 'potential' **1**

Classify the following sentences as: - 'precision' and 'potential.'

Sentence1: AI systems can warn the signs of depression.

Sentence 2: AI algorithms are capable of telling the effect of sleeping hours on the person correctly.

v) Name an online therapy that is best suited to the patients' needs from the AI tool chart. **1**

vi) List two cognitive behavioral therapies found effective in reducing depression and anxiety from the AI tool chart given. **1**

vii) How do AI systems read facial expressions to link with the person's mind? **2**

viii) Which of the AI tools in the chart uses CBT as well as psychodynamic therapy. **1**

(a)Woebot (b)Wysa (c) Talkspace (d) BetterHelp

SECTION B CREATIVE WRITING SKILLS (18 marks)

3. Attempt any one of the two, (A) or (B), in about 50 words. **1x4=4**

A. You are the Secretary of Vishvas Flats Welfare Association, Delhi-51. **Write a notice** to be circulated to the members of the Association, requesting them to attend a meeting to discuss about the security measures of the flats and appointment of new security guards. (Word limit 50words).

OR

B. You are Babita/ Biman the Secretary of the History Club of your school. **Draft a notice** in not more than 50 words informing the students of class IX and X about a proposed excursion to historical places of your city.

4. Attempt any one of the two, (A) or (B), in about 50 words. **1x4=4**

A. You are Suman/Sonu the Head Girl/Boy of New Field School. Your school has decided to celebrate "The Grand Parent's Day" in school. **Draft a formal invitation** to be sent to the grand parents of students of your school giving details of the programme.

OR

B. You are Dr. Shailesh Gupta, an eminent educationist. You have been invited to preside over an Inter Zonal Declamation Competition by Neha, the President of English Literary Club of Government Model Sr. Sec. School Sector 19, Chandigarh. **Write a reply for refusal** of the invitation.

5. Attempt any one of the two, (A) or (B), in 120-150 words. **1x5=5**

A. You are Gargi/Gagan of 22, H-Block, Janakpuri, Delhi. You feel sad to notice that people litter the roads with utter disregard for sanitation and cleanliness. As a responsible citizen, **write a letter to the editor** of a national daily highlighting the need for educational institutions to instill civic responsibility among school children. (120-150 words) You may use the following cues along with your own ideas to compose this letter.

cleanliness drive ………spreading awareness campaigns ………. eco club activities in schools ……………volunteer for cleanup ………workshops…………seminars

OR

B. Aarohi/Aryan of Hillside Road, Goa, sees the following advertisement in "The City News" and decides to apply for the post of a Marketing Executive. **Write a job application** along with the biodata in 120-150 words to the Personnel Manager, India Book House, Mall Road, Goa. **1x5=5**

INDIA BOOK HOUSE Requires Marketing Executive
Qualification:
Graduate in Marketing and Sales
Experience 3-5 years
Fluency in English and Local language
Knowledge of basic computer skills
Job requirement:
Setting targets and timelines
Supervising sales

6. Attempt any one of the two, (A) or (B), in 120-150 words. **1x5=5**

A. You are Vaibhavi/Vaibhav, a student of Class XII. Whenever you are stressed, you listen to music and get relaxed. You strongly believe that music de-stresses you and refreshes your body and mind. Based on your experience, **write an article** on Music as Therapy for a health magazine highlighting the healing power of music. Use the following cues along with your own ideas to compose this article:

music establishes connection with self _music helps in self-expression _comforts body, mind & soul _improves one's mood

OR

B. Cultural Society Brightland Public School, Lucknow organised an adult literacy camp in its neighbourhood. **Write a report** in 120 – 150 words on the camp for your school newsletter. You are Sumati/Shivam, the Secretary of the society. Use the following clues: **1x5=5**

- no. of volunteers
- hours spent in teaching
- location of the class
- chairs, blackboards
- no. of people attending the camp
- benefits

SECTION C LITERATURE (40 marks)

7. Read the following extracts and solve ANY ONE of the given two, (A) or (B). **1x6=6**

A) 'but after the airport's
security check, standing a few yards
away, I looked again at her, wan, pale
as a late winter's moon and felt that
old familiar ache, my childhood's fear,
but all I said was, see you soon, Amma,
all I did was smile and smile and
smile……'

(My Mother at Sixty-six)

i. What is the speaker's emotional state when looking at her mother? **1**

(a) Confused and disoriented (b) Nostalgic and longing

(c) Empathetic and understanding (d) Fearful and apprehensive

ii. Complete the following analogy correctly: **1**

She sang like a bird-Simile All I did was smile and smile and smile- ______

iii. Read the following statement and choose the correct option: **1**

(I)The poet had gone through the security check. (II) She did not want to look at her mother.

(a) (I) is true, but (II) is false.

(b) (I) is false, but (II) is true.

(c) Both (I) and (II) are true.

(d) Both (I) and (II) are false.

iv. What childhood fear is the poet referring to? **1**

v. Which of the following rhyme schemes has been employed by the poet in the above stanza? **1**

(a) ababab (b) free verse (c) abc abc (d) aabbaa

vi. 'Pale as a winter's moon' suggests that her face………… **1**

OR

B) Aunt Jennifer's fingers fluttering through her wool
Find even the ivory needle hard to pull
The massive weight of Uncle's wedding band
Sits heavily upon Aunt Jennifer's hand (Aunt Jennifer's Tigers)

i. Which of the following themes is best represented in the given extracts? **1**

(a) The maturity of adulthood

(b) The glory of femininity

(c) Victim of male domination

(d) The superficial beauty

ii. State whether the following statement is TRUE or FALSE with reference to the extract **1**

Aunt Jennifer is nervous and traumatised because of the constraints of her marriage. (True/False)

iii. Complete the following sentence appropriately: **1**

The fingers fluttering through her wool symbolise …………………..

iv. The use of the words 'massive weight' creates a powerful image of …………….. **1**

v. Complete the sentence appropriately. **1**

The feeling evoked in the reader towards Aunt Jennifer is ………………………………….

vi. What does the Uncle's character reflect in the poem? **1**

(a) male chauvinism and patriarchy

(b) a man's physical strength

(c) male ego

(d) a male's view of the world

8. Read the following extracts and solve ANY ONE of the given two, (A) or (B). 1X4=4

(A) "The next day, infection flared in the Maharaja's right hand. In four days, it developed into a suppurating sore which spread all over the arm. Three famous surgeons were brought in from Madras. After holding a consultation, they decided to operate. The operation took place. The three surgeons who performed it came out of the theatre and announced, "The operation was successful. The Maharaja is dead." In this manner the hundredth tiger took its final revenge upon the Tiger King." (The Tiger King)

i. What caused the initial health issue faced by the Maharaja in the extract? **1**

ii. What was the outcome of the surgical operation performed on the Maharaja? **1**

(a) The Maharaja fully recovered from the infection.

(b) The operation was successful, but the Maharaja died.

(c) The operation failed, and the infection worsened

(d) The surgeons refused to operate due to the severity of the sore.

iii. What does the phrase "the hundredth tiger took its final revenge" suggest about the Maharaja's death? **1**

(a) The Maharaja was directly killed by a tiger during a hunt.

(b) The Maharaja's obsession with killing tigers symbolically led to his victory.

(c) The hundredth tiger was responsible for infecting the Maharaja's hand.

(d) The surgeons conspired against the Maharaja to avenge the tigers.

iv. Choose the correct figure of speech used in the statement "the operation was successful but the Maharaja is dead"? (Irony/Metaphor) **1**

OR

(B) "If I am able, are you?" Sadao asked. "No," Hana said, "But if you can do it alone..." Sadao hesitated again. "The strange thing is," he said, "that if the man were whole, I could turn him over to the police without difficulty. I care nothing for him. He is my enemy. All Americans are my enemy. And he is only a common fellow. You see how foolish his face is. But since he is wounded…" (The Enemy)

i. What is the "strange thing" Sadao refers to? **1**

(a) Hana's fear of the enemy

(b) His inability to turn in an injured soldier

(c)The soldier's foolish face

(d) His deep concern for an American

ii. Complete the sentence appropriately. **1**

Sadao's claim that "he is my enemy" but also expressing hesitation to hand him over, reflects an inner conflict between _______ and _______.

iii. How does the wounded condition of the American soldier affect Sadao's perception of him? **1**

iv. With reference to Sadao's declaration, "All Americans are my enemies", read the statements given below and choose the option that correctly evaluates Sadao's belief: **1**

Statement 1: Sadao's declaration reflects the nationalistic conditioning prevalent during wartime.

Statement 2: Sadao genuinely hates all Americans and shows no empathy throughout the story. Choose the correct option:

(a) Statement 1 is true but Statement 2 is false.

(b) Statement 1 is false but Statement 2 is true.

(c) Both Statement 1 and Statement 2 are true.

(d) Both Statement 1 and Statement 2 are false.

9. Read the following extracts and solve ANY ONE of the given two, (A) or (B). 1x6=6

(A) The world had, of course, never been very kind to him, so it gave him unwonted joy to think ill of it in this way. It became a cherished pastime for him during many dreary ploddings to think of people he knew who had let themselves be caught in the world's rattrap, and of others who were still circling around the bait. One dark evening, as he trudged along the road, he caught sight of a little gray cottage by the roadside and knocked on the door to ask shelter for the night." (The Rattrap)

i. What does the line reveal about the peddler's outlook towards the world? **1**

(a) He believed in the kindness of strangers.

(b) He was optimistic despite hardships.

(c) He found satisfaction in criticizing the world.

(d) He thought the world was a fair place.

ii. What does the phrase "unwonted joy" imply about the peddler's mindset? **1**

(a) He was joyful but also ashamed of his thoughts.

(b) He was forced to think negatively about the world.

(c) He did not want to enjoy criticizing the world, but he couldn't help it.

(d) He was eager to change his attitude.

iii. The "gray cottage by the roadside" symbolically represent the joyful attitude of the peddler. (True/False) **1**

iv. Do you agree with the peddler's view that the world is like a rattrap? Why or why not? **1**

v. Choose the most relevant idea about the central theme of the story. **1**

(a) The kindness of strangers

(b)The deceptive nature of material temptations

(c) The importance of education

(d) The joy of companionship

vi. Choose the figure of speech used in 'the world's rattrap' (Simile/Metaphor) **1**

OR

(B) "I wish he was an Englishman," someone said on the bus. "Ireland will win the world cup." Little Derek told his mother when Sophie brought him home. Her father was gone to pub to celebrate. "What is this you have been telling", Jansie said, next week. "About what" your Geoff told our Frank you met Danney Casey." This was not an inquisition, just Jansie being nosey. But Sophie was startled "Oh that". Jansie frowned, sensing she was covering. "Yes that–well yes I did". "You never did?" Jansie exclaimed. Sophie glared at the ground. Damn that Geoff, this was a Geoff thing, not a Jansie thing. It was meant to be something special just between them. Something secret. It was not a Jansie thing at all. (Going Places)

i. "Ireland will win the World cup." Who is the speaker? **1**

ii. This was a Geoff thing, not a Jansie thing, because - **1**

(a) Jansie was trustworthy.

(b)She lived in the world of reality.

(c) Her personality was different from Geoff.

(d) Jansie was nosey about things.

Choose the most appropriate combination:

(a) a &b (b) a&d (c) c&d (d)a&d

iii. 'something special just between them' was meant to be- **1**

(a) A secret

(b)something suspicious

(c)a prank

(d) None of the above

iv. Sophie is obsessed about- **1**

(a)Geoff her elder brother

(b) Her Dad who loves to watch football matches.

(c) Her friend Jansie who wants her to be happy

(d) The prodigy Danny Casey

v. Who represents the realistic/practical side of the life in the above extract? **1**

vi. This chapter critically explores the clash between adolescent dreams and the realities of a working-class family, particularly through the character of Sophie. (Ture/False) **1**

10. Answer any five of the following six questions in 40-50 words each. 5x2=10

i) 'The attitude of the villagers was completely changed that day'' Elaborate with reference to the lesson. (The Last Lesson)

ii) How did the swimming instructor build a swimmer out of Douglas? (Deep Water)

iii) In what context do you conclude that Subbu was tailor-made for films? (Poets and Pancakes)

iv) Why do the people who run the roadside stand wait for the squealing of car brakes so eagerly? What is their plea/request? (A Roadside Stand)

v) Gandhi's selfless devotion and charisma won over the lawyers' confidence and ensured their wholehearted participation in the Champaran struggle. Explain. (Indigo)

vi) What are the views of writers like V.S. Naipaul and Lewis Carroll on interviews? (The Interview)

11. Answer any two of the following three questions in 40 -50 words each. 2x2=4

i) How did Tishani Doshi feel about visiting Antarctica? (Journey to the End of the Earth)

ii) How does Zitkala-Sa's experience with the loss of her long hair symbolize her struggle with cultural assimilation? (Memories of Childhood)

iii) Why did Derry return to Mr. Lamb's garden despite opposition? (On the Face of It)

12. Answer any one of the following two questions, in about 120-150 words. 1x5=5

A) As Anees Jung, write a diary entry reflecting on the harsh living conditions of the bangle makers you observed while visiting Mukesh's home in Firozabad, highlighting their struggles.

You may begin like this-
Date, Day, Time
Place: Today, Mukesh took me through Firozabad's…………..

OR

B) Imagine you are Pablo Neruda of 'Keeping Quiet. You advise Robert Frost (A Roadside Stand) in the context of his conflict and pain at the plight of the road side stand owners. Pen down your advice in a letter to Robert Frost. You may begin like this-

Dear Robert Frost,

You seem very pained at the plight of the roadside stand owners, and I would like to advise you....

13. Answer any one of the following two questions, in about 120-150 words. 1X5=5

A) Both Charley in The Third Level and Dr. Sadao in The Enemy are faced with difficult choices in their lives. Compare how these characters deal with their internal conflicts and what their decisions reveal about human nature.

OR

B) 'The boy drank the milk of an English cow, was brought up by an English nanny, tutored in English.' (The Tiger king).

You realize that western influence on Indian culture is deep rooted since the days of the Tiger King. Write an article using textual references on the pros and cons of western influence on Indian society. You may begin like this-

Indian's exposure to English language and western influence ……….