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PA-II Assignment: 2026 27

Class-XII Science

DATE OF SUBMISSION: 11-07-2026 (Saturday)

1.	ENGLISH
	<u>Easy Level</u> 1. Why did Douglas decide to learn swimming? 2. Describe the incident that made Douglas afraid of water. 3. Who helped Douglas overcome his fear of water? 4. What lesson did Douglas learn from his experience? 5. Why does the poet call a thing of beauty a 'joy forever'? 6. Name any four beautiful objects mentioned in the poem. 7. What does beauty do to our minds and hearts? 8. What removes the 'pall of sadness' from our lives? 9. Why was the Maharaja called the Tiger King? 10. What prediction did the astrologers make at the Maharaja's birth? 11. Why did the Maharaja ban tiger hunting in his kingdom? 12. How did the Maharaja finally meet his death? 13. Write a letter to the Editor expressing concern over increasing plastic pollution in your city. 14. Write a letter to the Editor highlighting the problem of poor sanitation in your locality. 15. Write a letter to the Editor on the need for water conservation. <u>Medium Level</u> 1. How did fear affect Douglas's life for many years? 2. Explain the role of the swimming instructor in Douglas's recovery. 3. Why does Douglas say that fear is more terrifying than death? 4. How does Douglas's experience inspire people facing challenges? 5. How does nature help human beings overcome sorrow? 6. Explain the significance of the phrase "endless fountain of immortal drink." 7. Why does Keats believe that beauty never fades? 8. How is the poem relevant to modern life? 9. How did the astrologer's prophecy influence the Maharaja's actions? 10. Explain the irony in the ending of the story. 11. Why is The Tiger King considered a satire on power? 12. What does the story suggest about fate and destiny? 13. Write a letter to the Editor discussing the increasing cases of cybercrime among teenagers and suggesting preventive measures. 14. Write a letter to the Editor expressing concern over the declining reading habits among students. 15. Write a letter to the Editor suggesting measures to improve road safety in your city. <u>HARD Level</u> 1. "Fear is a state of mind that can be conquered." Discuss with reference to Douglas's experience. 2. Evaluate Douglas's determination and resilience in overcoming fear. 3. Compare Douglas's struggle with any real-life situation where perseverance leads to success. 4. If Douglas had given up after his first failure, how would the message of the chapter have changed? 5. "Beauty is not a luxury but a necessity." Justify with reference to the poem. 6. Critically analyse Keats's belief that nature has the power to heal emotional wounds. 7. How does A Thing of Beauty encourage people to remain optimistic despite suffering? 8. Explain how the poem promotes environmental awareness in today's world. 9. "The Tiger King is a satire on arrogance, superstition and misuse of power." Discuss. 10. Fate cannot be defeated by human pride. Justify this statement with reference to the story. 11. If you were the Diwan, what advice would you have given the Maharaja to prevent his tragic end? 12. Evaluate the role of irony in making The Tiger King both humorous and thought-provoking. 13. Rapid urbanisation has resulted in traffic congestion, shrinking green spaces and poor waste management. Write a letter to the Editor suggesting measures for sustainable urban development. 14. Artificial Intelligence is transforming education. Write a letter to the Editor discussing its benefits, challenges and the need for responsible use.

	15. Climate change has increased the frequency of heat waves and water scarcity. Write a letter to the Editor urging citizens and authorities to take immediate action.
2.	PHYSICS
	<u>LEVEL-1</u> - What is diffraction of light? - What is the central maximum in diffraction? - What happens to diffraction when wavelength increases? - A force of 4N is acting between two charges in air. If the space between them is completely filled with glass (relative permittivity = 8), then the new force will be (a) 2N (b) 5N (c) 0.5N (d) 0.2N - A charge q is placed at the center of the line joining two equal charges Q. The system of three charges will be in equilibrium if q is equal to (a) $-Q/2$ (b) $-Q/4$ (c) $Q/2$ (d) $Q/4$ - Two point charges Q and -3Q are placed some distance apart. If the electric field at the location of Q is E, the field at the location of -3Q is (a) E (b) -E (c) $E/3$ (d) $-E/3$ - An electric dipole when placed in a uniform electric field will have minimum potential energy, if the angle between dipole moment and electric field is (a) Zero (b) $\pi/2$ (c) $\pi/3$ (d) π - An electric dipole consists of two opposite charges of magnitude $1\mu\text{C}$ separated by a distance of 2cm. The dipole is placed in an electric field 10^{-5} V/m. The maximum torque (a) 10^{-3} Nm (b) $2 \times 10^{-13}\text{ Nm}$ (c) $3 \times 10^{-3}\text{ N}$ (d) $4 \times 10^{-3}\text{ Nm}$ Assertion: No two electric lines of force can intersect each other. Reason: Tangent at any point of electric line of force gives the direction of electric field Assertion: Coulombs law of force is applicable for point charges at rest. Reason: Coulombs law is a central force. Assertion: Electric charge is quantized. Reason: Charging is because of transfer of an integral number of protons or electrons. Assertion: If there exists coulomb attraction between two bodies, both of them may not be charged. Reason: In coulomb attraction two bodies are oppositely charged Assertion: Surface charge density of an irregularly shaped conductor is non uniform. Reason: Surface density defined as charge per unit area. - If voltage applied on a capacitor is increased from V to 2V, choose the correct conclusion. (a) Q remains the same, C is doubled (b) Q is doubled, C doubled (c) C remains same, Q doubled (d) Both Q and C remain same - A parallel plate capacitor is charged. If the plates are pulled apart (a) The capacitance increases (b) The potential differences increase (c) The total charge increases (d) The charge & potential difference remain the same - Which of the following is an example of a molecule whose centre of mass of positive and negative charges coincide each other? (a) CO_2 (b) CO (c) CH_3OH (d) NH_3 - What is the angle between electric field and equipotential surface? (a) 90° always (b) 0° always (c) 0° to 90° (d) 0° to 180° - An electric dipole of dipole moment p is placed in a uniform electric field of strength E in a direction perpendicular to the field. The work done in rotating the dipole by an angle 90° without acceleration in a plane perpendicular to the field is: (a) pE (b) -pE (c). Zero (d). -2pE Assertion: A spherical equipotential surface is not possible for a point charge. Reason: A spherical equipotential surface is not possible inside a spherical capacitor. Assertion: The equatorial plane of a dipole is an equipotential surface. Reason: The electric potential at any point on equatorial plane is zero. Assertion: Electric potential and electric potential energy are different quantities.

Reason: For a system of positive test charge and point charge electric potential energy = electric potential.

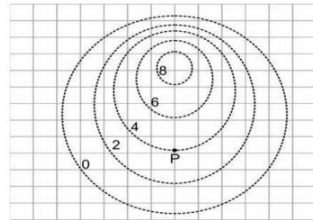
22. **Assertion:** Two equipotential surfaces cannot intersect each other.

Reason: Two equipotential surfaces are parallel to each other.

23. Why do the electric field lines never cross each other?
 24. Define electric flux. Write its S.I. unit. A charge q is enclosed by a spherical surface of radius R . If the radius is reduced to half, how would the electric flux through the surface change?
 25. Deduce the expression for the potential energy of an electric dipole placed with its axis at an angle θ to the external field $E \rightarrow$. Hence discuss the conditions of its stable and unstable equilibrium.

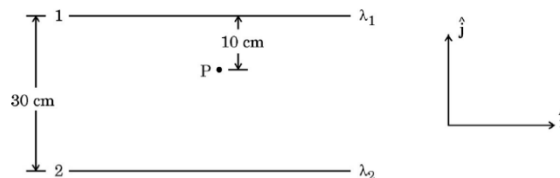
LEVEL-2

26. Define diffraction of light and state when it becomes significant.
 27. Give two differences between interference and diffraction.
 28. Two +ve charges of $0.2 \mu\text{C}$ and $0.01 \mu\text{C}$ are placed 10 cm apart. Calculate the work done in reducing the distance to 5 cm.
 29. Two metal spheres, one of radius R and the other of radius $2R$, both have same surface charge density σ . They are brought in contact and separated. What will be the new surface charge densities on them?
 30. The diagram below shows an arrangement of a set of equipotential lines in a given Region. Each line is marked with the potential it represents. The background gridlines are squares of each side equal to 1 cm
 (a) Determine electric field at point P. (b) Draw 6 field lines to represent the electric field in this region

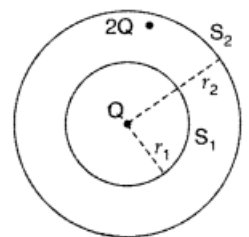


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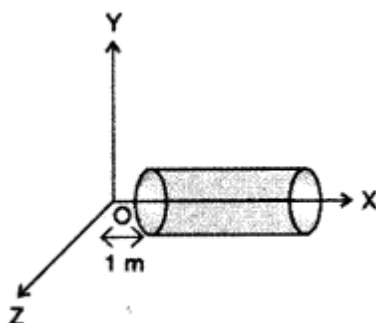
31. Explain diffraction of light and derive the condition for minima in single slit diffraction.
 32. Draw the intensity distribution curve for diffraction pattern and explain it.
 33. Compare interference and diffraction with at least three differences.
 34. Two long straight wires 1 and 2 are kept as shown in the figure. The linear charge density of the two wires are $\lambda_1 = 10 \text{ C/m}$ and $\lambda_2 = 20 \text{ C/m}$. Find the net force F experienced by an electron held at point P.



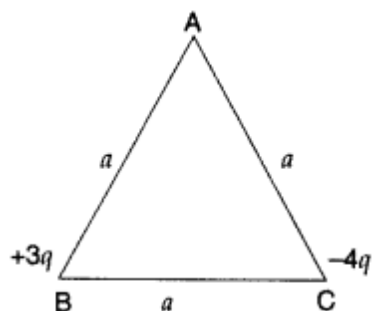
35. A sphere S_1 of radius r_1 encloses a net charge Q . If there is another concentric sphere S_2 of radius r_2 ($r_2 > r_1$) enclosing charge $2Q$, find the ratio of the electric flux through S_1 and S_2 . How will the electric flux through sphere S_1 change if a medium of dielectric constant K is introduced in the space inside S_2 in place of air?



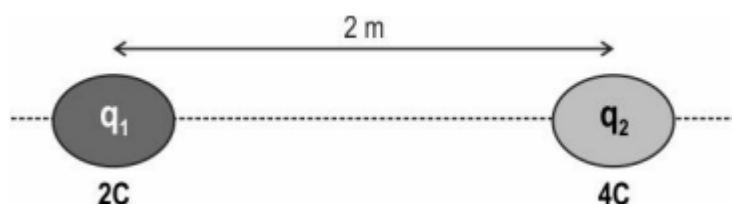
36. A hollow cylindrical box of length 1m and area of cross-section 25 cm^2 is placed in a three-dimensional coordinate system as shown in the figure. The electric field in the region is given by $E \rightarrow 50x\hat{i}$ where E is in NC^{-1} and x is in metres. Find • Net flux through the cylinder. Charge enclosed by the cylinder.



37. Two point charges $+3q$ and $-4q$ are placed at the vertices 'B' and 'C' of an equilateral triangle ABC of side 'a' as given in the figure. Obtain the expression for (i) the magnitude and (ii) the direction of the resultant electric field at the vertex A due to these two charges.



38. Two positive charges q_1 and q_2 lie along a straight line separated by a distance of 2 m as shown. (a) Find a location along the straight line joining the two charges, where if a positive charge q_3 is placed, it experiences a zero-resultant force. (b) Will the resultant force on q_3 placed at the location of part (a) still be zero, if it is negatively charged? Explain



3. CHEMISTRY

LEVEL-1

1. Define a solution.
2. What is a binary solution?
3. Define molarity.
4. What is molality?
5. Define mole fraction.
6. What is Henry's Law?
7. Define vapour pressure.
8. What is an ideal solution?
9. What is an azeotrope?
10. Define osmotic pressure.
11. Differentiate between molarity and molality.
12. State Raoult's Law for volatile liquids.
13. What are colligative properties? Name them.
14. Define abnormal molecular mass.
15. Explain van't Hoff factor.

LEVEL-2

16. Distinguish between ideal and non-ideal solutions.
17. Explain positive deviation from Raoult's Law.
18. Explain negative deviation from Raoult's Law.
19. What is reverse osmosis? Give one application.
20. Define relative lowering of vapour pressure.
21. Derive the expression for osmotic pressure.
22. Calculate molarity of a solution containing 10 g NaCl in 500 mL solution.
23. Define electrochemistry.
24. What is an electrochemical cell?
25. Define electrode potential.
26. What is standard electrode potential?
27. Define galvanic cell.
28. What is electrolysis?

29. Define conductivity.
30. What is molar conductivity?

LEVEL-03

31. What is Kohlrausch's Law?
32. Differentiate between galvanic cell and electrolytic cell.
33. Explain salt bridge and its function.
34. Write Nernst equation.
35. What is cell potential?
36. Explain oxidation and reduction in terms of electrons.
37. Define limiting molar conductivity.
38. What is electrochemical series?
39. Explain conductance and resistance relation.

Note: - Solve numerical problem from intext and Exercise of chapter 1 and chapter 2.

4. MATHEMATICS

LEVEL-1

1. If $\begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix} = 0$, and $a + b + c \neq 0$, then which of the following must be true?
(A) $a = b = c$ (B) $a^2 + b^2 + c^2 = ab + bc + ca$
(C) $ab = bc = ca$ (D) $abc = 0$

2. (Assertion–Reason)

Assertion (A): Interchanging any two rows changes the sign of the determinant.

Reason (R): If two rows of a determinant are identical, its value is zero.

3. If $|A| = 5$, $|B| = -2$, find $|3AB^{-1}|$.

4. Find all real values of k such that $\begin{bmatrix} k & 1 & 1 \\ 1 & k & 1 \\ 1 & 1 & k \end{bmatrix} = 0$.

5. If $\begin{bmatrix} 2x & 3 & 1 \\ 1 & x & 2 \\ 4 & 1 & x \end{bmatrix} = 0$, determine all possible values of x .

6. A surveying team records three landmarks at $A(2,3)$, $B(5,7)$, $C(k, 11)$. The landmarks are found to lie on a straight road. Using determinants, determine the value of k .

7. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ 1 & 0 & k \end{bmatrix}$, find the value(s) of k for which A is invertible.

8. (Solar Farm Case Study)

A solar company records the coordinates of three solar towers as $(3,4)$, $(7,8)$, $(k, 12)$. The towers are designed to lie on the same transmission line. Using determinants, find k . Also, explain why the determinant method is more efficient than calculating slopes repeatedly.

9. A farmer divides a triangular field into three plots having vertices $(1,2)$, $(5,8)$, $(7, k)$. The total area of the field is **18 square units**. Using determinants, determine all possible values of k .

10. Let $A = \begin{bmatrix} x & 1 & 2 \\ 1 & x & 3 \\ 2 & 3 & x \end{bmatrix}$. Find all values of x for which A is singular.

11. If $|A| = 3$, $|B| = -4$, find

12. $|2AB|$

13. $|A^{-1}B^T|$

14. $|(AB)^T|$

15. Find all values of m for which $\begin{bmatrix} m & 1 & 1 \\ 1 & m & 1 \\ 1 & 1 & m \end{bmatrix} = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix}$.

16. If $A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 3 & 1 \\ 1 & 2 & 4 \end{bmatrix}$, show that $A^2 - 8A + 9I = \text{adj}(A)$. Hence find A^{-1} without evaluating cofactors.

17. If $\text{adj}(A) = 3A + 2I$ and $|A| = 8$, find A^{-1} .

18. (Network Flow)

A transportation company models the movement of goods using $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 3 & 1 \\ 0 & 1 & 2 \end{bmatrix}$. The inverse matrix

represents the redistribution required after a disruption.

- (i) Verify whether redistribution is possible.
- (ii) Find the inverse.
- (iii) Explain why the determinant must be non-zero.

19. (Economics)

Three commodities satisfy $AX = B$. Given $A = \begin{bmatrix} 3 & 2 & 1 \\ 1 & 2 & 3 \\ 2 & 1 & 2 \end{bmatrix}$, solve the system using the inverse matrix.

Interpret the meaning if $|A| = 0$.

20. (Electrical Circuit)

The resistance matrix is $A = \begin{bmatrix} 4 & 1 & 0 \\ 1 & 4 & 1 \\ 0 & 1 & 4 \end{bmatrix}$.

Without calculating the inverse completely, determine whether A^{-1} exists. State the determinant property used.

LEVEL-2

21. Given $A^3 - 6A^2 + 5A + 12I = O$, show that A is invertible and express A^{-1} as a polynomial in A .

22. If $A \operatorname{adj}(B) = 3I$, and $|A| = 9$, find $|B|$, B^{-1} , $\operatorname{adj}(B^{-1})$.

23. Let $A = \begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$. Find conditions on a, b, c such that A^{-1} exists.

24. If $\operatorname{adj}(A) = A^2 - 4A + 5I$, show that A^{-1} can be expressed as a quadratic polynomial in A .

25. Let A be a non-singular 3×3 matrix satisfying $A + \operatorname{adj}(A) = 5I$. Determine all possible values of $|A|$.

26. A function is defined as $f(x) = \begin{cases} kx + 2, & x < 1 \\ 5, & x = 1 \\ 3x + k, & x > 1 \end{cases}$. Determine the value(s) of k for which $f(x)$ is continuous at $x = 1$.

27. Without using differentiation, determine whether $f(x) = |x - 2|$ is differentiable at $x = 2$. Justify your answer.

28. Find the value of a for which $f(x) = \begin{cases} ax + \sin x, & x \leq 0 \\ e^x - 1, & x > 0 \end{cases}$ is differentiable at $x = 0$.

29. Discuss the continuity and differentiability of $f(x) = x|x|$.

30. Determine all values of a such that $f(x) = \begin{cases} ax^2 + 3, & x \leq 2 \\ 5x - a, & x > 2 \end{cases}$ is continuous and differentiable at $x = 2$.

31. Discuss the differentiability of $f(x) = |x^2 - 4|$.

32. If $f(x) = \begin{cases} \frac{x^3 - 8}{x - 2}, & x \neq 2 \\ k, & x = 2 \end{cases}$, find k so that f is continuous. Then determine whether it is differentiable.

33. Discuss the continuity and differentiability of $f(x) = \begin{cases} x^2 \sin \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$

34. Find the points of non-differentiability of $f(x) = |x - 1| + |x + 2|$.

35. The A robotic arm follows $f(x) = \begin{cases} \sin x, & x \leq \pi \\ ax + b, & x > \pi \end{cases}$. Determine a, b so that the motion remains smooth.

36. Find all values of a for which $f(x) = \begin{cases} \frac{\sin(ax)}{x}, & x \neq 0 \\ 3, & x = 0 \end{cases}$ is continuous and differentiable at the origin.

37. A sensor used in an automated manufacturing system is calibrated using the function $f(x) = \begin{cases} ax + b, & x < 1 \\ \sqrt{x + 3}, & x \geq 1 \end{cases}$

38. For the sensor to operate reliably:

39. The output must be **continuous** at $x = 1$.

40. The rate of change of the output must also be **continuous** at $x = 1$.

Determine the values of a and b , and explain why differentiability is essential in practical engineering applications.

LEVEL-3

41. If $y = \left(\frac{x+1}{x-1}\right)^{\sqrt{x}}$, find $\frac{dy}{dx}$.

42. If $x^y = y^x$, prove that $\frac{dy}{dx} = \frac{y(\ln y - \frac{x}{y})}{x(\ln x - \frac{y}{x})}$.

43. Differentiate $y = \left(\sin^{-1} \frac{2x}{1+x^2}\right)^3$.

	44. If $y = x^{\tan^{-1} x}$, find $\frac{dy}{dx}$. 45. Find the second derivative of $y = e^{x \sin x}$. 46. If $\sqrt{x+y} + \sqrt{x-y} = a$, find $\frac{dy}{dx}$. 47. If $x = a(\theta + \sin \theta)$, $y = a(1 - \cos \theta)$, find $\frac{d^2y}{dx^2}$. 48. If $y = \ln\left(\frac{\sqrt{1+x^2}+x}{\sqrt{1+x^2}-x}\right)$, find $\frac{dy}{dx}$. 49. If $y = (\tan x)^{\sec x}$, find $\frac{dy}{dx}$. 50. Find $\frac{d}{dx}\left[\sin^{-1}\left(\frac{2x}{1+x^2}\right) + \tan^{-1}\left(\frac{2x}{1-x^2}\right)\right]$. 51. If $(x^2 + y^2)^2 = 16xy$, find $\frac{dy}{dx}$. 52. Differentiate $y = \left(\frac{\sin x + \cos x}{\sin x - \cos x}\right)^{\tan x}$. 53. If $y = (\ln x)^{\ln x}$, find $\frac{dy}{dx}$. 54. If $y = e^{\sqrt{\tan^{-1}(x^2)}}$, find $\frac{dy}{dx}$. 55. Find $\frac{d^2y}{dx^2}$, if $y = x^x$. 56. If $x = \sin t + \cos t$, $y = \sin t - \cos t$, find $\frac{dy}{dx}$ and hence $\frac{d^2y}{dx^2}$. 57. If $y = \ln(x + \sqrt{x^2 - 1})$, show that $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$. 58. Differentiate : $y = \left(\frac{x^2+1}{x^2-1}\right)^{\sqrt{x^2+1}}$. 59. If $y = (\sin x)^{\cos x}$, prove that $\frac{dy}{dx} = (\sin x)^{\cos x} \left[-\sin x \ln(\sin x) + \frac{\cos^2 x}{\sin x}\right]$. 60. (CBSE Competency-Based HOTS) A curve is defined implicitly by $x^3 + y^3 = 3axy$, where a is a positive constant. - Find $\frac{dy}{dx}$. - Determine all points where the tangent to the curve is horizontal. - Determine all points where the tangent is vertical.
5.	BIOLOGY - Which of the following amino acid substitution is responsible for causing sickle cell anemia? - Valine is substituted by Glutamic acid in the α globin chain at the sixth position - Valine is substituted by Glutamic acid in the β globin chain at seventh position - Glutamic acid is substituted by Valine in the α globin chain at the sixth position - Glutamic acid is substituted by Valine in the β globin chain at the sixth position - In human beings, where genotype AABbCC represents dark skin colour, aabbcc represents light skin colour and AaBbCc represents intermediate skin colour; the pattern of genetic inheritance can be termed as: - Pleiotropy and codominance - Pleiotropy and incomplete dominance - Polygenic and qualitative inheritance - Polygenic and quantitative inheritance - Which of the following combination of chromosome numbers represents the correct sex determination pattern in honey bees? - Male 32, Female 16 - Male 16, Female 32 - Male 31, Female 32 - Female 32, Male 31 - Rajesh and Mahesh have defective haemoglobin due to genetic disorders. Rajesh has too few globin molecules while Mahesh has incorrectly functioning globin molecules. Identify the disorder they are suffering from. Assertion: When the two genes in a dihybrid cross are situated on the same chromosome, the proportion of parental gene combinations is much higher than nonparental type. Reason: Higher parental gene combinations can be attributed to crossing over between two genes. - In Antirrhinum, RR is phenotypically red flowers, rr is white and Rr is pink. Select the correct phenotypic ratio in F₁ generation when a cross is performed between RR X Rr: 1 red: 2 Pink: 1 white 2 Pink: 1 white 2 Red: 2 Pink - All Pink - What would be the genotype of the parents if the offspring have the phenotypes in 1:1 proportion? - Aa X Aa - AA X AA - Aa X AA - Aa x aa

8. What is the pattern of inheritance in the above pedigree chart?
 A. Autosomal dominant B. Autosomal recessive
 C. Sex -linked dominant D. Sex -linked recessive
9. A couple has two daughters. What is the probability that the third child will also be a female?
 A. 25% B. 50% C. 75% D. 100%
10. The gene that controls the ABO blood group system in human beings has three alleles- I^A , I^B and i . A child has blood group O. His father has blood group A and mother has blood group B. Genotypes of other offsprings can be:
 i. $I^B I^B$
 ii. $I^A i$
 iii. $I^B i$
 iv. $I^A I^B$
 v. $i i$
 A. i, ii, iii, v B. ii, iii, iv, v C. iii, iv, v D. iv, iii, i
11. Placed below is a karyotype of a human being. On the basis of this karyotype, which of the following conclusions can be drawn:
 A. Normal human female
 B. Person is suffering from Colour Blindness
 C. Affected individual is a female with Down's syndrome
 D. Affected individual is a female with Turner's syndrome
12. Which of the following conclusions can be drawn on the basis of this cross? When yellow bodied (y), white eyed (w) *Drosophila* females were hybridized with brown bodied (y^+), red eyed males (w^+) and F1 progenies were intercrossed, F2 generation would have shown the following ratio:
 A. 1:2:1 because of linkage of genes
 B. 9:3:3:1 because of recombination of genes
 C. Deviation from 9:3:3:1 ratio because of segregation of genes
 D. Deviation from 9:3:3:1 ratio because of linkage of genes
13. The following are results of crossing a female fly ($AaBb$) with a male fly ($aabb$).
 $AaBb$ 1005
 $aabb$ 1000
 $Aabb$ 200
 $aABb$ 210
 Which two genotypes are the recombinant offspring?
 A. $AaBb$ & $Aabb$ B. $AaBb$ & $aABb$
 C. $Aabb$ & $aABb$ D. $AaBb$ & $aabb$
14. The sperm of *Drosophila* contains _____ number of chromosomes:
 (a) 4 (b) 46 (c) 23 (d) 8
15. Which of the following statements is correct?
 (a) Down's syndrome is caused due to trisomy of 22nd chromosome
 (b) Haemophilia is an autosomal recessive disorder
 (c) The life on the Earth appeared about 3.5 million years ago
 (d) In angiosperms, the endosperm is triploid
16. **Assertion:** - Mendel conducted his experiments on *Pisum Sativum*.
Reason: - *Pisum Sativum* belongs the family Solanaceae.
 (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.
17. The pedigree chart given below represents the pattern of inheritance of haemophilia in a family. Study it carefully and answer the following questions:
18. Identify the correct statement with respect to member '4':
 (a) He is a carrier male (b) She is a carrier female
 (c) He is haemophilic (d) She is a homozygous female

19. The possible genotype of member '5' is:
 (a) XHXH (b) XHY (c) XhY (d) None of these
20. The possible genotype(s) of member '6' is/are:
 (a) XHXH, XHXh (b) XHY (c) XhXh (d) None of these
21. Haemophilia is a/an ____ trait:
 (a) Dominant (b) Autosomal (c) X-linked (d) Y-linked
22. Assuming that member '14' is heterozygous for haemophilia, the probability of the son of this couple to be haemophilic is:
 (a) 25% (b) 50% (c) 75% (d) 100%

Read the paragraph

Some students wanted to investigate the pattern of inheritance of flower colour in snapdragon. They selected some plants which were homozygous for red flowers and some other plants which were homozygous for white flowers. These plants were labelled as Parental Plants (P1). These plants (red-flowered and white-flowered), were cross-pollinated. The seeds obtained from these plants were planted in a separate field. These seeds germinated to produce the plants which were labelled as the plants of F1-generation.

Based on the above experiment, answer the following questions:

23. Select the statement which correctly predicts the phenotype of the plants of F1 generation.
 (a) All the plants will bear red flowers
 (b) All the plants will bear white flowers
 (c) 50% plants will bear red flowers and 50% will bear white flowers
 (d) 100% plants will bear pink flowers.
24. If the plants of F1-generation are allowed to self-pollinate, then in F2-generation
 (a) All of the resulting plants will have pink flowers.
 (b) 75% plants will have red flowers and the remaining 25% plants will have white flowers.
 (c) 25% plants will have red flowers, 25% plants will have pink flowers and 25% will have white flowers.
 (d) 25% plants will have red flowers and the remaining 75% plants will have white flowers.
25. The genotypic ratio of the plants of F2-generation will be:
 (a) 1: 2: 3 (b) 9: 3: 3: 1 (c) 1: 2: 1 (d) 3:1
26. This type of inheritance can be described as:
 (a) Polygenic inheritance
 (b) Incomplete dominance
 (c) Co-dominance
 (d) Pleiotropism
27. The biological name of snapdragon is:
 (a) Antirrhinum majus
 (b) Pisum sativum
 (c) Lathyrus odoratus
 (d) Rhizobium leguminosarum
28. The year 1900AD is highly significant for geneti.

6. INFORMATICS PRACTICES

DataFrame and SQL

1. Create the following DataFrame using **Dictionary of Lists**.

Name	Class	Eng	B.st
Amit	XII	85	78
Riya	XII	91	89
Karan	XII	76	82
Sneha	XII	88	90
Ankit	XII	80	75

2. Create the above DataFrame using **List of Lists, List of Dictionaries, Dictionary of Series**.
 3. Create the same DataFrame with custom row labels S1 S2 S3 S4 S5
 4. Create an empty DataFrame and then add the above data into it. Use the DataFrame created above.

5. Display all column names.
6. Display row labels.
7. Display the shape of the DataFrame.
8. Display the total number of elements.
9. Display the number of dimensions.
10. Display the data types of every column.
11. Display the values of the DataFrame.
12. Display memory usage of the DataFrame.
13. Display the transpose of the DataFrame.
14. Rename the column **Eng** to **English**.
15. Rename row labels
S1→A
S2→B
S3→C
S4→D
S5→E
16. Rename both row labels and column names together.
17. Rename all columns as
Student Name
Class
English
Business Studies
18. Set **Name** as the index.
19. Reset the index.
20. Display only the **Name** column.
21. Display only students scoring more than 80 in English.
22. Display only Name and Business Studies columns.
23. Change the index to Roll Number and reset it back.
24. Insert a Total column after Business Studies.
25. Delete the last row.
26. Save only Name and English columns into a new CSV file.
27. Read the CSV file and display the last three records.
28. Replace all English marks less than 80 with 80.
29. Rename the Name column to Student_Name.
30. Display only rows S2 to S4 and columns English and Business Studies.

Database Query using SQL

Table Name: STUDENT

Name	Class	Stream	Age	Eng	Maths
Aman	XII	Science	17	85	92
Riya	XII	Commerce	18	78	70
Mohit	XI	Science	16	88	95
Neha	XII	Humanities	17	90	68
Arjun	XI	Commerce	16	76	72
Simran	XII	Science	18	81	89
Karan	XI	Science	17	69	74
Priya	XII	Commerce	17	92	80
Rahul	XI	Humanities	16	74	65
Sneha	XII	Science	18	87	96

- Q1. Create the above table **STUDENT** with appropriate data types.
- Q2. Insert all the above records into the STUDENT table.
- Q3. Display all records of the STUDENT table.
- Q4. Display Name and Stream of all students.
- Q5. Display details of students whose Stream is 'Science'.
- Q6. Display Name and Maths marks of students studying in Class XII.
- Q7. Display Name and ROUND(Eng).
- Q8. Display Name and left(Maths,3).

	Q9. Display Name and instr(stream, 'I'). Q10. Display Name and MOD(Maths,5). Q11. Display Name and POWER(2,3). Q12. Display student names in uppercase. Q13. Display student names in lowercase. Q14. Display first three characters of each student's name. Q15. Display the length of each student's name. Q16. Display Name and concatenate Name with Stream. Q17. Display current date. Q18. Display current date and current time. Q19. Display all students sorted by Name. Q20. Display students sorted by Maths marks in descending order. Q21. Display students sorted first by Stream and then by Eng marks descending. Q22. Display the average English marks stream-wise. Q23. Display the maximum Maths marks class-wise. Q24. Display the total number of students in each Stream. Q25. Display Stream-wise average English marks where average is greater than 80. Q26. Display Class-wise maximum Maths marks where maximum marks are greater than 90
7.	PHYSICAL EDUCATION
	EASY LEVEL (7 Questions) 1. Define child growth and development. 2. What is the meaning of anatomy? 3. What is physiology? 4. Name any two benefits of sports participation for women. 5. What is the Female Athlete Triad? 6. Name the three types of muscles in the human body. 7. What is the function of the skeletal system? Medium Level (7 Questions) 8. Differentiate between growth and development. 9. Explain the importance of sports participation for children. 10. Describe the components of the Female Athlete Triad. 11. Explain the functions of the muscular system during physical activity. 12. Discuss the role of bones and joints in movement. 13. Explain the structure and functions of the respiratory system during exercise. 14. Describe the effects of regular exercise on the cardiovascular system. Hard Level (6 Questions) 15. Discuss the physical, psychological, and social benefits of sports participation for children and women. 16. Explain the causes, symptoms, and prevention of the Female Athlete Triad. 17. Analyze the adaptations of the cardiovascular and respiratory systems to regular physical training. 18. Explain the structure and functions of the human skeletal system and its importance in sports performance. 19. Compare voluntary and involuntary muscles with suitable examples related to sports. 20. Discuss the role of anatomy and physiology in improving sports performance and preventing sports injuries.
8.	ARTIFICIAL INTELLIGENCE
	Q1. Communication Skills: Overcoming Barriers (2 Marks) Active listening is often disrupted by various psychological and environmental factors. Identify two distinct barriers to active listening in professional communication and provide a practical method to overcome each.

	Q2. Communication Feedback Dynamics (2 Marks) Explain the core difference between Evaluative Feedback and Descriptive Feedback. Why is descriptive feedback considered significantly more effective for a student's technical growth? Q3. Green Skills: Corporate Environmental Responsibility (2 Marks) Define the concept of Greenhouse Gas Mitigation. State two immediate measures that a software development firm can take to reduce its carbon footprint related to server usage. Q4. Generative AI Architecture: The Role of GANs (2 Marks) A Generative Adversarial Network (GAN) consists of two competing neural networks: the Generator and the Discriminator. Explain the specific objective of the Discriminator network and how it helps the Generator improve. Q5. Transformer Models & Text Generation (2 Marks) Modern Large Language Models (LLMs) rely heavily on the Transformer Architecture. Briefly explain one primary advantage that Transformer architecture has over traditional Recurrent Neural Networks (RNNs) when handling long paragraphs of text. Q6. Eco-Sustainability and Green Jobs (3 Marks) An e-commerce company operates a massive fulfillment warehouse and handles thousands of plastic-wrapped product shipments daily. The management decides to transition towards a "Green Economy" model. (i) Suggest two eco-friendly waste management or packaging practices the company can immediately enforce in its daily warehouse operations. <i>(2 Marks)</i> (ii) Identify one specific green job role that the company should create to oversee its resource conservation and sustainability compliance. <i>(1 Mark)</i> Q7. Generative AI Ethics & Mitigation (3 Marks) A high school educational platform intends to use Generative AI tools to instantly create simulated, interactive historical figures (using synthetic voice and video cloning) so students can "interview" them in real-time. (i) Highlight one constructive pedagogical benefit of using this generative technology in a virtual history classroom. <i>(1.5 Marks)</i> (ii) Discuss one critical data bias or safety risk that arises if the AI model is trained on unverified internet text archives, and suggest a workflow to mitigate this issue. <i>(1.5 Marks)</i>
9.	PSYCHOLOGY
	LEVEL – 1 Q1. Definition of stress? Q2. Explain Eustress and Distress? Q3. What is Strain? Q4. Mention different types of stress Appraisal? Q5. What is conflict? Q6. Explain the meaning of internal pressure? Q7. Mention different types of stress management techniques? Q8. Mention different types of groups? Q9. Mention different stages of group formation? Q10. What is social loafing? LEVEL – 2 Q1. What are the signs and symptoms of stress? Q2. How Stress have relation with immune system? Q3. Difference between Primary and Secondary V/S Formal and Informal group? Q4. Explain types of stress and dimensions? Q5. Who was Hens Selye and which modal of stress he gave? Q6. Mention appraisals and resources? Q7. Different between Ingroup and outgroup? Q8. Explain Minimal group paradigm experiments? Q9. What is group polarisation? Mention example Q10. Write the reasons of social loafing and mention how to reduce? LEVEL – 3 Q1. Explain the modal of stress of Hens Selye?

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| <p>Q2. Explain the effects of stress on psychological functioning and health?</p> <p>Q3. What are the Sources of stress?</p> <p>Q4. Mention the types of stress and explain it with examples?</p> <p>Q5. Which are the positive health and wellbeing?</p> <p>Q6. Explain the model of coping skills given by Lazarus and Folkman?</p> <p>Q7. Why do People Join Group?</p> <p>Q8. How do people form a group?</p> <p>Q9. How do the stages of group formation works</p> <p>Q10. Explain Social loafing and group polarisation?</p> |
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