KENDRIYA VIDYALAYA SANGATHAN

PM Shri Kendriya Vidyalaya Boudh

KVS Bhubaneswar Region

Session: 2025–26 | **HOLIDAY HOME WORK** | Max. Marks: 100

Class: XII (Science) | **Subject: Chemistry (043)** | Difficulty: Moderate–High

Chapters Covered: Chapter 1 – Solutions | Chapter 2 – Electrochemistry

1. All questions are compulsory. Read each question carefully before answering.
2. Section A: 30 MCQs × 1 mark = 30 marks.
3. Section B: 10 Short-Answer Questions (2 marks each) = 20 marks.
4. Section C: 10 Short-Answer Questions (3 marks each) = 30 marks.
5. Section D: 3 Long-Answer + 2 Case Studies (5 marks each) = 25 marks. Each Case Study carries 5 marks with internal sub-parts.
6. Use only blue/black ball-point pen. Neat diagrams are encouraged.
7. Submit within the first week after vacation ends.

SECTION – A | Multiple Choice Questions | 30 × 1 = 30 Marks

Choose the most appropriate option. Each question carries 1 mark. No negative marking.

Q1. The mole fraction of solute in a 1.00 molal aqueous solution is:

(a) 0.0160 (b) 0.0177
(c) 0.0263 (d) 0.0500

Q2. Henry's law constant for CO_2 dissolved in water at 298 K is 3.4×10^7 Pa. The mole fraction of CO_2 in a soft drink bottled at 4 atm partial pressure of CO_2 is approximately:

(a) 1.2×10^{-5} (b) 1.2×10^{-2}
(c) 2.4×10^{-5} (d) 4.8×10^{-3}

Q3. Which of the following pairs of liquids is expected to show positive deviation from Raoult's law?

(a) Acetone + Chloroform (b) Chloroform + Benzene
(c) Acetone + Benzene (d) Water + HCl

Q4. The van't Hoff factor (i) for a dilute solution of $K_3[Fe(CN)_6]$ is:

(a) 1 (b) 2
(c) 3 (d) 4

Q5. 1.0 g of a non-electrolyte solute dissolved in 50 g of benzene lowered the freezing point of benzene by 0.40 K. K_f for benzene = 5.12 K kg mol^{-1}. Molar mass of the solute is:

(a) 128 g/mol (b) 256 g/mol
(c) 64 g/mol (d) 512 g/mol

Q6. At the same temperature and molality, which aqueous solution has the highest boiling point?

(a) Urea (b) KCl

(c) $MgCl_2$ (d) $Al_2(SO_4)_3$

Q7. Osmotic pressure of 0.1 M NaCl solution at 300 K (R = 0.082 L atm mol^{-1} K^{-1}):

(a) 0.82 atm (b) 1.64 atm

(c) 4.92 atm (d) 2.46 atm

Q8. Which colligative property is most suitable for determining molar mass of macromolecules like polymers?

(a) Relative lowering of vapour pressure (b) Elevation in boiling point

(c) Depression in freezing point (d) Osmotic pressure

Q9. An azeotrope of HCl and H_2O has boiling point lower than either component. This means it:

(a) Shows negative deviation from Raoult's law (b) Shows positive deviation from Raoult's law

(c) Is an ideal solution (d) Cannot be separated by distillation

Q10. The molarity of a solution prepared by dissolving 2.5 g of NaOH (M = 40) in 500 mL of solution is:

(a) 0.125 M (b) 0.0625 M

(c) 0.25 M (d) 0.5 M

Q11. For a solution obeying Henry's law, if the partial pressure of a gas is doubled, the amount of gas dissolved:

(a) Halves (b) Remains the same

(c) Doubles (d) Quadruples

Q12. The relative lowering of vapour pressure for 0.1 mol fraction of solute in a solution is:

(a) 0.01 (b) 0.10

(c) 0.09 (d) 0.90

Q13. Which of the following does NOT affect the value of K_f of a solvent?

(a) Nature of the solvent (b) Nature of the solute

(c) Temperature (d) Both (a) and (c)

Q14. Benzene and toluene form nearly ideal solutions. If mole fraction of benzene is 0.6 and p°(benzene) = 75 mmHg, p°(toluene) = 25 mmHg, total vapour pressure is:

(a) 55 mmHg (b) 50 mmHg

(c) 45 mmHg (d) 60 mmHg

Q15. The degree of dissociation (α) of a weak electrolyte A_xB_y is related to van't Hoff factor by:

(a) $i = 1 + (x + y – 1)\alpha$ (b) $i = 1 – \alpha(x + y)$

(c) $i = \alpha(x + y)$ (d) $i = 1 + \alpha xy$

Q16. The standard electrode potential of Zn^{2+}/Zn is –0.76 V and of Cu^{2+}/Cu is +0.34 V. EMF of the Daniel cell is:

(a) 1.10 V (b) 0.42 V

(c) –1.10 V (d) 0.76 V

Q17. Kohlrausch's law states that at infinite dilution the molar conductivity of an electrolyte equals:

(a) Sum of conductances of ions (b) Sum of limiting molar conductivities of constituent ions

(c) Product of ionic conductances (d) Ratio of anion to cation conductance

Q18. The unit of molar conductivity (Λ_m) is:

(a) S cm^2 mol^{-1} (b) S cm^{-1} mol
(c) S^{-1} cm mol^{-1} (d) S m^{-1}

Q19. In the electrolysis of molten NaCl, at the cathode:

(a) Na^+ is oxidised (b) Cl^- is reduced
(c) Na^+ is reduced (d) Cl^- is oxidised

Q20. According to Faraday's first law, the mass deposited at an electrode is proportional to:

(a) Current only (b) Time only
(c) Charge passed (d) Voltage applied

Q21. Faraday's constant is approximately:

(a) 96500 C mol^{-1} (b) 9650 C mol^{-1}
(c) 965 C mol^{-1} (d) 6.023×10^{23} C

Q22. For a cell reaction: $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$, the standard Gibbs energy change ($\Delta G°$) is related to $E°_{cell}$ by:

(a) $\Delta G° = nFE°$ (b) $\Delta G° = -nFE°$
(c) $\Delta G° = nRT \ln E°$ (d) $\Delta G° = -RT \ln E°$

Q23. The conductivity of a solution decreases on dilution because:

(a) Degree of dissociation decreases (b) Number of ions per unit volume decreases
(c) Ion-ion interactions increase (d) Viscosity of solution increases

Q24. Which of the following is a secondary cell?

(a) Dry cell (Leclanche cell) (b) Mercury cell
(c) Lead storage battery (d) Fuel cell

Q25. At standard conditions, the equilibrium constant K for a cell reaction with $E° = 0.60$ V and $n = 2$ at 298 K is closest to:

(a) 10^{10} (b) 10^{20}
(c) 10^5 (d) 10^{30}

Q26. In a hydrogen-oxygen fuel cell, the reaction at the anode is:

(a) $O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$ (b) $H_2 \rightarrow 2H^+ + 2e^-$
(c) $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$ (d) $H^+ + e^- \rightarrow \frac{1}{2}H_2$

Q27. The Nernst equation for a cell at 298 K is: $E = E° - (0.0592/n) \log Q$. For the Daniel cell with $[Zn^{2+}] = 0.01$ M and $[Cu^{2+}] = 1$ M ($E° = 1.10$ V), EMF is:

(a) 1.10 V (b) 1.16 V
(c) 1.04 V (d) 0.98 V

Q28. The specific conductance (κ) and molar conductivity (Λ_m) are related by (C = molarity in mol L^{-1}):

(a) $\Lambda_m = \kappa \times 1000/C$ (b) $\Lambda_m = \kappa/C$
(c) $\Lambda_m = \kappa \times C/1000$ (d) $\Lambda_m = 1000\ \kappa \times C$

Q29. On increasing dilution, the molar conductivity of a weak electrolyte:

(a) Decreases then increases (b) Increases and approaches a limiting value
(c) Remains constant (d) First increases then decreases

Q30. How many coulombs are needed to deposit 1.08 g of silver (At. mass = 108) from $AgNO_3$ solution?

(a) 965 C
(b) 9650 C
(c) 96500 C
(d) 193000 C

SECTION – B | Short Answer Questions | 10 × 2 = 20 Marks

Answer each question in 2–4 sentences / necessary steps. Each question carries 2 marks.

Q1. Define molality and mole fraction. State one advantage of using molality over molarity for expressing concentration of solutions.

Q2. The vapour pressure of pure water at 298 K is 23.8 mmHg. Calculate the vapour pressure of a solution containing 18 g of glucose (M = 180 g/mol) in 90 g of water.

Q3. State Henry's law. Why does the solubility of gases in liquids decrease with increase in temperature? Give one example.

Q4. An aqueous solution of sucrose (M = 342 g/mol) has a concentration of 0.5 mol/L. Calculate its osmotic pressure at 300 K. ($R = 8.314\ J\ mol^{-1}\ K^{-1}$)

Q5. Distinguish between ideal and non-ideal solutions. Give one example of each.

Q6. Define the terms: (i) Cell constant, (ii) Specific conductance. State the SI unit of each.

Q7. Write the electrode reactions and overall cell reaction for the lead storage battery during discharge.

Q8. The standard electrode potential of Cu^{2+}/Cu is +0.34 V. Calculate ΔG° for the reaction: $Cu \rightarrow Cu^{2+} + 2e^-$. ($F = 96500\ C\ mol^{-1}$)

Q9. How does molar conductivity of (i) strong electrolytes and (ii) weak electrolytes vary with dilution? Explain briefly.

Q10. What is meant by the degree of dissociation of an electrolyte? A solution of $MgCl_2$ (van't Hoff factor i = 2.7) has a degree of dissociation of:

SECTION – C | Short Answer Questions | 10 × 3 = 30 Marks

Answer concisely with proper derivations / calculations where required. Each question carries 3 marks.

Q1. State Raoult's law for a solution of volatile liquids. Derive an expression for the relative lowering of vapour pressure of a dilute solution of a non-volatile solute. Show that this is a colligative property.

Q2. A 1.8% (w/w) solution of glucose (M = 180) in water is found to have an osmotic pressure of 2.42 atm at 300 K. Calculate the van't Hoff factor and comment on the nature of glucose in solution. (Density of solution ≈ 1.0 g/mL; R = 0.082 L atm mol^{-1} K^{-1})

Q3. K_f of water is 1.86 K kg mol^{-1}. A solution containing 3.0 g of haemoglobin in 150 mL of water shows a depression in freezing point of 0.00186 K. Calculate the molar mass of haemoglobin.

Q4. (a) Define azeotrope. (b) Ethanol-water mixture shows maximum boiling point at a certain composition. What type of deviation from Raoult's law does it show? (c) Why cannot such a mixture be separated into pure components by fractional distillation?

Q5. Write the Nernst equation for a general electrode reaction. For the cell Zn | Zn^{2+}(0.001 M) || Cu^{2+}(0.1 M) | Cu, calculate the EMF at 298 K. (E°_{cell} = 1.10 V)

Q6. State Kohlrausch's law of independent migration of ions. Using the following molar conductivities at infinite dilution, calculate Λ°_m for acetic acid: Λ°(HCl) = 426, Λ°(NaCl) = 126, $\Lambda^\circ(CH_3COONa)$ = 91 S cm^2 mol^{-1}.

Q7. Calculate the charge in coulombs required to reduce 2 mol of MnO_4^- to Mn^{2+} in acidic medium. How long would it take using a current of 2 A? (F = 96500 C mol^{-1})

Q8. Explain the working of a hydrogen-oxygen fuel cell. Write the electrode reactions and state two advantages of fuel cells over conventional cells.

Q9. The conductivity of a 0.02 M KCl solution at 298 K is 2.768×10^{-3} S cm^{-1}. The resistance of the conductivity cell is 82.4 Ω. Calculate: (i) Cell constant, (ii) Molar conductivity.

Q10. For the reaction: $2Ag^{+} + H_2 \rightarrow 2Ag + 2H^{+}$, E° = +0.80 V at 298 K. Calculate the equilibrium constant K at 298 K. Comment on the spontaneity of the reaction. (R = 8.314 J mol^{-1} K^{-1}, F = 96500 C mol^{-1})

SECTION – D | Long Answer & Case-Based Questions | 5 × 5 = 25 Marks

Q1–Q3 are long-answer questions (5 marks each). Q4 and Q5 are case-based questions (5 marks each, with sub-parts).

Q1. (a) Explain why dissolution of a gas in a liquid is always exothermic. (b) Henry's law constant (K_H) for O_2 in water at 298 K is 46.82 kbar. Air contains 21% O_2 by volume. Calculate the mole fraction of O_2 dissolved in water when exposed to air at 1 bar pressure. (c) State two applications of Henry's law.

Q2. (a) Starting from the definition of molar conductivity, explain why Λ_m of a strong electrolyte varies linearly with $\sqrt{C}$ but that of a weak electrolyte shows steep rise only at very low concentrations. (b) The degree of dissociation of 0.01 M CH_3COOH is 4.24%. Calculate: (i) Λ_m at this concentration, (ii) K_a of acetic acid. [$\Lambda^\circ_m(CH_3COOH) = 390.5$ S cm^2 mol^{-1}]

Q3. A zinc rod is placed in a $CuSO_4$ solution. (a) Write the cell representation, electrode reactions, and overall cell reaction. (b) Calculate E°_{cell}. (c) Using the relation $\Delta G^\circ = -nFE^\circ$, calculate ΔG° and K at 298 K. (d) What happens to E_{cell} as the reaction proceeds? Explain using the Nernst equation. [$E^\circ(Zn^{2+}/Zn) = -0.76$ V; $E^\circ(Cu^{2+}/Cu) = +0.34$ V]

Q4. CASE STUDY – I: Colligative Properties and Abnormal Molar Mass

A chemistry student dissolves 2.44 g of benzoic acid (C_6H_5COOH, M = 122 g/mol) in 100 g of benzene and measures the depression in freezing point as 1.22 K. K_f for benzene = 5.12 K kg mol^{-1}. On performing the same experiment in water, the depression in freezing point was found to be only 0.240 K for the same amount dissolved in 100 g water (K_f = 1.86 K kg mol^{-1}). In benzene, benzoic acid molecules associate due to intermolecular hydrogen bonding, while in water, benzoic acid partially ionises. This discrepancy in observed molar mass is described by the van't Hoff factor (i). When i < 1, association occurs; when i > 1, dissociation occurs. The degree of association (α) for an n-mer is related to i by: $i = 1 - \alpha(1 - 1/n)$. The degree of dissociation for ionisation $A \rightarrow B^+ + C^-$ is: $i = 1 + \alpha$.

(i) Calculate the observed (experimental) molar mass of benzoic acid in benzene. What does this tell us about the state of benzoic acid in benzene? [2 marks]

(ii) If benzoic acid dimerises in benzene, calculate the degree of association (α). [1 mark]

(iii) Calculate the van't Hoff factor (i) for benzoic acid in water and hence find its degree of ionisation. [1 mark]

(iv) What is the significance of van't Hoff factor in calculating colligative properties? Write the modified expression for osmotic pressure. [1 mark]

Q5. CASE STUDY – II: Electrochemical Cells and Corrosion

Rusting of iron is an electrochemical process. When iron is exposed to moist air, an electrochemical cell is set up. At the anode (iron surface), oxidation occurs: $Fe \rightarrow Fe^{2+} + 2e^-$ ($E° = +0.44$ V). At the cathode, dissolved oxygen in the presence of water is reduced: $O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$ ($E° = +0.40$ V). The Fe^{2+} ions produced further oxidise to Fe^{3+} and combine with OH^- to form rust ($Fe_2O_3 \cdot xH_2O$). The rate of corrosion is accelerated by salt solutions (electrolytes), acids, and impurities in the metal. Methods to prevent corrosion include: cathodic protection (connecting iron to a more active metal like zinc — galvanisation), coating with paints, sacrificial anodes, and alloying. The standard EMF of the corrosion cell can be related to the Gibbs energy and equilibrium constant, giving insight into the thermodynamic spontaneity of the rusting process.

(i) Write the overall cell reaction for the rusting of iron and calculate $E°_{cell}$. Comment on its spontaneity. [2 marks]

(ii) Calculate $\Delta G°$ for the rusting process. ($n = 4$, $F = 96500$ C mol^{-1}) [1 mark]

(iii) Why does galvanisation prevent rusting even if the zinc coating is scratched or damaged? Explain the electrochemical basis. [1 mark]

(iv) Salt bridges and salt solutions accelerate corrosion. Justify this statement in terms of electrochemical principles. [1 mark]

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"Science is not only a disciple of reason but also one of romance and passion." — Stephen Hawking

PM SHRI KENDRIYA VIDYALAYA BOUDH

HOLIDAY HOMEWORK

CLASS XII BIOLOGY

MULTIPLE CHOICE QUESTIONS (MCQS)

1. Spiny/sticky pollen grains and large attractive coloured flowers are associated with

   a) Hydrophily

   b) Entomophily

   *c)*Ornithophily

   d) Anemophily

2. Study the correct order of endosperm types

   a) Cellular, Helobial, Free nuclear

   b) Helobial, Free nuclear, Cellular

   *c)*Free nuclear, Cellular, Helobial

   d) Cellular, Free nuclear, Helobial

3. Abundant occurrence of fossilized pollen grain is due to resistant:

   a. Pectocellulose

   b. Pectin Lignin

   c. Sporopollenin

d. Lignocellulose

4. This plant flowers occur in 12 years. During September 2006, its mass flowering transformed large tracts of hilly areas in Kerala ,Karnataka and Tamilnadu into blue stretches and attract a large number of tourists. This plant is

a) Bambusatulda

b) Strobilantheskunthiana

c)Kigelia

d) Adansonia

5. Select the mismatched pair

a) Storage of pollen grains ---- - 196^0 C

b) Pollen allergy ------ Carrot grass

c) Chasmogamous flower ----- - Exposed anthers and stigmas

d) Xenogamy ------ Self pollination

6. A bilobed dithecous anther had 50 microspore mother cells per microsporangium. How many male gametes this anther can produce?

a) 400

b) 800

c) 100

d) 200

7. Flowering plants have developed certain outbreeding devices to discourage self-pollination and encourage cross-pollination. One of these is not an example of such a breeding device.

    a) Dicliny

    b) Dichogamy

    c) Herkogamy

    d) Cleistogamy

8. Which of the following statementsabout sporopollenin is incorrect?

    a) Exine is made up of sporopollenin.

    b) Sporopollenin is one of the resistant organic materials.

    c) Exine has apertures called germ pores where sporopollenin is present.

    d) Sporopollenin can withstand high temperatures and strong acids.

9. Persistent nucellus is called as ..... and is found in .....

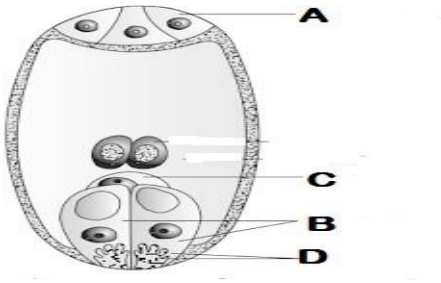
    a) Perisperm. Black pepper

    b) Perisperm. Ground nut

    c) Endosperm , Black pepper

    d) Endosperm , Ground nut

10. Identify the parts labelled in the given figure and select the correct match.



A	B	C	D
a) Synergids	Egg	Antipodal cells	Filiform apparatus
b) Antipodal cells	Synergids	Egg	Filiform apparatus
c) Egg	Synergids	Antipodal cells	Filiform apparatus
d) Egg	Antipodal cells	Synergids	Filiform apparatus

11. The scutellum observed in a grain of wheat or maize is comparable to which part of the seed of the monocotyledons?

a) Cotyledon

b) Endosperm

c) Aleurone layer

d) Plumule

12. What is the function of the filiform apparatus in an angiospermic embryo sac?

a) Guides pollen tube from synergid to egg.

b) Helps in entry of pollen tube into a synergid.

c) Prevents entry of more than one pollen tube into a synergid.

d) Brings about the opening of the pollen tube.

13. Both chasmogamous and cleistogamous flowers are present in

a) Helianthus

b) Commelina

c) Rosa

d) Gossypium

14. From among the sets of terms given below, identify those that are associated with the gynoecium

(a) Stigma, ovule, embryo sac, placenta

(b) Thalamus, pistil, style, ovule

(c) Ovule, ovary, embryo sac, tapetum

(d) Ovule, stamen, ovary, embryo sac

15. If an endosperm cell of an angiosperm contains 24 chromosomes, the number of chromosomes in each cell of the root will be

a) 8

b) 4

c) 16

d) 24

16. Which one of the following is not found in a female gametophyte of an angiosperm?

(a) Germ Pore (b) Synergids (c) Filiform apparatus (d) Central cell

17..... is the transfer of pollen grains from anther of one flower to the stigma of another flower of the same plant.

(a) Autogamy (b) Geitonogamy (c) Xenogamy (d) Monogamy 18.During microsporogenesis, meiosis occurs in-

(a) Endothecium (b) Microspore mother cell (c) Microspore tetrads (d) Pollen grains

19. Embryo sac is to ovule as is to an anther-

(a) Stamen (b) filament (c) Pollen grain (d) Androecium

20. Double fertilization is characteristic of-

(a) Bryophytes (b) Pteridophyte s (c) Gymnosperms (d) Angiosperms

21. The fusion product of polars and male gamete is-

(a) Secondary nucleus (b) triple fusion (c) Primary endosperm nucleus (d) Zygote

22. A leaf cell of flowering plant has 22 chromosomes then the number of chromosomes would be-

(a) 11 in gametes (b) 22 in gametes (3) 44 in embryo (4) 44 in cell of stem

23. The best example of Polyembryony is-

(a) Cocos (b) Citrus (c) Capsicum (d) Cycas

24. The embryo sac of a typical dicot at the time of fertilization is –

(a) 8-celled (b) 7-celled (c) 6-celled (d) 5-celled

25. When the hilum, chalaza, and micropyle of the ovule lie in the same longitudinal axis, it is known as-

(a) Anatropous ovule (b) Amphitropous ovule (c) Campylotropous ovule (d) Orthotropous ovule

26. The phenomenon where the ovary develops in to a fruit without fertilization is called-

(a) Parthenocarpy (b) Apomixis (c) Asexual reproduction (d) Sexual reproduction

27. Which of the following flowers only once in its lifetime?

(a) Bamboo species (b) jackfruit (c) Mango (d) Papaya

28. Which among these are the Layers of Microsporangium-

(a) Endothecium (b) Epidermis (c) Tapetum (d) All of these

29. Banana is a .....

(a) Fruit (b) True fruit (c) Parthenocarpic fruit (d) All of these

30. Perisperm is the remains of-

(a) Archegonium (b) Integuments (c) endosperm (d) nucellus

1 Normally fertilization of ovum with sperm takes place in:

(A) Isthmus of oviduct.

(B) Ampulla of oviduct

(C) Infundibulum of oviduct.

(D) Isthmus-Ampullary junction.

2 Morula contains:

(A) 4-8 blastomeres.

(B) 8-16 blastomeres.

(C) 16-32 blastomeres.

(D) More than 32 blastomeres.

3 Which one of the given hormone is not produced by placenta during pregnancy:

(A) Estrogen.

(B) Progesteron.

(C) hCG

(D) FSH

4 Which one of the following is incorrect match:

(A) Perimetrium –Membranous layer.

(B) Myometrium – Smooth muscle layer.

(C) Endometrium – Glandular and vascular layer.

(D) None of the above.

5 If you are a gynaecologist and wants to induce parturition in a pregnant women suffering from delay in giving birth to child. Which one of the following hormone you may use:

(A) Estrogens.

(B) Progesterone.

(C) Oxytocin.

(D) Relaxin.

6 A hormonal drug is prescribed by a medical practitioner to a women having complain of delayed menstruation. The hormone present in the drug is:

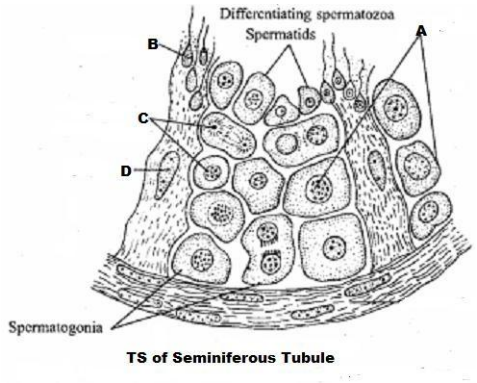
(A) Estrogens.

(B) Progesterone.

(C) FSH

(D) LH

7 In the diagram given bellow the Secondary spermatocytes is labelled as:



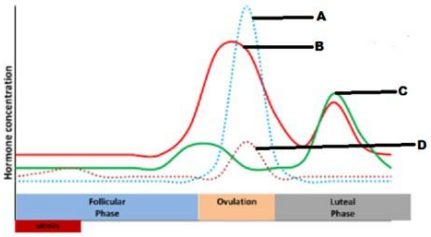
(A) D

(B) C

(C) A

(D) B

8 Observe the given graph of hormones level during



menstruation and choose the correct option that denote hormones labelled as A,B,C and D respectively:

(A) LH, Estrogens, Progesterone, FSH.

(B) Estrogens, Progesterone, LH, FSH.

(C) LH, FSH, Estrogens, Progesterone.

(D) Estrogens, Progesterone, FSH, LH

9 An adult male ejaculates 200-300 millions sperms during coitus out of which 40 percent are of normal shape, size and motile. He will be considered as:

(A) Having normal fertility.

(B) Having infertility.

(C) Having impotence.

(D) Both B and C.

41 In the human female, menstruation can be deferred by the administration of

(A) FSH only

(B) LH only

(C) Combination of FSH and LH only

(D) combination of estrogen and progesterone

42 Cowper’s glands secrete a substance to (a)Nourish plasma

(b) neutralize the acidity (c)Kill pathogens

(d) Lubricate female vagina to facilitate copulation Choose the correct answer

(A) 1,2,3 are correct (B)1 and 2 are correct

(C) 2 and 4 are correct

(D) 1 and 3 are correct

43 First polar body is formed at which stage of oogenesis (A)1st meiosis

(B) 2nd meiosis

(C) 1st mitosis

(D) differentiation

44 Which one of the following is the correct matching of the events during menstrual cycle

(A) Ovulation-LH and FSH in peak level and Sharp fall in secretion of progesterone (B)Proliferative phase – rapid regeneration of myometrium and maturation of Graffian follicle

(C) Developing of corpus luteum – secretary phase and increased secretion of progesterone

(D) Menstruation –breakdown of myometrium and ovum not fertilized

45 The signals for parturition originate from

(A) Placenta only

(B) placenta as well as fully developed foetus

(C) Oxytocin released from maternal pituitary

(D) fully developed foetus only

46 Sperm cells are produced in:

(A) Seminiferous tubules

(B) interstitial cells

(C) Epididymis

(D) prostate gland

47 Mother milk during initial days of lactation is rich in antibodies

(A) IgA

(B) IgG

(C) IgM

(D) IgE

48 Seminal plasma, the fluid part of semen is contributed by

(A) Seminal vesicle

(B) prostate

(C) urethra

(D) bulbourethral gland

49 The difference between spermiogenesis and spermiation is

(A) In spermiogenesis spermatozoa from sertoli cells are released into cavity of seminiferous tubules while in spermiation spermatozoa are formed

(B) In spermiogenesis spermatozoa are formed while spermiation spermatids are formed

(C) In spermiogenesis spermatids are formed while in spermiation spermatozoa are formed

(D) In spermiogenesis spermatozoa are formed while in spermiation spermatozoa are released through seminiferous tubules.

50 Every time copulation does not lead to fertilization and pregnancy because of failure of sperm to reach the

(A) Ampulla

(B) Cervix

(C) Endometrium

(D) Myometrium

SECTION- B (SHORT QUESTIONS)

51. What are chasmogamous flowers? Can cross pollination occur in cleistogamous flowers? Give reasons for your answer.

52. What is triple fusion? Where and how does it take place? Name the nuclei involved in triple fusion.

53. Mention two stragegies evolved to prevent self pollination in flowers.

54. A. Differentiate between Hypocotyl and Epicotyl

B. Differentiate between Coleptile and Coleorrhiza

55. What is apomixis and what is its importance

56. What is meant by emasculation ? When and why does a plant breeder employ this technique ?

57. What are the contrivances for cross pollination?

58. Draw a labelled diagram of the sectional view of a mature pollen grain of angiosperms. Explain the function of any two of its parts.

58. Starting with the zygote, draw the diagrams of the different stages of embryo development in a dicot.

59. Draw a diagrammatic sectional view of a mature anatropous ovule and label the following parts in it :

60. Draw a labelled diagram of a transverse section of a mature anther of an angiosperm showing different wall layers.

61. Describe the endosperm development in coconut.

62. Draw a labelled diagram of L.S. of an embryo of grass (any six labels)

63. Pollination is an important phenomenon in the life cycle of a flowering plant. Describe the agencies responsible for this.

64. Why does endosperm development precede embryo development in angiosperm seeds? State the role of endosperm in mature albuminous seeds and Describe with the help of three labelled diagrams the different embryonic stages that include mature embryo of dicot plants

65. Explain the process of microsporogenesis in angisopersm

66. Draw a neat and well labelled diagram of transverse section of human ovary.

67. Differentiate oestrus cycle and menstrual cycle.

68. Name the hormones involved in regulation of spermatogenesis

69. What is spermatogenesis? Briefly describe the process of spermatogenesis.

70. What are the major functions of male accessory ducts and glands?

71. Write the functions of the following: 1. Endometrium, 2. Acrosome 3. Sperm tail 4. Fimbriae

72. What is parturition? Which hormones are involved in induction of parturition ?

73. Distinguish between Corona radiata and zona pellucida.

74. Distinguish between Spermatocyte and Oocyte.

75. Differentiate between morula and blastocyst as stages in human embryonic development. Which of these stages gets implanted in the uterine wall and about how many days after fertilization?

76. Describe the different changes during menstrual cycle occurring in a woman.

77. Show well labelled diagram of the structure of human sperm and write about its components in brief.

78. Explain the process of fertilization of an ovum in humans. Trace the events that occur after fertilisation upto the implantation of blastocyst.

79. Where does fertilization occur in humans ? Explain the events that occur during this process?

80. Describe the post-zygotic events leading to implantation and placenta formation in humans. Mention any two functions of placenta.

PM SHRI KENDRIYA VIDYALAYA , BOUDH
HOLIDAY HOMEWORK MAY 2026
CLASS-XII SUB- ENGLISH CORE

PART- A SOURCE BASED QUESTION
NO. OF QUESTION -30

(I) Usually, when school began, there was a great bustle, which could be heard out in the street, the opening and closing of desks, lessons repeated in unison, very loud, with our hands over our ears to understand better, and the teacher's great ruler rapping on the table. But now it was all so still! I had counted on the commotion to get to my desk without being seen; but, of course, that day everything had to be as quiet as Sunday morning. Through the window I saw my classmates, already in their places, and M. Hamel walking up and down up and down with his terrible iron ruler under his arm.

A. Which of the following sounds could be heard at Franz's school usually? 1) banging of desks 2) voices of students 3) tapping on wood 4) screams of students 5) swishing of rulers 6) rustle of paper

(a)(1), (2), & (3) (b) (4), (5) & (6) (c)(1), (3) & (5) (d) (2), (5) & (6)

B. Choose another word that means 'bustle' and 'commotion'.

a. tranquility b. serenity c. mess d. furor

C. How did Franz usually slip into class?

a. By using magical powers b. By hiding his face behind his satchel c. By sneaking in through the window exploiting the noisy confusion d. By taking advantage of his teacher's carelessness

D. Why does Franz call M. Hamel's iron ruler 'terrible'? a. The iron ruler was gigantic and sharp. b. Franz was used to seeing the iron ruler. c. The ruler was used as a drilling tool. d. Franz might have been at the receiving end of it.

2. M. Hamel went on to talk of the French language, saying that it was the most beautiful language in the world — the clearest, the most logical; that we must guard it among us and never forget it, because when a people are enslaved, as long as they hold fast to their language it is as if they had the key to their prison.

Then he opened a grammar book and read us our lesson. I was amazed to see how well I understood it. All he said seemed so easy, so easy!

A. Which of the following can be attributed to M. Hamel's declaration about the French language?

a. subject expertise b. nostalgic pride c. factual accuracy d. patriotic magnification

B. Read the quotes given below. Choose the option that might best describe M. Hamel's viewpoint

(i) Those who know nothing of foreign languages know nothing of their own-– Johann Wolfgang von Goethe

(ii) Language is the road map It tells you where people come from and where they are going. – Rita Mae Brown

(iii) A poor man is like a foreigner in his own country- Ali Ibn Abi Talib

(iv) The greatest propaganda in the world is our mother tongue, that is what learn as children, and which we learn –unconsciously. That shapes our perceptions for life. – Marshal McLuhan

(a) Option (i) (b) Option (ii) (c) Option (iii) (d) Option (iv)

C. "I was amazed to see how well I understood it." Select the option that does NOT explain why Franz found the grammar lesson "easy".

a. Franz was paying careful attention in class this time. b. M. Hamel was being extremely patient and calm in his teaching. c. Franz was inspired and had found a new meaning and purpose to learning d. Franz had realized that French was the clearest and most logical language

D. Franz was able to understand the grammar lesson easily because he was – a. Receptive. b. Appreciative. c. Introspective. d. competitive

3.I started for school very late that morning and was in great dread of a scolding, especially because M. Hamel had said that he would question us on participles, and I did not know the first word about them. For a moment I thought of running away and spending the day out of doors. It was so warm, so bright! The birds were chirping at the edge of the woods; and in the open field

back of the sawmill the Prussian soldiers were drilling. It was all much more tempting than the rule for participles, but I had the strength to resist, and hurried off to school.

A. Why was Franz in great dread of scolding?

a. He had got late. b. He hadn't prepared his lesson on 'participles'. c. He always dreaded going to school. d. He had other plans to settle in life.

B. Why did Franz think of running away?

a. He always dreaded school. b. He was terribly afraid of M. Hamel's asking about 'participles. c. He wanted to enjoy the scenes of nature. d. None of the above

C. What does Franz's description of nature reveal of him? a. Franz is a great lover of nature. b. Franz likes being in nature. c. The entire scene of nature is more captivating. d. All of the above

D. An antonym of resist is- a. Protest b. Struggle c. Withstand d. Yield

4. When I passed the town hall there was a crowd in front of the bulletin-board. For the last two years all our bad news had come from there – the lost battles, the draft, the orders of the commanding officer – and I thought to myself, without stopping, "What can be the matter now?"

A. The bulletin-board is central to the people to Alsace because a. It displays the village news. b. It records all the important events of the surroundings. c. All go to and read it. d. None of the above.

B. What amazes Franz when he passes the town hall? a. a big crowd before the bulletin-board b. beautiful scene of nature c. army men parading d. none of the above

C. Name some of the bad news around the place.

a. the lost battles b. orders of the commanding officer c. (a) and (b) d. none of the above

D. For how many years had the bulletin board been a source of disappointment to the villagers?

a. 2 b. 3 c. 4 d. 5

5. I jumped over the bench and sat down at my desk. Not till then, when I had got a little over my fright, did I see that our teacher had on his beautiful green coat, his frilled shirt, and the little black silk cap, all embroidered, that he never wore except on inspection and prize days. Besides, the whole school seemed so strange and solemn. But the thing that surprised me most was to see, on the back benches that were always empty, the village people sitting quietly like ourselves; old Hauser, with his three-cornered hat, the former mayor, the former postmaster and several others besides.

A. What had surprised Franz the most?

a. his dread of going to school b. his fear of M. Hamel c. his not getting to know the participles d. none of the above

B. What did the teacher's dress indicate?

a. a signal of bad times b. a signal of celebrations c. things were not normal d. (b) and (c)

C. How did M. Hamel give the shocking news to the students and the villagers and with what effect?

a. M. Hamel spoke in a gentle and grave tone and the news shocked and stunned the village elders. b. M. Hamel spoke in a grave tone but the village elders were ecstatic to receive the news. c. M. Hamel conveyed the news happily and the villagers too received the news happily. d. M. Hamel spoke in a gentle and grave tone but the news made no difference to the villagers.

D. 'The Last Lesson' is about

a. values of native language, identity and patriotism. b. the start of teaching German c. M. Hamel's last day at school d. Franz's test on participles.

6. Usually, when school began, there was a great bustle, which could be heard out in the street, the opening and closing of desks, lessons repeated in unison, very loud, without hands over our ears to understand better, and the teacher's great ruler rapping on the table. But now it was all so still! I had counted on the commotion to get to my desk without being seen; but, of course, that day everything had to be as quiet as Sunday morning. Through the window I saw my

classmates, already in their places, and M. Hamel walking up and down with his terrible iron ruler under his arm. I had to open the door and go in before everybody. You can imagine how I blushed and how frightened I was.

A. Why did Franz hope to use the commotion of the school?

a. To join the other students in making noise b. To help him sneak into the class without being noticed c. To help him escape Mr Hamel's scolding for not doing his homework d. To help him reach his desk easily

B. What made Franz blush on reaching the school that day?

a. He was the first one to enter the class b. He had not done his homework c. He was late for school and embarrassed d. Mr Hamel was waiting to scold him

C. The school seemed unusual to Franz that day because _____

a. Mr Hamel was walking about with a ruler b. He was late for school and was embarrassed c. The sound of students could be heard from far off d. There was a strange silence that day

D. While Franz's classmates were already in the school, he was late which implies that _____

a. He preferred to remain alone while going to school b. He was more casual and lazier than his classmates c. He deliberately got delayed every day in reaching school d. His classmates usually wanted to please Mr Hamel

7. After the grammar, we had alesson in writing. That day M. Hamel had new copies for us, written in a beautiful round hand— France, Alsace, France, Alsace. They looked like little flags floating everywhere in the school-room, hung from the rod at the top of our desks. You ought to have seen how everyone set to work, and how quiet it was! The only sound was the scratching of the pens over the paper. Once some beetles flew in; but nobody paid any attention to them, not even the littlest ones, who worked right on tracing their fish-hooks, as if that was French, too. On the roof the pigeons cooed very low, and I thought to myself, "Will they make them sing in German, even the pigeons?"

A. Why did Mr. Hamel made them re-write 'France, Alsace' only?

a. Because he was in a hurry to use any other word b. Because he wanted them to learn these spellings well c. Because he wanted to instill patriotic feelings in them d. Because Mr Hamel knew these were easy for them to write

B. What does the attentive behavior of the people suggest?

a. That they were very dedicated students b. That they did not want to waste any time in the last class c. That they were very enthusiastic about what was taught d. That they very eager to learn new things

C. Select the option that lists the correct inference based on the context of the pigeons in the above extract.

a. Once taken over, the pigeons would be forced to sing in German too b. Franz wanted to protect the pigeons from being tortured by German soldiers c. Pigeons are free birds and cooing is natural to them as French is to him d. Germans would not be able to force the pigeons to sing in German

D. What impression did Franz form of the handwriting lesson copies?

a. That they looked like some flags in patriotic festival b. That they looked like little confetti during a birthday party c. That they were like bouquets decorated during a wedding ceremony d. That they were like little balloons hanging from a rod

8. “Usually, when school began, there was a great bustle, which could be heard out in the street, the opening and closing of desks, lessons repeated in unison, very loud, with our hands over our ears to understand better, and the teacher’s great ruler rapping on the table. But now it was all so still! I had counted on the commotion to get to my desk without being seen; but, of course, that day everything had to be as quiet as Sunday morning”

A. Why was Franz counting on the hustle and bustle to enter his class?-

a. He was late for school and wanted to enter unnoticed b. He was scared of his teacher, M Hamel’s temper c. Only (i) is correct d. Both options (i) and (ii) are correct

B. Do you think that in your classroom there should be hustle and bustle?

a. Hustle and bustle indicate a proactive classroom where students are involved b. No, as hustle and bustle will only lead to chaos c. Yes, as this gives an opportunity for the backbenchers to have fun d. Hustle and bustle indicate a boring classroom

PART- B - REFERENCE TO CONTEXT BASED QUESTIONS- SHORT ANSWER TYPE QUESTIONS (2 MARK) , NO OF QUESTIONS - 10

Q1- "*For the last two years, all our bad news had come from there. And I thought to myself, what could be the matter now"?*
(a)What does "all our bad news" refer to?
(b)What was the 'matter'?
Q2-*While I was wondering about it all my teacher mounted his chair and in the same grave, gentle tone said, "My children, this is the last lesson I shall give you"*
(a) Why do you think was the teacher's tone grave as well as gentle?
(b)What impact this announcement must have had on children?
Q3-*My books, that had seemed such a nuisance a while ago were old friends now that I could not give up"*
(a)Why were the books a nuisance a while ago?
(b)Which literary device has been used in the expression 'old friends?

Q4 *"Now those fellows out there will have the right to say to you."*
(a)Whom do "Those fellows" mentioned here refers to ?
(b)What will have those fellows right to say ?

Q4 *You can imagine how I blushed and how frightened I was.*

(a)Why did Franz blushed ?
(b)Why was Franz *frightened*

Q5 *But nothing happened. M. Hamel saw me and said very kindly, "Go to your place quickly, little Franz. We were beginning without you."*

(a)Explain "but nothing happened ?
(b)does Franz find his kind words unusual? If yes , why ?

PART- C - REFERENCE TO CONTEXT BASED QUESTIONS- SHORT ANSWER TYPE QUESTIONS (3 MARK) , NO OF QUESTIONS - 10

Q1-'*But you are not the worst. We have all a great deal to reproach ourselves with."*
(a)Why would they all reproach themselves?
(b)What did they all do instead of being regular?

Q2-" we must guard it among us and never forget it because when people are enslaved, as long as they hold fast to their language, it is as if they had the key to their prison"
(a)When does the language help people? How?
(b)Why do you think one should hold fast to his language?

Q3-Whenever I looked up from my writing I saw him sitting motionless in his chair and gazing at everything"

(a)Why was 'him' sitting motionless?
(b)Describe M.Hamel's state of mind.
Q4-Then he turned to the blackboard, took a piece of chalk and wrote as large as he could – 'VIVE LA FRANCE'"
(a)Why do you think M.Hamel wrote VIVE LA FRANCE ?
(b)What do you think must be the impact of this on everyone?

Q5-Explain the inference that can be drawn from the line : "Will they make them sing in German, even the pigeons ?"

PART- D -LONG ANSWER TYPE QUESTION WITHIN 120-150 WORDS (6 MARK) , NO OF QUESTIONS - 5

Q-1 Do you consider Mr. Hamel as an ideal French teacher? Give reasons for your answer

VALUE POINTS

- Very strict in nature
- A true lover of French language
- Acknowledges his mistake of giving too much holidays to the students
- Teaches with dedication in the last class
- Desperate attempt to teach the basics to the students
- Showers his blessings over his students

Q2-The normal flow of education system is often hampered by political conflicts & warfare—discusses it with reference to *The Last Lesson*

- Backdrop of Franco-Prussian War
- France was defeated
- French people were compelled to learn German
- Forceful eradication of tradition & native culture
- Official notice to ban French studies & its impact.

Q3.*Every day we have said to ourselves, 'Bah! I've plenty of time. I'll learn it tomorrow.' And now you see where we've come out […] We've all a great deal to reproach ourselves with."* How does M. Hamel include himself in the reproach, casting himself as no better than the villagers whom he lectures

Q4. How does M. Hamel affirm his national identity as a means of resistance against domination through the exercises that he assigns his students during the class.

Q5- We miss a thing when we are in fear of losing it. Substantiate statement with two or more examples from the story " The Last Lesson" . How did these people in the story suddenly realise how precious their language was to them.

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PM SHRI KENDRIYA VIDYALAYA BOUDH

Holiday Homework (Summer) – Class 12 Physics

Chapters: Electric Charges and Fields | Electrostatic Potential and Capacitance

Section A: Multiple Choice Questions

Each question carries 1 mark. Choose the correct option.

1. A glass rod rubbed with silk acquires a charge of $+8 \times 10^{-12}$ C. The number of electrons transferred from the rod to silk is:

(a) 5.0×10^{7}

(b) 5.0×10^{6}

(c) 2.5×10^{7}

(d) 2.5×10^{6}

2. Two point charges +3 μC and +3 μC are placed 20 cm apart. A third charge of +1 μC is placed on the line joining them such that it experiences no net force. The distance of this charge from either of the two charges is:

(a) 5 cm

(b) 10 cm

(c) 15 cm

(d) 20 cm

3. The electric field at a point on the equatorial plane at a distance r from the centre of a dipole of dipole moment p is given by (r >> a):

(a) $\frac{p}{4\pi\varepsilon_0 r^3}$

(b) $\frac{2p}{4\pi\varepsilon_0 r^3}$

(c) $\frac{p}{4\pi\varepsilon_0 r^2}$

(d) $\frac{p}{2\pi\varepsilon_0 r^3}$

4. Electric flux through a surface of area 100 m² lying in the xy-plane is (if $\vec{E} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ N/C):

(a) 100 Nm²/C

(b) 300 Nm²/C

(c) 400 Nm²/C

(d) 500 Nm²/C

5. A hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V. The potential at the centre of the sphere is:

(a) Zero

(b) 10 V

(c) 5 V

(d) 2 V

6. The work done in moving a charge of 2 C from a point at potential 10 V to a point at potential 4 V is:

(a) 12 J

(b) –12 J

(c) 8 J

(d) –8 J

7. Two capacitors of capacitance 6 μF and 3 μF are connected in series across a 12 V battery. The charge on each capacitor is:
(a) 12 μC
(b) 24 μC
(c) 36 μC
(d) 72 μC
8. A parallel plate capacitor has a capacitance of 10 μF. If a dielectric slab of dielectric constant 4 fills half the space between the plates, the new capacitance is:
(a) 10 μF
(b) 16 μF
(c) 20 μF
(d) 40 μF
9. The angle between the electric dipole moment and the electric field strength due to it on the axial line is:
(a) 0°
(b) 90°
(c) 180°
(d) 45°
10. If the distance between two equal point charges is doubled and their individual charges are also doubled, the force between them will:
(a) remain the same
(b) increase by a factor of 2
(c) decrease by a factor of 2
(d) increase by a factor of 4
11. A charge q is placed at the centre of the line joining two equal charges Q. The system of the three charges will be in equilibrium if q is equal to:
(a) –Q/2
(b) –Q/4
(c) +Q/2
(d) +Q/4
12. The electric field inside a charged conducting sphere is:
(a) maximum at the centre
(b) zero
(c) uniform but non-zero
(d) inversely proportional to distance from the centre
13. Two conducting spheres of radii r_1 and r_2 have the same charge. The ratio of their surface charge densities is:
(a) $r_1^2 : r_2^2$
(b) $r_2^2 : r_1^2$
(c) $r_1 : r_2$
(d) $r_2 : r_1$
14. The SI unit of electric field intensity is:
(a) N/C
(b) $N \cdot m^2/C$
(c) $N \cdot m/C$
(d) C/N
15. The electric potential at a point due to a point charge q at a distance r is V. The electric field at the same point is:
(a) V/r
(b) V/r^2

(c) Vr
(d) V^2/r

16. The capacitance of a parallel plate capacitor increases from 4 μF to 80 μF when a dielectric medium is introduced between the plates. The dielectric constant of the medium is:
(a) 10
(b) 20
(c) 40
(d) 80

17. An electric dipole is placed in a uniform electric field. The net force acting on the dipole is:
(a) always zero
(b) never zero
(c) depends on the orientation of the dipole
(d) depends on the strength of the field

18. The energy stored in a capacitor of capacitance C charged to a potential difference V is:
(a) CV
(b) $\frac{1}{2}CV$
(c) $\frac{1}{2}CV^2$
(d) CV^2

19. According to Gauss's theorem, the electric flux through a closed surface enclosing a charge q is:
(a) q/ε_0
(b) $q\varepsilon_0$
(c) $q/4\pi\varepsilon_0$
(d) $4\pi\varepsilon_0 q$

20. Equipotential surfaces:
(a) are always equally spaced
(b) are perpendicular to the electric field lines
(c) can intersect each other
(d) are parallel to the electric field lines

21. When air is replaced by a dielectric medium of constant K, the maximum force of attraction between two charges separated by a distance:
(a) increases K times
(b) decreases K times
(c) remains unchanged
(d) increases K^2 times

22. A capacitor is charged by a battery. The battery is then disconnected, and a dielectric slab is inserted. Which of the following remains constant?
(a) Electric field between the plates
(b) Potential difference across the plates
(c) Charge on the plates
(d) Energy stored in the capacitor

23. The electric potential at a point on the axial line of a short dipole at distance r from the centre is proportional to:
(a) r
(b) $1/r$
(c) $1/r^2$
(d) $1/r^3$

24. Four capacitors each of capacitance 4 μF are connected to form a square. The equivalent capacitance between two opposite corners is:

(a) 2 μF
(b) 4 μF
(c) 8 μF
(d) 16 μF

25. The electric field at a distance of 3 m from a uniformly charged infinite plane sheet with surface charge density $\sigma = 17.7 \times 10^{-9}$ C/m² is:
(a) 500 N/C
(b) 1000 N/C
(c) 750 N/C
(d) 250 N/C

26. A proton and an electron are placed in a uniform electric field. The ratio of the forces experienced by them is:
(a) 1 : 1
(b) 1 : 1836
(c) 1836 : 1
(d) depends on the field strength

27. The work done in rotating an electric dipole from its equilibrium position by an angle θ in a uniform electric field E is:
(a) pE(1 – cos θ)
(b) pE cos θ
(c) pE sin θ
(d) –pE cos θ

28. In a parallel plate capacitor, if the separation between the plates is halved and the area of each plate is doubled, the capacitance:
(a) remains the same
(b) doubles
(c) becomes four times
(d) becomes half

29. Electric potential is a:
(a) vector quantity
(b) scalar quantity
(c) tensor quantity
(d) dimensionless quantity

30. A charge Q is distributed over two concentric hollow spheres of radii r and R (R > r) such that their surface charge densities are equal. The potential at the common centre is:
(a) $\frac{Q(R+r)}{4\pi\varepsilon_0(R^2+r^2)}$
(b) $\frac{Q}{4\pi\varepsilon_0(R+r)}$
(c) $\frac{Q(R-r)}{4\pi\varepsilon_0(R^2+r^2)}$
(d) Zero

Assertion – Reason Type Questions

01. Assertion: If a conducting medium is placed between two charges, then electric force between them becomes zero.
Reason: Dielectric constant or relative permittivity of a conducting medium is infinity.

02. Assertion-When a charge is placed at a corner of a square, the flux passing through the square will be zero.
Reason-When electric field and area vector are perpendicular each other at every point, then the flux passing through that surface will be zero.

03. Assertion :The Equipotential surface due to a point charge is spherical in shape
Reason :The potential due to a point charge depends on The value of the charge and its distance from the point of determination.

04. Assertion- Capacity of a parallel plate capacitor increases when distance between the plates is increased.
Reason- Capacitance of a capacitor is directly proportional to distance between them.

Section B: Short Answer Questions

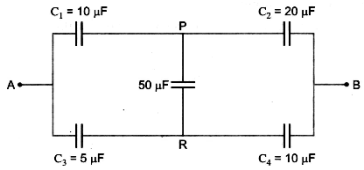
Each question carries 2 marks. Answer briefly.

1. Define electric dipole moment. Is it a scalar or a vector quantity? Write its SI unit.
2. State Gauss's law in electrostatics. What is the significance of choosing a Gaussian surface?
3. What is an equipotential surface? Why is no work done in moving a charge along an equipotential surface?
4. Two point charges +q and –q are separated by a distance 2a. What is the electric field at a point on the perpendicular bisector at a distance r from the centre? (r >> a)
5. Define dielectric constant in terms of the capacitance of a parallel plate capacitor.
6. What is the effect on the capacitance of a parallel plate capacitor when:
(a) the area of plates is doubled, and
(b) the distance between the plates is halved?
7. A charge of 5 μC is at the centre of a cube of side 10 cm. What is the electric flux through each face of the cube?
8. Why does a dielectric slab get attracted into a charged capacitor when the capacitor is connected to a battery?
9. Sketch the electric field lines for:
(a) Two equal positive point charges
(b) A point charge +q near a conducting plane
10. State the principle of a Van de Graaff generator. Why is it enclosed in a steel tank filled with gas at high pressure?

Section C: Short Answer Questions

Each question carries 3 marks. Show working where applicable.

01. Derive an expression for the electric field at a point on the axial line of an electric dipole.
02. Using Gauss's law, derive an expression for the electric field due to a uniformly charged infinite plane sheet.
03. Three capacitors of capacitances 2 μF, 3 μF, and 6 μF are connected in series. Find the equivalent capacitance. If this combination is connected across a 12 V battery, find the charge on each capacitor.
04. Derive the expression for the potential energy of an electric dipole placed in a uniform electric field.
05. A parallel plate capacitor is charged and the charging battery is then disconnected. If the plates of the capacitor are moved further apart using insulating handles, what happens to:
(a) the charge on the capacitor,
(b) the potential difference across the plates, and
(c) the energy stored in the capacitor?
06. Two charges +2 μC and –2 μC are placed at points A and B, 6 cm apart.
(a) Draw equipotential surfaces of the system.
(b) Identify the position of zero potential on the line joining the two charges.
07. Calculate the equivalent capacitance between points A and B in the circuit below. If a battery of 10 V is connected across A and B, calculate the charge drawn from the battery by the circuit.



08. A 600 pF capacitor is charged by a 200 V supply. It is then disconnected and connected to another uncharged 600 pF capacitor. How much electrostatic energy is lost in the process?

09. Define the terms:
(a) Electric flux
(b) Electric potential at a point
(c) Capacitance of a capacitor
Also, write the SI unit of each.

10. An electron and a proton are released from rest in a uniform electric field of magnitude 10^4 N/C. Calculate the ratio of the accelerations of the electron and proton. (Given: $m_e = 9.1 \times 10^{-31}$ kg, $m_p = 1.67 \times 10^{-27}$ kg)

Section D: Long Answer Questions

Each question carries 5 marks. Provide detailed answers with diagrams and derivations.

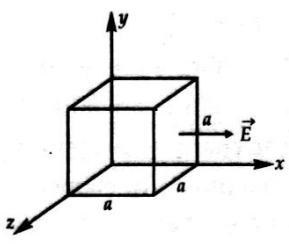
01. (a) Derive an expression for the capacitance of a parallel plate capacitor with a dielectric slab of thickness t (t < d) between the plates.
(b) A parallel plate capacitor with air between the plates has a capacitance of 8 pF. What will be its capacitance if the distance between the plates is reduced by half and the space between them is filled with a substance of dielectric constant 6?

02. (a) Using Gauss's law, obtain the expression for the electric field due to a uniformly charged thin spherical shell at a point:
(i) outside the shell, and
(ii) inside the shell.
(b) Draw the graph showing the variation of electric field with distance r from the centre of the shell.

03. (a) Define the SI unit of capacitance. (b) Obtain the expression for the capacitance of a parallel plate capacitor (assuming vaccum in between the plates) (c) Write the expression for energy stored inside a capacitor in terms of electric field (E) in between the plates, area of each plate (A) and distance between two plates (d).

04. (a) Derive an expression for the torque acting on an electric dipole placed in a uniform electric field. When is the torque maximum?
(b) An electric dipole consists of charges ±10 nC separated by 2 mm. It is placed in a uniform electric field of intensity 5×10^5 N/C making an angle of 30° with the field. Calculate:
(i) the magnitude of the torque acting on the dipole, and
(ii) the potential energy of the dipole.

05. (a) Given a uniform electric field $\vec{E} = 2 \times 10^3 \hat{i}\ N/C$, find the flux of this field through a square of side 20 cm, whose plane is parallel to the y-z plane. What would be the flux through the same square, if the plane makes an angle of 30° with the x-axis?



(b) Given the electric field in the region $\vec{E} = 2x\,\hat{i}$, find the net electric flux through the cube and the charge enclosed by it.

PM SHRI KV BOUDH

HOLIDAY HOMEWORK (SUMMER BREAK)

CLASS-XII SUBJECT-MATHEMATICS

CHAPTER- RELATION AND FUNCTION

Section A

1. Let A = {1, 2, 3, 4, 5, 6}. Which of the following partitions of A correspond to an equivalence relation on A? **[1]**

   a) {1, 2}, {3, 5, 6}. b) {1, 2, 3}, {3, 4, 5, 6}.

   c) {1, 2, }, {3, 4}, {2, 3, 5, 6} d) {1, 3}, {2, 4, 5}, {6}

2. Let R a relation on N x N defined by (a,b) R (c,d) = a + d = b + c Then R is **[1]**

   a) Reflexive and symmetric but not transitive b) Reflexive and transitive but not symmetric

   c) An equivalence relation d) Symmetric and transitive but not reflexive

3. Let A = {x, y, z) and B = {a, b} then the number of onto function from A to B is **[1]**

   a) 6 b) 0

   c) 8 d) 3

4. The relation **greater than** denoted by > in the set of integers is **[1]**

   a) Asymmetric b) Reflexive

   c) Transitive d) Symmetric

5. Let $A = \{x : -1 \leq x \leq 1\}$ and f : A → A such that f (x) = x |x|, then f is **[1]**

   a) surjective but not injective b) a bijection

   c) neither injective nor surjective d) injective but not surjective

6. A function f : R → R defined by $f(x) = 2 + x^2$ is **[1]**

   a) neither one-one nor onto b) one-one

   c) not onto d) not one-one

7. The relation R is the set of natural number N defined as R = {(x, y) : x + 4y = 10, x, y ∈ N} is **[1]**

   a) transitive but neither reflexive nor symmetric b) Reflexive, symmetric but nor transitive

   c) an equivalence relation d) Reflexive but neither symmetric nor transitive

8. Let A = {1, 2, 3} and B = {4, 5, 6, 7} and let f = {(1, 4), (2, 5), (3, 6)} be a function from A to B. Then, f is **[1]**

   a) many-one b) bijective

   c) one-one d) onto

9. Let T be the set of all triangles in a plane with R be the relation in T given by R = {(T_1, T_2) : T_1 is congruent to T_2}. Then, R is **[1]**

   a) not transitive b) symmetric only

   c) reflexive only d) an equivalence relation

10. Let S be the set of all real numbers. Then the relation R = {(a, b) : 1 + ab > 0} on S is **[1]**

    a) reflexive symmetric and transitive. b) reflexive and symmetric but not transitive.

    c) reflexive and transitive but not symmetric. d) symmetric and transitive but not reflexive.

11. Number of onto (subjective) functions from A to B if n(A) = 6 and n(B) = 3 are **[1]**

    a) 340 b) None of these

    c) $2^6 - 2$ d) $3^6 - 3$

12. If A = {a, b, c}, then the relation R = {(b, c)} on A is **[1]**

    a) reflexive and transitive only b) reflexive only

c) symmetric only

d) transitive only

13. The function f : R → R, given by f(x) = $\frac{1}{x}$ is **[1]**

a) many-one

b) one-one and onto

c) one-one

d) onto

14. Let A = {1, 2, 3}. Which of the following is not an equivalence relation on A ? **[1]**

a) {(1, 1), (2, 2), (3, 3), (2, 3), (3, 2)}

b) {(1, 1), (2, 2), (3, 3)}

c) None of these

d) {(1, 1), (2, 2), (3, 3), (1, 2), (2, 1)}

15. Let f : Z → Z be given by $f(x) = \begin{cases} \frac{x}{2}, & \text{if } x \text{ is even} \\ 0, & \text{if } x \text{ is odd} \end{cases}$. Then f is **[1]**

a) onto but not one-one

b) neither one-one nor onto

c) one-one but not onto

d) one-one and onto

16. The function f : R → R given by f(x) = 2x is **[1]**

a) many-one

b) surjective

c) bijective

d) injective

17. Let N be the set of natural numbers and the function f : N → N be defined by f (n) = 2n + 3 ∀ n ∈ N. Then f is **[1]**

a) surjective and bijective

b) bijective

c) surjective

d) injective

18. If R is a relation on the set A = {1, 2, 3} given by R = (1, 1), (2, 2), (3, 3), then R is **[1]**

a) transitive

b) reflexive

c) symmetric

d) all the three options

19. **Assertion (A):** Let a relation R defined from set A = {1, 2, 5, 6} to A is R = {(1, 1), (1, 6), (6, 1)}, then R is symmetric relation. **[1]**
Reason (R): A relation R in set A is called symmetric if (a, b) ∈ R.
⇒ (b, a) ∈ R for every a, b ∈ A.

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.

20. **Assertion (A):** If $A = \{x \in z : 0 \leq x \leq 12\}$ and R is the relation in A given by R = {(a, b) : a = b. Then, the set of all elements related to 1 is {1, 2}. **[1]**
Reason (R): If R_1 and R_2 are equivalence relation in a set A, then $R_1 \cap R_2$ is an equivalence relation.

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

21. f: R → R be defined as f(x) = 3x, Check whether the function is one – one onto or other. **[2]**

22. Show that the relation is congruent to on the set of all triangles in a plane is an equivalence relation. **[2]**

23. Give an example to show that the union of two equivalence relations on a set A need not be an equivalence relation on A. **[2]**

24. Let C be the set of complex numbers. Prove that the mapping f : C → R given by f(z) = |z|, ∀z ∈ C, is neither one-one nor onto. **[2]**

25. Let A and B be two sets each with finite number of elements. Assume that there is an injective map from A to B and that there is an injective map from B to A. Prove that there is a bijection from A to B. **[2]**

Section C

26. Let L be the set of all lines in a plane and R be the relation in L defined as R = {(L_1, L_2) : L_1 is perpendicular to L_2}. Show that R is symmetric but neither reflexive nor transitive. **[3]**

27. Let A = {1, 2, 3, 4, 5, 6} and let R = {{a, b): a, b A and b = a + 1}. Show that R is **[3]**
    i. not reflexive,
    ii. not symmetric and
    iii. not transitive

28. Check whether the relation R defined in the set {1, 2, 3, 4, 5, 6} as R = {(a, b): b = a +1} is reflexive, symmetric or transitive. **[3]**

29. Show that f : N → N, given by $f(x) = \begin{cases} x+1, & \text{if } x \text{ is odd} \\ x-1, & \text{if } x \text{ is even} \end{cases}$ is both one-one and onto. **[3]**

30. Let the function f : R → R be defined by f(x) = cosx, ∀ x ∈ R. Show that f is neither one-one nor onto. **[3]**

31. Define the relation R in the set N × N as follows: For (a, b), (c, d) ∈ N × N, (a, b) R (c, d) iff ad = bc. Prove that R is an equivalence relation in N × N. **[3]**

Section D

32. Show that the function f: $R_0 \rightarrow R_0$, defined as $f(x) = \frac{1}{x^2}$ is one-one onto, where R_0 is the set non-zero real numbers. Is the result true, if the domain R_0 is replaced by N with co-domain being same as R_0? **[5]**

33. Let A be the set of all human beings in a town at a particular time. Determine whether each of the following relations are reflexive, symmetric and transitive: **[5]**

i. R = {(x, y): x is wife of y}

ii. R = {(x, y): x is father of y}

34. Show that the function f : R - {3} → R - {1} given by $f(x) = \frac{x-2}{x-3}$ is a bijection. **[5]**

35. Let A = {1, 2, 3,.....9} and R be the relation in A×A defined by (a, b) R (c, d) if a + d = b + c for (a, b), (c, d) in A×A. Prove that R is an equivalence relation and also obtain the equivalence class [(2, 5)]. **[5]**

Section E

36. **Read the following text carefully and answer the questions that follow:** **[4]**

Sherlin and Danju are playing Ludo at home during Covid-19. While rolling the dice, Sherlin's sister Raji observed and noted the possible outcomes of the throw every time belongs to set {1, 2, 3, 4, 5, 6}. Let A be the set of players while B be the set of all possible outcomes.

A = {S, D}, B = {1, 2, 3, 4, 5, 6}

i. Let R : B → B be defined by R = {(x, y): y is divisible by x}. Determine whether R is Reflexive, symmetric or transitive. (1)

ii. Raji wants to know the number of functions from A to B. How many number of functions are possible? (1)

iii. Let R be a relation on B defined by R = {(1, 2), (2, 2), (1, 3), (3, 4), (3, 1), (4, 3), (5, 5)}. Then describe R . (2)

OR

Raji wants to know the number of relations possible from A to B. How many numbers of relations are possible? (2)

37. **Read the following text carefully and answer the questions that follow:** **[4]**

A relation R on a set A is said to be an equivalence relation on A iff it is

- Reflexive i.e., (a, a) ∈ R ∀ a ∈ A.
- Symmetric i.e., (a, b) ∈ R ⇒ (b, a) ∈ R ∀ a, b ∈ A.
- Transitive i.e., (a, b) ∈ R and (b, c) ∈ R ⇒ {a, c) ∈ R ∀ a,b, c ∈ A.

i. If the relation R = {(1, 1), (1, 2), (1, 3), (2, 2), (2, 3), (3, 1), (3, 2), (3, 3)} defined on the set A - {1, 2, 3}, then define if R is reflexive, symmetric or transitive. (1)

ii. If the relation R = {(1, 2), (2, 1), (1, 3), (3, 1)} defined on the set A = {1, 2, 3}, then check whether R is reflexive,symmetric or transitive (1)

iii. If the relation R on the set N of all natural numbers defined as R - {(x, y) : y = x + 5 and x < 4}, then check whether R is reflexive, symmetric or transitive. (2)

OR

If the relation R on the set A = {1, 2, 3,..... 13, 14} defined as R = {(x, y) : 3x - y = 0}, then define R. (2)

38. **Read the following text carefully and answer the questions that follow:** **[4]**

Consider the mapping f : A → B is defined by $f(x) = \frac{x-1}{x-2}$ such that f is a bijection.

i. What is the domain of the function f(x)? (1)

ii. What is the range of the function f(x)? (1)

iii. If g(x) : R - {2} → R - {1}, How can the function g(x) in terms of x be expressed if it is defined as g(x) = 2f(x) - 1? (2)

OR

Under what condition is a function f(x) considered to be one-one? (2)

CHAPTER -INVERSE TRIGONOMETRIC FUNCTION

1. $(\cos x) = x$ is satisfied by, **[1]**

$x \in [-1, 1]$ b) $x \in [0, \pi]$

c) $x \in [0, -1]$ d) $x \in [0, 1]$

2. If sin (π cos x) = cos (π sin x) then x equals **[1]**

a) $\frac{}{2}$ $\sin^{-1}\frac{}{4}$ b) $\frac{}{2}$ $\cos^{-1}\frac{}{4}$

c) $-\frac{1}{2}$ $\cos^{-1}\frac{}{4}$ d) $-\frac{1}{4}$ $\sin^{-1}\frac{}{4}$

3. Range of $\sin^{-1}$x is **[1]**

a) $[0, \frac{\pi}{4}]$ b) $[0, \pi]$

c) $[\frac{-\pi}{2}, \frac{\pi}{2}]$ d) $[0, \frac{\pi}{2}]$

4. The value of $\sin^{-1}\left(\cos\left(\frac{43\pi}{5}\right)\right)$ is **[1]**

a) $-\frac{\pi}{10}$ b) $\frac{-7\pi}{5}$

c) $\frac{3\pi}{5}$ d) $\frac{\pi}{10}$

5. The principal value of $[\tan^{-1}\sqrt{} - \cot^{-1}(-\sqrt{})]$ is: **[1]**

a) b) 0

c) $2\sqrt{3}$ d) $\frac{}{2}$

6. The value of the expression sin [$\cot^{-1}$ (cos ($\tan^{-1}$ 1))] is **[1]**

a) $\sqrt{\frac{}{3}}$ b) 0

c) $\frac{1}{\sqrt{3}}$ d) 1

7. The value of $\sin(2\sin^{-1}(0.8))$ is **[1]**

a) 4.8 b) 0.96

c) 1.6 d) sin 1.6

8. If $f(x) = \sin^{-1}x$, then domain of f(x) is **[1]**

a) $x \geq 1$ or $x \leq -1$ b) $x \geq 1$

c) $0 \leq x \leq 1$ d) $-1 \leq x \leq 1$

9. The value of $\cos^{-1}\left(\cos\frac{3\pi}{2}\right)$ is equal to **[1]**

a) $\frac{\pi}{2}$ b) $\frac{5\pi}{2}$

c) $\frac{3\pi}{2}$ d) $\frac{7\pi}{2}$

10. The value of $\sec^{-1}(\sec\frac{4\pi}{3})$ is **[1]**

a) $\frac{4\pi}{3}$ b) $\frac{-\pi}{3}$

c) $\frac{\pi}{3}$ d) $\frac{2\pi}{3}$

11. Domain of $\cos^{-1}x$ is **[1]**

a) [-1, 0] b) [0, 1]

c) [1, -1] d) [-1, 1]

12. The value of $\cot\left[\cos^{-1}\left(\frac{7}{25}\right)\right]$ is **[1]**

a) $\frac{25}{24}$ b) $\frac{24}{25}$

c) $\frac{7}{24}$ d) $\frac{25}{7}$

13. Range of $\sec^{-1}x$ is **[1]**

a) $[0, \pi]$ b) $[0,\pi] - \{\frac{\pi}{2}\}$

c) $[0, \frac{\pi}{4}]$ d) $[0, \frac{\pi}{2}]$

14. Which of the following is the principal value branch of $\text{cosec}^{-1}x$? **[1]**

a) $(\frac{-\pi}{2}, \frac{\pi}{2})$ b) $[\frac{-\pi}{2}, \frac{\pi}{2}] - \{0\}$

c) $[0,\pi] - \{\frac{\pi}{2}\}$ d) $[\frac{-\pi}{2}, \frac{\pi}{2}]$

15. $\tan^{-1}(-2) + \tan^{-1}(-3)$ is equal to **[1]**

a) $\frac{-3\pi}{4}$ b) $-\frac{\pi}{4}$

c) $\frac{3\pi}{4}$ d) $\frac{\pi}{4}$

16. The principal value of $\cos^{-1}\left(\frac{-1}{\sqrt{2}}\right)$ is **[1]**

a) $\frac{5\pi}{4}$ b) $\frac{3\pi}{4}$

c) $\frac{-\pi}{4}$ d) $\frac{\pi}{4}$

17. $\sin^{-1}\left(\frac{1}{\sqrt{5}}\right) + \cot^{-1}(3) =$

a) $\frac{\pi}{4}$ b) $\frac{\pi}{}$

c) $\frac{\pi}{}$

d $\int_{\frac{\pi}{6}}^{2}$

[1]

18. The value of $\cos^{-1}(-1) - \sin^{-1}(1)$ is **[1]**

a) $\frac{3\pi}{2}$ b) π

c) $-\frac{3\pi}{2}$ d) $\frac{\pi}{2}$

19. **Assertion (A):** The domain of the function $\sec^{-1} 2x$ is $(-\infty, -\frac{1}{2}] \cup [\frac{1}{2}, \infty)$ **[1]**

Reason (R): $\sec^{-1}(-2) = -\frac{\pi}{4}$

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.

20. **Assertion (A):** All trigonometric functions have their inverses over their respective domains. **[1]**

Reason (R): The inverse of $\tan^{-1} x$ exists for some $x \in R$.

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

21. $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ **[2]**

22. For the principal value, evaluate $\tan^{-1}\{2\cos(2\sin^{-1}\frac{1}{2})\}$. **[2]**

23. Find the value of $\cos^{-1}\frac{1}{2} + 2\sin^{-1}\frac{1}{2}$. **[2]**

24. Which is greater, tan 1 or $\tan^{-1} 1$? **[2]**

25. Write the interval for the principal value of function and draw its graph: $\tan^{-1} x$. **[2]**

Section D

26. $\operatorname{cosec}^{-1}(-\sqrt{2})$ **[2]**

27. $\cos^{-1}\left(\frac{-1}{2}\right)$ **[2]**

28. Find the principal value of $\operatorname{cosec}^{-1}(-1)$. **[2]**

29. Evaluate $\cos\left[\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right) + \frac{\pi}{6}\right]$ **[2]**

30. Write the interval for the principal value of function and draw its graph: $\sin^{-1}x$.... **[2]**

31. Find the principal value of $\cot^{-1}(\sqrt{3})$. **[2]**

32. Find the value of $\tan^{-1}\left(\tan\frac{9\pi}{8}\right)$ **[2]**

33. $\cos^{-1}\left(\frac{-1}{\sqrt{2}}\right)$ **[2]**

34. For the principal values, evaluate $\sin^{-1}[\cos\{2\operatorname{cosec}^{-1}(-2)\}]$ **[2]**

35. Find the value of $\tan^{-1}\left(\tan\frac{2\pi}{3}\right)$. **[2]**

CHAPTER- MATRICES

1. If A and B are symmetric matrices, then ABA is **[1]**

   a) symmetric matrix
   b) diagonal matrix
   c) skew-symmetric matrix
   d) scalar matrix

2. A matrix $A = [a_{ij}]_{3\times 3}$ is defined by $a_{ij} = \begin{cases} 2i+3j & , \ i < j \\ 5 & , \ i = j \\ 3i-2j & , \ i > j \end{cases}$ **[1]**

   The number of elements in A which are more than 5, is 4:

   a) 5
   b) 6
   c) 4
   d) 3

3. For any two matrices A and B, **[1]**

   a) AB = BA is always true
   b) Whenever AB exists, then BA exists
   c) Sometimes AB = BA and sometimes AB ≠ BA
   d) AB = BA is never true

4. If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then the value of k, so that $A^2 = 8A + KI$ is **[1]**

a) 4 b) 6

c) -7 d) 5

5. The transformation 'orthogonal projection on X-axis' is given by the matrix **[1]**

a) $\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$

c) $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ d) $\begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}$

6. If $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ then $A^2 - 4A$ =? **[1]**

a) 0I b) 1I

c) 3I d) 5I

7. If $f(x) = x^2 + 4x - 5$ and $A = \begin{vmatrix} 1 & 2 \\ 4 & -3 \end{vmatrix}$, then f(A) is equal to **[1]**

a) $\begin{vmatrix} 8 & 4 \\ 8 & 0 \end{vmatrix}$ b) $\begin{vmatrix} 1 & 1 \\ 1 & 0 \end{vmatrix}$

c) $\begin{vmatrix} 0 & -4 \\ 8 & 8 \end{vmatrix}$ d) $\begin{vmatrix} 2 & 1 \\ 2 & 0 \end{vmatrix}$

8. The matrix $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ is **[1]**

a) a symmetric matrix b) a unit matrix

c) a diagonal matrix d) a skew- symmetric matrix

9. If $A = \begin{bmatrix} 4 & 4 \\ 2 & 7 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 4 \\ 3 & -5 \end{bmatrix}$, then Find A - B - C. **[1]**

a) $\begin{bmatrix} 1 & 4 \\ 6 & -5 \end{bmatrix}$ b) $\begin{bmatrix} 2 & -2 \\ 0 & 9 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 3 \\ 6 & -4 \end{bmatrix}$ d) $\begin{bmatrix} 4 & -3 \\ 5 & 0 \end{bmatrix}$

10. If $A = \begin{vmatrix} p & q \\ 0 & 1 \end{vmatrix}$, then A^5 is: **[1]**

a) $\begin{vmatrix} p^5 & q(\frac{p^5-1}{p-1}) \\ 0 & 1 \end{vmatrix}$ b) $\begin{vmatrix} p^5 & (\frac{p^5-1}{p-1}) \\ 0 & 1 \end{vmatrix}$

c) $\begin{vmatrix} p^5 & q^5 \\ 0 & 1 \end{vmatrix}$ d) $\begin{vmatrix} p^4 & q(\frac{p^5-1}{p-1}) \\ 1 & 10 \end{vmatrix}$

11. If A is a null matrix then **[1]**

a) A is a cube matrix

b) A is not a square matrix

c) both A is a square matrix and A is not a square matrix

d) A is a square matrix

12. If matrices A and B anticommute then **[1]**

a) $(AB) = (BA)^{-1}$

b) $AB = BA$

c) $(AB)^{-1} = (BA)$

d) $AB = -BA$

13. The order of matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & -1 \end{bmatrix}$ is _____. **[1]**

a) 3×2

b) 3×3

c) 2×3

d) 2×2

14. Assume X, Y, Z, W, and P are matrices of order $2 \times n$, $3 \times k$, $2 \times p$, $n \times 3$ and $p \times k$, respectively. **[1]**
The restriction on n, k and p so that PY + WY will be defined are

a) p is arbitrary, k = 3

b) k is arbitrary, p = 2

c) k = 2, p = 3

d) k = 3, p = n

15. A square matrix A can be expressed as $A = \frac{1}{2}(A + A') + \frac{1}{2}(A - A')$, where **[1]**

a) $\frac{1}{2}(A - A')$ is a symmetric matrix of A

b) $\frac{1}{2}(A - A')$) is a skew-symmetric matrix of A

c) $\frac{1}{2}(A + A')$ is a skew-symmetric matrix of A

d) $\frac{1}{2}(A' - A)$ is a symmetric matrix of A

16. If a matrix A = [1 2 3], then the matrix AA' (where A' is the transpose of A) is: **[1]**

a) [14]

b) 14

c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$

d) $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix}$

17. **Assertion (A):** If the order of A is 3×4, then order of B is 3×4 and the order of C is 5×4, then the order of $(A^T B) C^T$ is 4×5. **[1]**
Reason (R): The multiply an $m \times n$ matrix by $n \times p$ matrix then n must be the same and result is an $m \times p$ matrix. Also, A be a matrix of order $m \times n$ then the order of transpose matrix is $n \times m$.

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.

18. **Assertion (A):** If $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$, then $3A - C = \begin{bmatrix} 8 & 7 \\ 6 & 2 \end{bmatrix}$. **[1]**

Reason (R): If the matrices A and B are of same order, say $m \times n$, satisfy the commutative law, then A + B = B + A.

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

19. If $A = \begin{bmatrix} 2 & -3 & 1 \\ 0 & 7 & -9 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -3 \\ 4 & 8 & -4 \end{bmatrix}$ find (A - B). **[2]**

20. Let $A = \begin{bmatrix} 2 & 3 & 5 \\ -1 & 0 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -2 & 3 \\ 2 & 6 & -1 \end{bmatrix}$ **[2]**

Verify that A + B = B + A.

21. Simplify: $\cos\theta \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} + \sin\theta \begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$ **[2]**

22. Construct a matrix $A = [a_{ij}]_{2\times 2}$ whose elements a_{ij} are given by $a_{ij} = e^{2ix}\sin jx$ **[2]**

23. If A = diag (2 - 5 9), B = diag (1 1 - 4) and C = diag (-6 3 4), find 2A + 3B - 5C **[2]**

Section C

24. $A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$, Show that $(aI + bA)^n = a^nI + na^{n-1}bA$, where I is the identify matrix of order 2 and $n \in N$ **[3]**

25. Find the matrix X, so that $X\begin{bmatrix} 1 & 2 & 3 \end{bmatrix} = \begin{bmatrix} -7 & -8 & -9 \end{bmatrix}$ **[3]**

26. If $A' = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 5 & 6 \\ -1 & 2 & 1 \end{bmatrix}$ then verify (A – B)′ = A′ – B′ **[3]**

27. If $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, then prove that $A^n = \begin{bmatrix} 1+2n & -4n \\ 2 & 1-2n \end{bmatrix}$; where n is any positive integer. **[3]**

28. Let A = $\begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$, B = $\begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$, C = $\begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$. Find each of the following: **[3]**

i. A + B

ii. A - B

iii. 3A - C

iv. AB

v. BA

29. Find the matrix A satisfying the matrix equation: **[3]**

$$\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix} A \begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Section D

30. If A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then show that A^2 - 5A + 7I = 0 and hence find A^4. **[5]**

31. If A = $\begin{bmatrix} 9 & 1 \\ 7 & 8 \end{bmatrix}$, B = $\begin{bmatrix} 1 & 5 \\ 7 & 12 \end{bmatrix}$, find matrix C such that 5A + 3B + 2C is a null matrix. **[5]**

$\begin{bmatrix} 1 & 3 & 2 \end{bmatrix}\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ **[5]**

32. Find the value of x, if $\begin{bmatrix} 1 & x & 1 \end{bmatrix}\begin{bmatrix} 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix}\begin{bmatrix} 2 \\ x \\ 1 \end{bmatrix} = 0$

33. If matrix A = $\begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$ and A^2 = pA, then write the value of p. **[5]**

Section E

34. **Read the following text carefully and answer the questions that follow:**

To promote the making of toilets for women, an organization tried to generate awareness through

i. house calls

ii. emails and

iii. announcements.

ost for each mode per attempt is given below:

[4]

1. ₹ 50
2. ₹ 20

3. ₹ 40

The number of attempts made in the villages X, Y and Z are given below:

	(i)	(ii)	(iii)
X	400	300	100
Y	300	250	75
Z	500	400	150

Also, the chance of making of toilets corresponding to one attempt of given modes is

1. 2%
2. 4%
3. 20%

i. Find total number of toilets that can be expected after the promotion in village X. (1)

ii. Find the percentage of toilets that can be expected after the promotion in all the three-villages? (1)

iii. Find the cost incurred by the organization on village X. (2)

OR

Find the total cost incurred by the organization on for all the three villages? (2)

35. **Read the following text carefully and answer the questions that follow:** **[4]**

On her birthday, Shanti decided to donate some money to children of an orphanage home. If there were 8 children less, everyone would have got ₹ 10 more. However, if there were 16 children more, everyone would have got ₹ 10 less. Let the number of children be x and the amount distributed by Shanti for one child be y (in ₹).

i. Find the equations related to the given problem in terms of x and y. (1)

ii. Find the number of children. How much amount is given to each child by Shanti? (1)

iii. Write the equations in form of matrix representation for the information given above? (2)

OR

How much amount Shanti spends in distributing the money to all the students of the Orphanage? (2)

36. **Read the following text carefully and answer the questions that follow:** **[4]**

Two farmers Shyam and Balwan Singh cultivate only three varieties of pulses namely Urad, Masoor and Mung. The sale (in ₹) of these varieties of pulses by both the farmers in the month of September and October are given by the following matrices A and B.

September sales (in ₹)

$$A = \begin{matrix} \textit{Urad} & \textit{Masoor} & \textit{Mung} \\ \left\lfloor \begin{matrix} 10000 & 20000 & 30000 \\ 50000 & 30000 & 10000 \end{matrix} \right\rfloor & \begin{matrix} \textit{Shyam} \\ \textit{Balwan Singh} \end{matrix} \end{matrix}$$

October sales (in ₹)

$$B = \begin{matrix} \textit{Urad} & \textit{Masoor} & \textit{Mung} \\ \left\lfloor \begin{matrix} 5000 & 10000 & 6000 \\ 20000 & 10000 & 10000 \end{matrix} \right\rfloor & \begin{matrix} \textit{Shyam} \\ \textit{Balwan Singh} \end{matrix} \end{matrix}$$

i. What were the combined sales of Masoor for farmer Balwan Singh in September and October? (1)

ii. What were the combined sales of Urad for farmer Shyam in September and October? (1)

iii. How much did the sales of Mung decrease from September to October for farmer Shyam? (2)

OR

How much profit did each farmer and each variety sold in October earn, considering they both received a 2% profit on their gross sales? (2)

पीएम श्री केंद्रीय विद्यालय बौद्ध ग्रीष्मकालीन अवकाश गृह कार्य

कक्षा बारहवीं (हिंदी)

निर्देश:-

सभी विद्यार्थी अपना कार्य साफ-सुथरे एवं सुव्यवस्थित रूप में करें। यह कार्य आपकी जून की परीक्षा के को ध्यान में रखते हुए दिया गया है यह कार्य आंतरिक मूल्यांकन के लिए भी उपयोग किया जाएगा

निम्नलिखित गद्यांश को ध्यानपूर्वक पढ़कर दिए गए प्रश्नों के उत्तर दीजिए

भक्तिन अच्छी है यह कहना कठिन होगा क्योंकि उसमें दुर्गुणों का अभाव नहीं है वह सत्यवादी हरिश्चंद्र नहीं बन सकती पर नारो वा कुंजरो वा कहानी में भी विश्वास नहीं करती मेरे इधर-उधर पड़े रूपए पैसे भंडार घर की किसी मटकी में कैसे अंतररहित हो जाते हैं यह रहस्य भी भक्तिन जानती है पर उस संबंध में किसी के संकेत करते ही वह उसे शास्त्र अर्थ के लिए चुनौती दे डालती हैं जिनको स्वीकार कर लेना किसी तर्क शिरोमणि के लिए संभव नहीं है यह उसका अपना घर ठहरा रुपए पैसा जो इधर-उधर पड़ा देखा संभाल कर रख दिया क्या यह चोरी है। उसके जीवन का परम कर्तव्य मुझे प्रश्न रखता है। जिस बात से मुझे क्रोध आ सकता है उसे बदलकर इधर-उधर करके बताना क्या झूठ है इतनी चोरी और इतना झूठ तो धर्मराज महाराज में भी होगा नहीं तो वे भगवान जी को कैसे प्रसन्न रख सकते थे और संसार को कैसे चला सकते थे।

क लेखिका ने नारो वा कुंजारो वा किस संदर्भ में कहा था -

1. महाभारत का प्रश्ग बताने के लिए
2. भक्तिन के चरित्र के विषय में बताने के लिए
3. नर और कंजर का अर्थ स्पष्ट करने के लिए
4. मनुष्य और देवता में अंतर बताने के लिए

ख भक्ति द्वारा भंडार घर की मटकी में छुपा कर रखें रूपों को छोरी ने करने के पीछे क्या तर्क दिया गया?

1. यह रूपयो का एक स्थान पर संचयन करना है
2. यह रूपयो के अपव्यय को रोकना है
3. यह आपातकाल के लिए बचाई गई राशि है
4. यह भक्तिन की स्वयं की कमाई है

ख लेखिका के क्रोध से बचने के लिए भक्तिन क्या करती थी?

1. बात को सीधे-सीधे बता देती थी
2. बात को इधर-उधर करके बताती थी
3. बात को छुपा कर रखती थी
4. बात ही नहीं करती थी

घ भक्तिन के जीवन का परम कर्तव्य किसे माना गया है -

1. अपना जीवन सुधारना
2. लेखिका कोप्रसन्न रखना
3. चोरी करना
4. लेखिका का विरोध करना

निम्नलिखित पद्यांश को ध्यान पूर्वक पढ़िए एवं गद्यांशपर आधारित प्रश्नों के उत्तर दीजिए:-

मैं जगजीवन का भार लिए फिरता हूं

फिर भी जीवन में प्यार लिए फिरता हूं

कर दिया किसी ने झंकृत जिनको छूकर

मैं दो सांसों के तार लिए फिरता हूं

मैं स्नेहा सुर का पान किया करता हूं

कभी न जग का ध्यान किया करता हूं

जग पूछ रहा है उनको जो जग की गाते

मै अपने मन का गाण किया करता हूं।

क काव्यांश में कई किसका भर लिए फिरता है

1. घर तथा परिवार का
2. संसार का
3. अपने कार्यालय का
4. आज पड़ोस का

ख काव्यांश के अनुसार कवि सबको क्या बांट रहा है

1. खुशियां

2. दुख
3. आशा
4. प्रेम

ग कवि अपने जीवन में किस सुर का पान करता है?

1. ईर्ष्या द्वेष का
2. उत्साह उमंग
3. स्नेहा
4. यह सभी

घ कवि ने किसका ध्यान नहीं करने की बात की है

1. संसार की समर्थकता की
2. संसार के बंधनों की
3. संसार की भाव प्रधानता की
4. संसार के स्वरूप की

ड कवि के अनुसार संसार में किन लोगों को प्रतिष्ठा प्राप्त होती है ?

1. संसार के हित में कार्य करने वालों को
2. संसार के लिए उच्च साहित्य रखने वालों को
3. संसार की झूठी प्रशंसा न करने वालों को
4. संसार का झूठा गुणगान करने वालों को

अपठित गद्यांश व अपठित पद्यांश का अर्थ हिंदी साहित्य में क्या महत्व है यह विद्यार्थियों की किस कौशल में वृद्धि करता है एवं स्टडी मैटेरियल से प्रथम तीन गद्यांश व तीन पद्यांशो का लेखनपुस्तिका में अभ्यास करें

अभिव्यक्ति और माध्यम पुस्तक

टेलीविजन के विभिन्न चरणों पर विस्तार पूर्वक लिखें साथ में उदाहरण स्वरूप कोई एक समाचार भी तैयार करें।

समाचार लेखन की प्रसिद्ध शैली उल्टा पिरामिड शैली एवं छः ककार का विस्तार पूर्वक चित्र सहित वर्णन करें।

प्रतिदिन समाचार पढ़ें एवं कोई तीन समाचार पत्रों की कटिंग काटकर अपनी लेखन पुस्तिका में चिपकाए।

निम्न विषयों पर लेख तैयार करें

जनसंचार के प्रमुख माध्यम (प्रिंट, रेडियो, टेलीविजन, इंटरनेट) पर जानकारी देते हुए चित्र चिपकाएँ।

इंटरनेट पत्रकारिता क्या है? इसका इतिहास तथा भारत में इंटरनेट पत्रकारिता पर लेख लिखें ।(जो विद्यार्थी कक्षा कार्य के साथ यह कार्य कर चुके हैं वे दोबारा ना करें केवल याद करें)

📝 टिप्पणियाँ (100-120 शब्द) खोजपूर्ण कार्य

फीचर लेखन क्या है फीचर लेखन का उद्देश्य बताएं

विशेष लेखन एवं उसकी भाषा शैली

विशेष रिपोर्ट एवं प्रकार

संपादकीय लेख एवं आलेख

स्तंभ लेख एवं साक्षात्कार

पत्रकारों के प्रकार (पूर्णकालिक, अंशकालिक, फ्रीलांसर)

पाठ पर आधारित कार्य

पाठ 4 को ध्यानपूर्वक पढ़कर 20 लघु प्रश्न-उत्तर तैयार करे

निम्न विषयों पर रचनात्मक लेखन कीजिए(150-200 शब्द)

हिंदी विषय में रोजगार के अवसर

शिक्षा के विकास में तकनीकी (डिजिटल) का सहयोग

सोशल मीडिया का विद्यार्थियों पर दुष्प्रभाव

समाज में नारी शिक्षा का महत्व

कामकाजी महिला का दोहरा जीवन

2047 का भारत / मेरी कल्पना का भारत

देश के भविष्य निर्माण में युवाओं की भूमिका

आरोह (गद्य एवं पद्य)

जहां पर दाना रहते हैं वहीं पर नादान भी होते हैं कवि ने ऐसा क्यों कहा होगा?

शीतल वाणी में भी आज होने का क्या अभिप्राय है

बच्चे किस आशा में नीडो से झांक रहे होंगे?

जन्म से ही वे अपने साथ लाते हैं कपास कपास के बारे में सोचे कि कपास से बच्चों का क्या संबंध बन सकता है?

पतंग के साथ बच्चे उड़ रहे हैं बच्चों का उड़ान से क्या संबंध बनता है?

वितान (पूरक पुस्तक)

सिल्वर वेडिंग' एवं अन्य पाठ को ध्यानपूर्वक पढे।

प्रोजेक्ट वर्क

कक्षा में कराया गया संपूर्ण पाठ्यक्रम याद करें एवं अपनी लेखन पुस्तिका पूर्ण करे।

प्रोजेक्ट वर्क (प्रकल्प कार्य)

प्रेमचन्द की जीवनी २५पृष्ठ

बाज़ार की नियंत्रण संभव है या नहीं उसपर अपना विचार व्यक्त करते हुए चित्र सहित प्रकल्प कार्य करें।

‘