

Roll No.

--	--	--	--	--	--	--

Candidates must write the Code on the title page of the answer book.

- Please check that this question paper contains **10** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer book by the candidate.
- Please check that this question paper contains **35** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minutes time has been allotted to read this question paper. The students will read the question paper only and will not write any answer on the answer-book during this period.

## I-PRE BOARD EXAMINATION CHEMISTRY (THEORY) [043]

*Time allowed : 3 hours*

*Maximum Marks : 70*

### General Instructions :

*Read the following instructions carefully.*

- There are 35 questions in this question paper with internal choice.*
- Section-A consists of 18 multiple-choice questions carrying 1 mark each.*
- Section-B consists of 7 very short answer questions carrying 2 marks each.*
- Section-C consists of 5 short answer questions carrying 3 marks each.*
- Section-D consists of 2 case-based questions carrying 4 marks each.*
- Section-E consists of 3 long answer questions carrying 5 marks each.*
- All questions are compulsory.*
- Use of log tables and calculators is not allowed.*

SECTION - A [OBJECTIVE TYPE]

The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

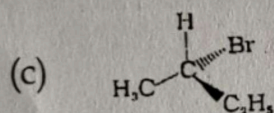
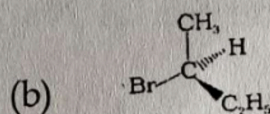
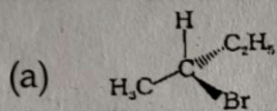
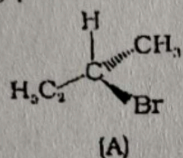
1. Peptide linkage is present in :

[1]

- (a) Carbohydrates (b) Vitamins  
(c) Proteins (d) Rubber

2. Mirror image of A. is :

[1]



(d) None of these

3. Which of the following reagents may be used to distinguish between phenol and benzoic acid ?

[1]

- (a) Neutral  $\text{FeCl}_3$  (b) Aqueous  $\text{NaOH}$   
(c) Tollen's reagent (d) None of these

4. Which one is the complementary base of cytosine in one strand to that in other strand of DNA ?

[1]

- (a) Adenine (b) Guanine  
(c) Thymine (d) None of these

5. The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called .....

[1]

- (a) Cell potential (b) Cell emf  
(c) Potential difference (d) None of these

6. Consider the Arrhenius equation given below and mark the correct option : [1]

$$k = Ae^{-E_a/RT}$$

- (a) Rate constant increases exponentially with increasing activation energy and decreasing temperature.
- (b) Rate constant decreases exponentially with increasing activation energy and decreasing temperature.
- (c) Rate constant increases exponentially with decreasing activation energy and decreasing temperature.
- (d) Rate constant increases exponentially with decreasing activation energy and increasing temperature.

7. Which of the following B group vitamins can be stored in our body ? [1]

- (a) Vitamin B<sub>1</sub>
- (b) Vitamin B<sub>2</sub>
- (c) Vitamin B<sub>6</sub>
- (d) None of these

8. A chelating agent has two or more than two donor atoms to bind to a single metal ion. Which of the following is not a chelating agent ? [1]

- (a) thiosulphato
- (b) oxalato
- (c) glycinato
- (d) None of these

9. Which of the following compound will not undergo azo coupling reaction with benzene diazonium chloride. [1]

- (a) Aniline
- (b) Phenol
- (c) Anisole
- (d) None of these

OR

Which of the following reagents would not be a good choice for reducing an aryl nitro compound to an amine ?

- (a) H<sub>2</sub> (excess)/Pt
- (b) LiAlH<sub>4</sub> in ether
- (c) Fe and HCl
- (d) None of these

10. The correct order of increasing acidic strength is .....

[1]

- (a) Phenol < Ethanol < Chloroacetic acid < Acetic acid
- (b) Ethanol < Phenol < Chloroacetic acid < Acetic acid
- (c) Ethanol < Phenol < Acetic acid < Chloroacetic acid
- (d) None of these

OR

Which of the following reagents can be used to oxidise primary alcohols to aldehydes ?

- (a)  $\text{CrO}_3$  in anhydrous medium
- (b)  $\text{KMnO}_4$  in acidic medium
- (c) Pyridinium chlorochromate
- (d) None of these

11. Rate law for the reaction  $\text{A} + 2\text{B} \longrightarrow \text{C}$  is found to be  $\text{Rate} = k[\text{A}][\text{B}]$  if concentration of reactant 'B' is doubled, keeping the concentration of 'A' constant, the value for rate constant will be .....

[1]

- (a) the same
- (b) doubled
- (c) quadrupled
- (d) None of these

12.  $\text{KMnO}_4$  acts as an oxidising agent in alkaline medium. When alkaline  $\text{KMnO}_4$  is treated with KI, iodide ion is oxidised to .....

[1]

- (a)  $\text{I}_2$
- (b)  $\text{IO}^-$
- (c)  $\text{IO}_3^-$
- (d) None of these

13. A first order reaction is 50% completed in  $1.26 \times 10^{14}$  s. How much time would it take for 100% completion ?

[1]

- (a)  $1.26 \times 10^{15}$  s
- (b)  $2.52 \times 10^{14}$  s
- (c)  $2.6 \times 10^{28}$  s
- (d) None of these

14. The reagent which does not react with both, acetone and benzaldehyde.

[1]

- (a) Sodium hydrogen sulphite
- (b) Phenyl hydrazine
- (c) Fehling's solution
- (d) None of these

**Direction for question numbers 15 to 18 :** A statements of assertion (a) followed by a statement of reason (R) is given. Choose the correct option out of the choices given below for each question.

- (a) A and R both are correct and R is the correct explanation of A.
- (b) A and R both are correct but R is not the correct explanation of A.
- (c) A is true, but R is false.
- (d) A and R both are false.

15. **Assertion :** Aromatic diazonium salts are more stable than aliphatic diazonium salts at low temperature. [1]

**Reason :** Aromatic diazonium ion stabilised by resonance.

16. **Assertion :** Glycine must be taken through diet. [1]

**Reason :** It is an essential amino acid.

17. **Assertion :** Linkage isomerism arises in coordination compounds containing ambidentate ligand. [1]

**Reason :** Ambident ligand has two different donor atoms.

18. **Assertion :** Aniline can undergo Friedel Crafts reaction easily. [1]

**Reason :**  $\text{NH}_2$  group is activating and o and p-directing.

**OR**

**Assertion :** Aniline and ethyl amine can be distinguished by Azo dye test. [1]

**Reason :** Tertiary amines form salt soluble in water with  $\text{HNO}_2$ .

### SECTION-B

This section contains 7 questions with internal choice in two questions. The following questions are very short answer type and carry 2 marks each.

19. p-Dichlorobenzene has higher melting point than those of o-and m-isomers. [2]

**OR**

What is meant by the Zwitter ion ? Give an example.

20. Explain why is ortho nitrophenol more acidic than ortho methoxyphenol ? [2]

21. In the given reaction  $A + 3B \longrightarrow 2C$  the rate of formation of C is  $2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ S}^{-1}$ . [2]  
Calculate the
- (i) rate of reaction
  - (ii) rate of disappearance of B.
22. Arrange each set of compounds in order of increasing boiling points. [2]
- (i) Bromomethane, Bromoform, Chloromethane, Dibromomethane
  - (ii) 1-Chloropropane, Isopropyl chloride, 1-Chlorobutane.
23. Account for the following : [2]
- (a) There are 5 OH groups in glucose
  - (b) Glucose is a reducing sugar. What happens when D-glucose is treated with the following reagents ?
    - (a) Bromine water.
    - (b)  $\text{HNO}_3$
24. Arrange the following compounds in increasing order of their acid strength : [2]  
Propan-1 ol, 2, 4, 6-trinitrophenol, 3-nitrophenol, 3, 5-dinitrophenol, phenol , 4-methylphenol.
25. Prove that the half life time of I order reaction does not depend on initial concentration. [2]

OR

What is rate constant explain it's unit for I and II order reaction.

### SECTION-C

This section contains 5 questions with internal choice in two questions. The following questions are short answer type and carry 3 marks each.

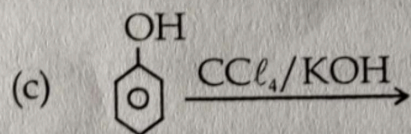
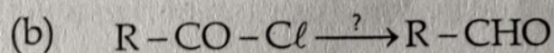
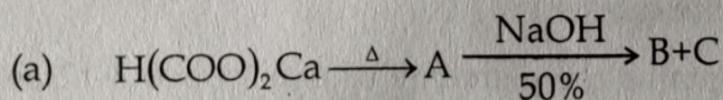
26. (a) What are the products of hydrolysis of maltose ? [3]  
(b) What type of bonding provides stability of  $\alpha$ -helix structure of protein ?  
(c) Name the vitamin whose deficiency causes pernicious anemia.

Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanides as the chief product. Explain.

27. Write the formulas for the following coordination compounds : [3]

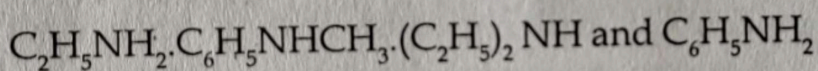
- Diamminechloridonitrito-N-platinum (II)
- Potassium trioxalatochromate (III)
- Dichloridobis (ethane-1, 2-diamine) cobalt (III) chloride

28. Complete the following reactions: [3]

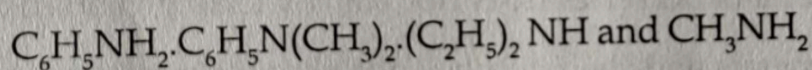


29. Arrange the following: [3]

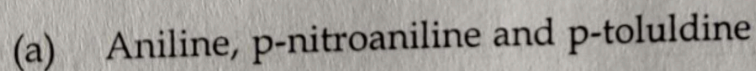
(I) In decreasing order of the  $\text{pK}_b$  values :



(II) In increasing order of basic strength :



(III) In increasing order of basic strength :



30. How will you convert :

- Benzoic acid to aniline
- Aniline to 2, 4, 6-tribromofluorobenzene
- Butan-2-one to butan-2-ol

OR

Write short notes on :

- (a) Reimer-Tiemann reaction
- (b) Gabriel phthalimide synthesis
- (c) Hoffmann bromamide reaction

### SECTION-D

The following questions are case-base questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow.

31. Read the given passage and answer the questions.

The d-block of the periodic table contains the elements of the groups 3-12 and are known as transition elements. In general, the electronic configuration of these elements is  $(n - 1) d^{1-10} ns^{1-2}$ . The d-orbitals of the penultimate energy level in their atoms receive electrons giving rise to the three rows of the transition metals i.e., 3d, 4d and 5d series. However, Zn, Cd and Hg are not regarded as transition elements. Transition elements exhibit certain characteristic properties like variable oxidation state, complex formation, formation of coloured ions and alloys, catalytic activity, etc. Transition metals are hard (except Zn, Cd and Hg) and have a high melting point.

- (a) Why are Zn, Cd and Hg non-transition elements ?
- (b) Which transition metal of 3d series does not show variable oxidation states ?
- (c) Why do transition metals and their compounds show catalytic activity ?

OR

Why is  $Cu^{2+}$  ion coloured while  $Zn^{2+}$  ion is colourless in aqueous solution ?

32. Read the given passage and answer the questions that follow :

The substitution reaction of alkyl halide mainly occurs by  $S_N1$  or  $S_N2$  mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rate of  $S_N1$  reactions are governed by the stability of carbocation whereas for  $S_N2$  reactions steric factor is the deciding factor. If the starting material is a chiral



compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed.

- (a) Predict the stereochemistry of the product formed if an optically active alkyl halide undergoes substitution reaction by  $S_N1$  mechanism.
- (b) Name the instrument used for measuring the angle by which the plane polarised light is rotated.
- (c) Predict the major product formed when 2-Bromopentane reacts with alcoholic KOH.

OR

Write the structures of the products formed when anisole is treated with HI.

#### SECTION-E

The following questions are long answer type and carry 5 marks each. Two questions have an internal choice.

33. (a) Convert. [5]
- (i) 3-Methylaniline to 3-nitrotoluene.
  - (ii) Aniline into 1, 3, 5-tribromobenzene.
  - (iii) Nitromethane into dimethylamine
- (b) An alkene 'A' (molecular formula  $C_5H_{10}$ ) gives a mixture of compounds 'B' and 'C' through ozonolysis. Compound 'B' gives +ve test with Fehling solution and forms iodoform with  $I_2$  and NaOH. Compound 'C' does not give test with Fehling solution but forms iodoform. Identify 'A', 'B' and 'C' and write all the reactions.

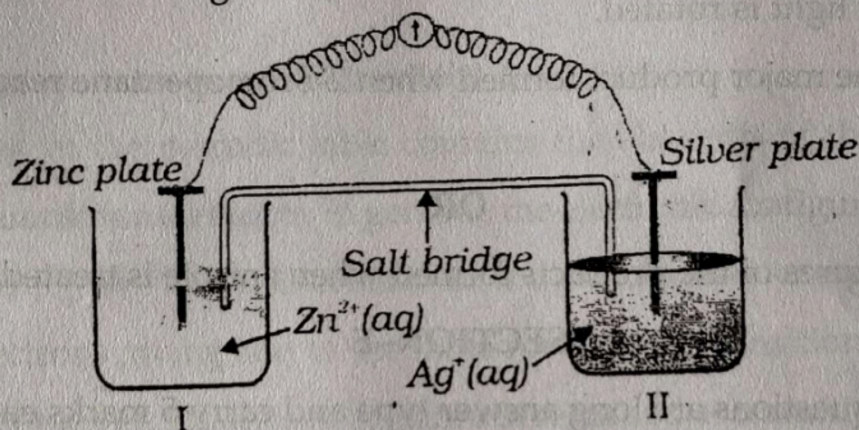
OR

- (a) Why are different colours observed in octahedral and tetrahedral complexes for the same metal and same ligands? [2]
- (b) Name the type of isomerism when ambidentate ligands are attached to central metal ion. Give two examples of ambidentate ligands. [3]

34. A) (i) Aniline does not undergo Friedel-Crafts reaction.
- (ii) Write the reaction of (a) aromatic and (b) aliphatic primary amines with nitrous acid.
- (iii)  $pK_b$  of aniline is more than that of methylamine.
- B) Why are aquatic species more comfortable in cold water in comparison to warm water?

35. Consider Figure and answer the questions (a) to (e) given below :

- (a) Redraw the diagram to show the direction of electron flow.



- (b) Is silver plate the anode or cathode?
- (c) What will happen if salt bridge is removed?
- (d) When will the cell stop functioning?
- (e) How will the concentration of  $Zn^{2+}$  ions and  $Ag^+$  ions be affected when the cell functions?

[5]

OR

- (a) Define the following as related to proteins
- (i) Peptide linkage
- (ii) Mutarotation
- (iii) Cross aldol condensation
- (b) Differentiate between globular and fibrous proteins.

#####