

Series : AAB4/3



SET-3

प्रश्न-पत्र कोड 56/3/3
Q.P. Code

रोल नं.

Roll No.

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परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।

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

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 12 हैं।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 12 प्रश्न हैं।
- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।
- Please check that this question paper contains 12 printed pages.
- Q.P. 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 12 questions.
- **Please write down the Serial Number of the question in the answer-book before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.



रसायन विज्ञान (सैद्धान्तिक) CHEMISTRY (Theory)

निर्धारित समय : 2 घण्टे

Time allowed : 2 hours

अधिकतम अंक : 35

Maximum Marks : 35

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222 C

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P.T.O.

General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) This question paper contains **12** questions. *All* questions are compulsory.
- (ii) This question paper is divided into **three** Sections – Section **A**, **B** and **C**.
- (iii) **Section - A** Q. Nos. **1** to **3** are very short answer type questions carrying **2** marks each.
- (iv) **Section - B** Q. Nos. **4** to **11** are short answer type questions carrying **3** marks each.
- (v) **Section - C** Q. No. **12** is case based question carrying **5** marks.
- (vi) Use of log tables and calculators is **NOT** allowed.

SECTION – A

1. An Organic compound (A) with molecular formula C_3H_7NO on heating with Br_2 and KOH forms a compound (B). Compound (B) on heating with $CHCl_3$ and alcoholic KOH produces a foul smelling compound (C) and on reacting with $C_6H_5SO_2Cl$ forms a compound (D) which is soluble in alkali. Write the structures of (A), (B), (C) and (D). **2**

2. Write the products formed when benzaldehyde reacts with the following reagents (Any **two**) :
 - (i) CH_3CHO in presence of dilute $NaOH$
 - (ii) H_2N-OH in presence of weak acid
 - (iii) Tollen's reagent **$1 \times 2 = 2$**

3. The conductivity of 0.001M acetic acid is $7.8 \times 10^{-5} S\ cm^{-1}$. Calculate its degree of dissociation if $\wedge^\circ m$ for acetic acid is $390 S\ cm^2\ mol^{-1}$. **2**



SECTION – B

4. (i) Why are melting points of transition metals high ?
(ii) Why the transition metals generally form coloured compounds ?
(iii) Why E° value for Mn^{3+}/Mn^{2+} couple is highly positive ? **1 × 3 = 3**

5. (a) (i) Which acid of the following pair would you expect to be stronger ?
 $F-CH_2-COOH$ or CH_3-COOH
(ii) Arrange the following compounds in increasing order of their boiling points :
 CH_3CH_2OH , CH_3-CHO , CH_3-COOH
(iii) Give simple chemical test to distinguish between Benzaldehyde and Acetophenone. **1 × 3 = 3**

OR

- (b) (i) Which will undergo faster nucleophilic addition reaction ?
Acetaldehyde or Propanone
(ii) What is the composition of Fehling's reagent ?
(iii) Draw structure of the semicarbazone of Ethanal. **1 × 3 = 3**
6. Give reasons :
- (i) Ammonolysis of alkyl halides is not a good method to prepare pure primary amines.
(ii) Aniline does not give Friedel-Crafts reaction.
(iii) Although $-NH_2$ group is o/p directing in electrophilic substitution reactions, yet aniline on nitration gives good yield of m-nitroaniline. **1 × 3 = 3**

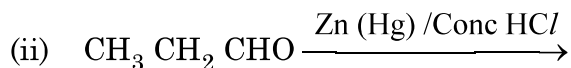
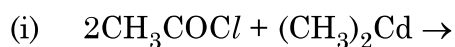
7. (a) What happens when
(i) Propanone is treated with CH_3MgBr and then hydrolysed ?
(ii) Ethanal is treated with excess ethanol and acid ?
(iii) Methanal undergoes Cannizzaro reaction ? **1 × 3 = 3**

OR

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(b) Write the main product in the following reactions :



1 × 3 = 3

8. (a) Differentiate between the following :

(i) Adsorption and Absorption

(ii) Lyophobic Sol and Lyophilic Sol

(iii) Multimolecular Colloid and Macromolecular colloid.

1 × 3 = 3

OR

(b) (I) Define the following terms :

(i) Zeta Potential

(ii) Coagulation

(II) Why a negatively charged sol is obtained when AgNO_3 solution is added to KI solution ?

3

9. Define transition metals. Why Zn, Cd and Hg are not called transition metals ? How is the variability in oxidation states of transition metals different from that of p-block elements ?

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10. (a) Using valence bond theory, predict the hybridization and magnetic character of the complex : $[\text{Ni}(\text{CO})_4]$ (Atomic number : Ni = 28)

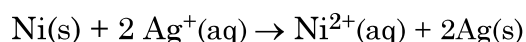
(b) Write IUPAC name of $[\text{Pt}(\text{NH}_3)_2 \text{Cl}(\text{NO}_2)]$.

(c) Why $[\text{Co}(\text{en})_3]^{3+}$ is a more stable complex than $[\text{Co}(\text{NH}_3)_6]^{3+}$?

1 × 3 = 3



11. (a) Calculate $\Delta_r G^\circ$ and $\log K_c$ for the following cell :

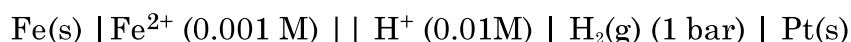


Given that $E^\circ_{\text{cell}} = 1.05\text{V}$, $IF = 96,500 \text{ Cmol}^{-1}$.

3

OR

- (b) Calculate the e.m.f. of the following cell at 298K :



Given that $E^\circ_{\text{cell}} = +0.44 \text{ V}$

$$[\log 2 = 0.3010 \quad \log 3 = 0.4771 \quad \log 10 = 1]$$

3

SECTION – C

12. Read the following passage and answer the questions that follow :

The rate of reaction is concerned with decrease in concentration of reactants or increase in the concentration of products per unit time. It can be expressed as instantaneous rate at a particular instant of time and average rate over a large interval of time. A number of factors such as temperature, concentration of reactants, catalyst affect the rate of reaction. Mathematical representation of rate of a reaction is given by rate law :

$$\text{Rate} = k[\text{A}]^x [\text{B}]^y$$

x and y indicate how sensitive the rate is to the change in concentration of A and B. Sum of $x + y$ gives the overall order of a reaction.



When a sequence of elementary reactions gives us the products, the reactions are called complex reactions. Molecularity and order of an elementary reaction are same. Zero order reactions are relatively uncommon but they occur under special conditions. All natural and artificial radioactive decay of unstable nuclei take place by first order kinetics.

- (a) What is the effect of temperature on the rate constant of a reaction ?
- (b) For a reaction $A + B \rightarrow \text{Product}$, the rate law is given by, $\text{Rate} = k[A]^2 [B]^{1/2}$. What is the order of the reaction ?
- (c) How order and molecularity are different for complex reactions ?
- (d) A first order reaction has a rate constant $2 \times 10^{-3} \text{s}^{-1}$. How long will 6g of this reactant take to reduce to 2g ?

OR

The half life for radioactive decay of ^{14}C is 6930 years. An archaeological artifact containing wood had only 75% of the ^{14}C found in a living tree. Find the age of the sample.

$$[\log 4 = 0.6021 \quad \log 3 = 0.4771 \quad \log 2 = 0.3010 \quad \log 10 = 1]$$

$$1 + 1 + 1 + 2$$

