SET-1

Series AABB1/2

प्रश्न-पत्र कोड
Q.P. Code **56/2/1**

रोल नं.
Roll No.

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 **11** हैं ।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी 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 **11** printed pages.
- Q.P. Code 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 students 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 *अधिकतम अंक : 35*

Time allowed : 2 hours *Maximum Marks : 35*

सामान्य निर्देश :

निम्नलिखित निर्देशों को बहुत सावधानी से पढ़िए और उनका सख़्ती से पालन कीजिए ।

(i) *इस प्रश्न-पत्र में कुल **12** प्रश्न हैं । **सभी** प्रश्न अनिवार्य हैं ।*

(ii) *यह प्रश्न-पत्र **तीन** खण्डों – **क, ख** और **ग** में विभाजित है ।*

(iii) ***खण्ड क** में प्रश्न संख्या **1** से **3** तक अति लघु-उत्तरीय प्रकार के प्रश्न हैं । प्रत्येक प्रश्न **2** अंकों का है ।*

(iv) ***खण्ड ख** में प्रश्न संख्या **4** से **11** तक लघु-उत्तरीय प्रकार के प्रश्न हैं । प्रत्येक प्रश्न **3** अंकों का है ।*

(v) ***खण्ड ग** में प्रश्न संख्या **12** प्रकरण आधारित प्रश्न है । यह प्रश्न **5** अंकों का है ।*

(vi) *लॉग सारणियाँ और कैल्कुलेटर के प्रयोग करने की अनुमति **नहीं** है ।*

खण्ड क

1. आप निम्नलिखित परिवर्तन कैसे करेंगे : (कोई ***दो***) *2×1=2*

(i) प्रोपेनैल से प्रोपेन

(ii) एथेनैल से ब्यूट-2-ईनल

(iii) एथेनॉइक अम्ल से एथेनेमाइड

2. दी गई अभिक्रिया

$$N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$$

में, NH_3 के बनने का वेग $3{\cdot}6 \times 10^{-4}$ mol L^{-1} s^{-1} है ।

परिकलित कीजिए : *2×1=2*

(i) अभिक्रिया का वेग, और

(ii) $H_2(g)$ के लुप्त होने का वेग ।

3. (i) आयनों के स्वतंत्र अभिगमन का कोलराउश नियम लिखिए ।

(ii) यदि CH_3COOH के लिए $\wedge_m$ और $\wedge^o_m$ क्रमश: 48 S cm^2 mol^{-1} एवं 400 S cm^2 mol^{-1} दिए गए हैं, तो CH_3COOH की वियोजन मात्रा (α) को परिकलित कीजिए । *2×1=2*

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 – **A**, **B** and **C**.*

(iii) ***Section A** – Questions no. **1** to **3** are very short answer type questions, carrying **2** marks each.*

(iv) ***Section B** – Questions no. **4** to **11** are short answer type questions, carrying **3** marks each.*

(v) ***Section C** – Question no. **12** is case based question, carrying **5** marks.*

(vi) *Use of log tables and calculators is **not** allowed.*

SECTION A

1. How will you carry out the following conversions : (Any ***two***) *2×1=2*

(i) Propanal to Propane

(ii) Ethanal to But-2-enal

(iii) Ethanoic acid to ethanamide

2. In the given reaction

$$N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$$

the rate of formation of NH_3 is $3{\cdot}6 \times 10^{-4}$ mol L^{-1} s^{-1}.

Calculate the *2×1=2*

(i) rate of reaction, and

(ii) rate of disappearance of H_2 (g).

3. (i) State Kohlrausch's law of independent migration of ions.

(ii) Calculate the degree of dissociation (α) of CH_3COOH if $\wedge_m$ and $\wedge^o_m$ of CH_3COOH are 48 S cm^2 mol^{-1} and 400 S cm^2 mol^{-1} respectively. *2×1=2*

खण्ड ख

4. (क) निम्नलिखित संकुलों के संकरण एवं चुम्बकीय लक्षण लिखिए : *3×1=3*

(i) $[NiCl_4]^{2-}$

(ii) $[Co(NH_3)_6]^{3+}$

(iii) $[FeF_6]^{3-}$

[परमाणु क्रमांक : Ni = 28, Co = 27, Fe = 26]

अथवा

(ख) (i) निम्नलिखित संकुल का IUPAC नाम लिखिए :

$[Co(NH_3)_4(H_2O)Cl]Cl_2$

(ii) उभदंती लिगन्ड एवं द्विदंतुर लिगन्ड के बीच में क्या अंतर है ?

(iii) $[Fe(NH_3)_6]^{3+}$ और $[Fe(C_2O_4)_3]^{3-}$ में से कौन-सा संकुल अधिक स्थायी है और क्यों ? *3×1=3*

5. निम्नलिखित सेल के लिए वि.वा. बल (emf) परिकलित कीजिए : *3*

$Zn\,(s)\,|\,Zn^{2+}\,(0{\cdot}01\ M)\ ||\ (0{\cdot}001\ M)\ Ag^{+}\,|\,Ag\,(s)$

दिया गया है : $E^{\ominus}_{Zn^{2+}/Zn} = -0{\cdot}76\ V$ और

$E^{\ominus}_{Ag^{+}/Ag} = +\ 0{\cdot}80\ V$

[log 2 = 0·3010, log 3 = 0·4771, log 10 = 1]

SECTION B

4. (a) Write the hybridisation and magnetic character of the following complexes : *3×1=3*

(i) $[NiCl_4]^{2-}$

(ii) $[Co(NH_3)_6]^{3+}$

(iii) $[FeF_6]^{3-}$

[Atomic number : Ni = 28, Co = 27, Fe = 26]

OR

(b) (i) Write the IUPAC name of the following complex :

$[Co(NH_3)_4(H_2O)Cl]Cl_2$

(ii) What is the difference between an Ambidentate ligand and a Bidentate ligand ?

(iii) Out of $[Fe(NH_3)_6]^{3+}$ and $[Fe(C_2O_4)_3]^{3-}$, which complex is more stable and why ? *3×1=3*

5. Calculate the emf of the following cell : *3*

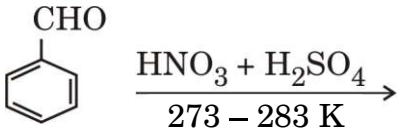
$Zn\,(s)\,|\,Zn^{2+}\,(0{\cdot}01\ M)\ ||\ (0{\cdot}001\ M)\ Ag^{+}\,|\,Ag\,(s)$

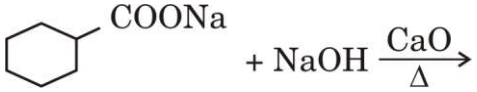
Given : $E^{\ominus}_{Zn^{2+}/Zn} = -0{\cdot}76\ V$ and

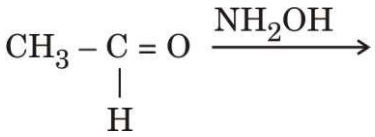
$E^{\ominus}_{Ag^{+}/Ag} = +0{\cdot}80\ V$

[log 2 = 0·3010, log 3 = 0·4771, log 10 = 1]

6. (क) निम्नलिखित में मुख्य उत्पादों को लिखिए : *3×1=3*

(i) 

(ii) 

(iii) 

अथवा

(ख) (i) प्रोपेनोन की अपेक्षा प्रोपेनैल का ऑक्सीकरण आसान होता है । क्यों ?

(ii) आप ऐसीटोफ़ीनॉन और बेन्ज़ोफ़ीनोन के मध्य विभेद कैसे करेंगे ?

(iii) निम्नलिखित व्युत्पन्न की संरचना बनाइए : *3×1=3*
प्रोपेनोन का 2,4-डाइनाइट्रोफेनिलहाइड्रेज़ोन

7. एक प्रथम कोटि की अभिक्रिया को 75% वियोजन होने में 30 मिनट लगते हैं । $t_{1/2}$ की गणना कीजिए । *3*

दिया गया है : [log 2 = 0·3, log 3 = 0·48, log 4 = 0·6, log 5 = 0·7]

8. (क) द्रवविरागी सॉल एवं द्रवरागी सॉल के बीच में तीन अंतर लिखिए । *3*

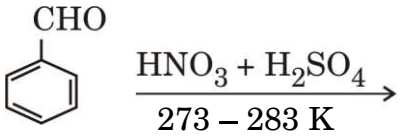
अथवा

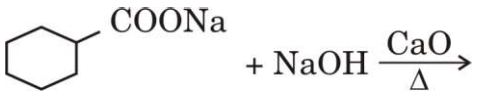
(ख) (i) 'दूध' की परिक्षिप्त प्रावस्था तथा परिक्षेपण माध्यम लिखिए ।

(ii) कोलॉइडी कणों में ब्राउनी गति का कारण क्या है ?

(iii) तापमान के बढ़ने पर भौतिक अधिशोषण क्यों घटता है ? *3×1=3*

6. (a) Write the major products in the following : *3×1=3*

(i) 

(ii) 

(iii) $CH_3 - \underset{\underset{H}{|}}{C} = O \xrightarrow{NH_2OH}$

OR

(b) (i) Oxidation of propanal is easier than propanone. Why ?

(ii) How can you distinguish between Acetophenone and Benzophenone ?

(iii) Draw the structure of the following derivative : *3×1=3*

2,4-Dinitrophenylhydrazone of Propanone

7. A first order reduction takes 30 minutes for 75% decomposition. Calculate $t_{1/2}$. *3*

Given : [log 2 = 0·3, log 3 = 0·48, log 4 = 0·6, log 5 = 0·7]

8. (a) Write three differences between Lyophobic sol and Lyophilic sol. *3*

OR

(b) (i) Write the dispersed phase and dispersion medium of 'milk'.

(ii) What is the cause of Brownian movement in colloidal particles ?

(iii) Why does physisorption decrease with increase in temperature ? *3×1=3*

9.

$E^{\ominus}_{M^{2+}/M}$	Cr	Mn	Fe	Co	Ni	Cu	Zn
	– 0·91	– 1·18	– 0·44	– 0·28	– 0·25	+ 0·34	– 0·76

संक्रमण तत्त्वों की प्रथम पंक्ति के $E^{\ominus}$ मानों के दिए गए आँकड़ों से निम्नलिखित प्रश्नों के उत्तर दीजिए : *3×1=3*

(i) $E^{\ominus}_{Mn^{2+}/Mn}$ मान अन्य तत्त्वों की तुलना में अधिक ऋणात्मक क्यों है ?

(ii) ऊपर दिए गए $E^{\ominus}$ मानों में अनियमितता का क्या कारण है ?

(iii) $E^{\ominus}_{Cu^{2+}/Cu}$ मान अपवाद-स्वरूप धनात्मक क्यों है ?

10. (क) निम्नलिखित अभिक्रियाओं में होने वाले समीकरण लिखिए : *3×1=3*

(i) रोज़ेनमुंड अपचयन

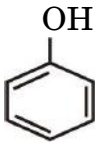
(ii) ईटार्ड अभिक्रिया

(iii) स्टीफैन अभिक्रिया

अथवा

(ख) (i) नीचे प्रदर्शित अम्लों के प्रत्येक युग्म में कौन-सा अम्ल अधिक प्रबल है ? कारण दीजिए । *2+1=3*

(I) CH_3COOH अथवा $F-CH_2-COOH$

(II)  अथवा CH_3-COOH

(ii) पेन्टेन-2-ऑन एवं पेन्टेन-3-ऑन में विभेद कीजिए ।

11. निम्नलिखित के उत्तर दीजिए : *3×1=3*

(i) संक्रमण धातुएँ तथा इनके यौगिक उत्प्रेरकीय सक्रियता दर्शाते हैं ।

(ii) Zn, Cd और Hg संक्रमण तत्त्व नहीं हैं ।

(iii) Zr एवं Hf की परमाणु त्रिज्याएँ लगभग बराबर होती हैं ।

9.

$E^{\ominus}_{M^{2+}/M}$	Cr	Mn	Fe	Co	Ni	Cu	Zn
	– 0·91	– 1·18	– 0·44	– 0·28	– 0·25	+ 0·34	– 0·76

From the given $E^{\ominus}$ values of the first row transition elements, answer the following questions : *3×1=3*

(i) Why is $E^{\ominus}_{Mn^{2+}/Mn}$ value highly negative as compared to other elements ?

(ii) What is the reason for the irregularity in the above $E^{\ominus}$ values ?

(iii) Why is $E^{\ominus}_{Cu^{2+}/Cu}$ value exceptionally positive ?

10. (a) Write the equation involved in the following reactions : *3×1=3*

(i) Rosenmund reduction

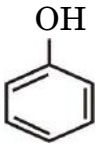
(ii) Etard reaction

(iii) Stephen reaction

OR

(b) (i) Which acid of each pair would you expect to be stronger ? Give reason. *2+1=3*

(I) CH_3COOH or $F - CH_2 - COOH$

(II)  or $CH_3 - COOH$

(ii) Distinguish between Pentan-2-one and Pentan-3-one.

11. Account for the following : *3×1=3*

(i) Transition metals and their compounds show catalytic activities.

(ii) Zn, Cd and Hg are non-transition elements.

(iii) Zr and Hf are of almost identical atomic radii.

खण्ड ग

12. निम्नलिखित अनुच्छेद को पढ़िए तथा दिए गए प्रश्नों के उत्तर दीजिए : *1+1+1+2=5*

ऐमीन, अमोनिया अणु से एक अथवा अधिक हाइड्रोजन परमाणुओं के ऐल्किल/ऐरिल समूहों द्वारा विस्थापन से प्राप्त कार्बनिक यौगिकों का एक महत्त्वपूर्ण वर्ग बनाती हैं । ऐमीन प्राय: नाइट्रो यौगिकों, हैलाइड, ऐमाइड, इत्यादि से बनती हैं । ये हाइड्रोजन आबंधन प्रदर्शित करती हैं जिससे इनके भौतिक गुण प्रभावित होते हैं । ऐल्किल ऐमीन अमोनिया से प्रबल क्षारक होती हैं । ऐरोमैटिक ऐमीनों में इलेक्ट्रॉन विमोचक व अपनयक समूह क्रमश: क्षारकता में वृद्धि एवं कमी करते हैं । ऐमीनों की अभिक्रियाएँ नाइट्रोजन पर उपस्थित असहभाजित इलेक्ट्रॉन युगल की उपलब्धता द्वारा निर्धारित होती हैं । नाइट्रोजन परमाणु पर उपस्थित हाइड्रोजन परमाणुओं की संख्या का अभिक्रियाओं के प्रकार तथा प्राप्त उत्पादों की प्रकृति पर प्रभाव प्राथमिक, द्वितीयक एवं तृतीयक ऐमीनों की पहचान तथा विभेद के लिए उत्तरदायी है । ऐरोमैटिक ऐमीनों की अभिक्रियाशीलता को ऐसिलन प्रक्रिया द्वारा नियंत्रित किया जा सकता है ।

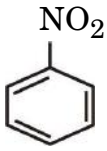
(i) ऐनिलीन फ्रीडेल-क्राफ्ट्स अभिक्रिया क्यों प्रदर्शित नहीं करती ? *1*

(ii) निम्नलिखित को उनके pK_b मानों के बढ़ते हुए क्रम में व्यवस्थित कीजिए : *1*

$C_6H_5NH_2$, NH_3, $C_2H_5NH_2$, $(CH_3)_3N$

(iii) हिन्सबर्ग परीक्षण द्वारा $CH_3CH_2NH_2$ एवं $(CH_3CH_2)_2NH$ के मध्य आप कैसे विभेद कर सकते हैं ? *1*

(iv) (क) निम्नलिखित अभिक्रियाओं में A तथा B की संरचनाएँ लिखिए : *2×1=2*

(I) 

$\xrightarrow{Sn + HCl}$ A $\xrightarrow{Br_2 \text{ जल}}$ B

(II) $CH_3CH_2CONH_2 \xrightarrow{Br_2 / \text{alc. KOH}} A \xrightarrow[\text{पिरिडीन}]{CH_3COCl} B$

अथवा

(ख) निम्नलिखित को आप कैसे परिवर्तित करेंगे : *2×1=2*

(I) बेन्ज़ोइक अम्ल से ऐनिलीन

(II) ऐनिलीन से p-ब्रोमोऐनिलीन

SECTION C

12. Read the following passage and answer the questions that follow : *1+1+1+2=5*

Amines constitute an important class of organic compounds derived by replacing one or more hydrogen atoms of ammonia molecule by alkyl/aryl groups. Amines are usually formed from nitro compounds, halides, amides, etc. They exhibit hydrogen bonding which influences their physical properties. Alkyl amines are found to be stronger bases than ammonia. In aromatic amines, electron releasing and withdrawing groups, respectively increase and decrease their basic character. Reactions of amines are governed by availability of the unshared pair of electrons on nitrogen. Influence of the number of hydrogen atoms at nitrogen atom on the type of reactions and nature of products is responsible for identification and distinction between primary, secondary and tertiary amines. Reactivity of aromatic amines can be controlled by acylation process.

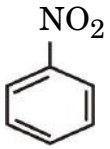
(i) Why does aniline not give Friedel-Crafts reaction ? *1*

(ii) Arrange the following in the increasing order of their pK_b values : *1*

$C_6H_5NH_2$, NH_3, $C_2H_5NH_2$, $(CH_3)_3N$

(iii) How can you distinguish between $CH_3CH_2NH_2$ and $(CH_3CH_2)_2NH$ by Hinsberg test ? *1*

(iv) (a) Write the structures of A and B in the following reactions : *2×1=2*

(I)  $\xrightarrow{Sn + HCl}$ A $\xrightarrow{Br_2 \text{ water}}$ B

(II) $CH_3CH_2CONH_2 \xrightarrow{Br_2 / \text{alc. KOH}} A \xrightarrow[\text{Pyridine}]{CH_3COCl} B$

OR

(b) How will you convert the following : *2×1=2*

(I) Benzoic acid to aniline

(II) Aniline to p-bromoaniline

Strictly Confidential: (For Internal and Restricted use only)

Senior Secondary School Term–II Examination, 2022

Marking Scheme: CHEMISTRY (Subject Code: 043)

[Paper Code: 56/2/1]

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2. **"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under IPC."**
3. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.**
4. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluators will mark(√) wherever answer is correct. For wrong answer 'X" be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
6. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left-hand margin and encircled. This may be followed strictly.
7. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
8. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
9. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks 0-35 has to be used. Please do not hesitate to award full marks if the answer deserves it.
11. Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 30 answer books per day in main subjects and 35 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.
12. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
    - Leaving answer or part thereof unassessed in an answer book.
    - Giving more marks for an answer than assigned to it.

- Wrong totaling of marks awarded on a reply.
- Wrong transfer of marks from the inside pages of the answer book to the title page.
- Wrong question wise totaling on the title page.
- Wrong totaling of marks of the two columns on the title page.
- Wrong grand total.
- Marks in words and figures not tallying.
- Wrong transfer of marks from the answer book to online award list.
- Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
- Half or a part of answer marked correct and the rest as wrong, but no marks awarded.

13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.

14. Any unassessed portion, non-carrying over of marks to the title page, or totalling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

15. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.

16. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.

17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

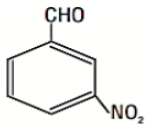
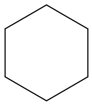
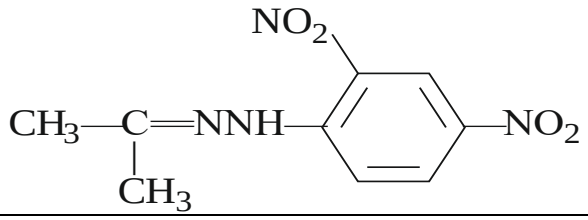
MARKING SCHEME

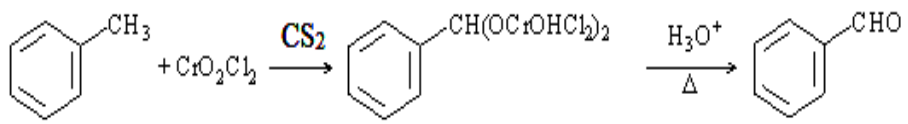
Senior Secondary School Examination TERM–II, 2022

CHEMISTRY (Subject Code–043)

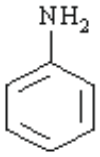
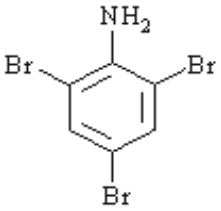
[Paper Code: 56/2/1]

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks
	SECTION—A	
1.	*(i)* $CH_3CH_2CHO \xrightarrow[\text{conc. HCl}]{Zn(Hg)} CH_3CH_2CH_3$ *(ii)* $CH_3CHO \xrightarrow{\text{dil. NaOH}} CH_3\underset{\underset{OH}{|}}{CH}—CH_2—CHO \xrightarrow[-H_2O]{\Delta} CH_3—CH=CH—CHO$ *(iii)* $CH_3COOH \xrightarrow[\Delta]{NH_3} CH_3CONH_2$ (or any other correct method of conversion) (Any *two*)	1×2
2.	*(i)* Rate $= \frac{-\Delta(N_2)}{\Delta t} = \frac{-1}{3}\frac{\Delta(H_2)}{\Delta t} = \frac{+1}{2}\frac{\Delta(NH_3)}{\Delta t}$ Rate $= \frac{1}{2} \times 3 \cdot 6 \times 10^{-4}$ mol L^{-1} $s^{-1} = 1 \cdot 8 \times 10^{-4}$ mol L^{-1} s^{-1} *(ii)* $\frac{-\Delta(H_2)}{\Delta t} = 3 \times 1 \cdot 8 \times 10^{-4}$ mol L^{-1} $s^{-1} = 5 \cdot 4 \times 10^{-4}$ mol L^{-1} s^{-1}	1 1
3.	*(i)* Limiting molar conductivity is equal to the sum of individual contributions of the anion and cation of the electrolyte. *(ii)* $\alpha = \frac{\wedge_m}{\wedge_{m^\circ}}$ $= \frac{48}{400} = 0 \cdot 12$	1 1
	SECTION—B	
4.	*(a)* *(i)* sp^3, paramagnetic *(ii)* d^2sp^3, diamagnetic *(iii)* sp^3d^2, paramagnetic	½+½ ½+½ ½+½
4.	**OR** *(b)* *(i)* Tetraammineaquachloridocobalt (III) chloride *(ii)* Ambidentate ligand is a ligand which has two different donor atoms and either of the two ligates with metal atom or ion in the complex whereas when a ligand ligates through two donor atoms is called a bidentate ligand. *(iii)* $[Fe(C_2O_4]_3]^{3-}$, due to chelate effect / due to cyclic structure.	1 1 ½ + ½
5.	$E_{cell} = (E^\circ_C - E^\circ_A) - \frac{0 \cdot 059}{2} \log \frac{[Zn^{2+}]}{[Ag^+]^2}$	1

	$= [0 \cdot 80 - (-0 \cdot 76)] - \frac{0 \cdot 059}{2} \log \frac{(0 \cdot 01)}{(0 \cdot 001)^2}$ $= 1 \cdot 56 - \frac{0 \cdot 059}{2} \log 10^4$ $= (1 \cdot 56 - 0 \cdot 118)\ \text{V}$ $E_{\text{cell}} = 1 \cdot 442\ \text{V}$ (Deduct ½ marks if no or incorrect unit)	1 1
6.	*(a)* *(i)*  / m-Nitrobenzaldehyde *(ii)*  / Cyclohexane *(iii)* $CH_3—\underset{\displaystyle H}{\overset{\displaystyle |}{C}}=N—OH$ / Ethanal oxime	1×3
6.	**OR** *(b)* *(i)* Because of oxidation of propanal involves cleavage of C—H bond which is weaker than C—C bond of propanone. *(ii)* On heating with NaOH and I_2, acetophenone gives yellow precipitate of iodoform whereas benzophenone does not. *(iii)* 	1 1 1
7.	$\mathbf{k} = \frac{2 \cdot 303}{t} \log \frac{(R)_0}{(R)}$ $\mathbf{k} = \frac{2 \cdot 303}{30} \log \frac{100}{25}$ $\mathbf{k} = \frac{2 \cdot 303}{30} \log 4 = 0 \cdot 046\ \text{min}^{-1}$ $t_{1/2} = \frac{0 \cdot 693}{\mathbf{k}}$ $= \frac{0 \cdot 693}{0 \cdot 046}$ $t_{1/2} = 15\ \text{min}$ (Deduct ½ marks if no or incorrect unit) (or any other correct method)	½ ½ ½ ½ 1
8.	*(a)* ***Lyophobic Sol*** / ***Lyophilic Sol*** Solvent repelling / Solvent loving Irreversible / Reversible Unstable / Stable Easy to coagulate / Difficult to coagulate (Any *three*)	1×3

8.	**OR** *(b) (i)* Dispersed phase = liquid and dispersion medium = liquid *(ii)* Unbalanced bombardment of the colloidal particles by the molecules of dispersion medium. *(iii)* Because it is exothermic in nature / weak bonds between adsorbate and adsorbent break.	 1 1 1
9.	*(i)* Because of the stable half-filled $3d^5$ configuration in Mn^{2+}. *(ii)* Because of the irregular sum of $(\Delta_i H_1 + \Delta_i H_2)$ values and much less sublimation enthalpies for Mn and V. *(iii)* Because of high $\Delta_a H^0$ and low $\Delta_{hyd} H^0$	1 1 1
10.	*(a) (i)* $RCOCl + H_2 \xrightarrow{Pd \cdot BaSO_4} RCHO + HCl$ *(ii)*  *(iii)* $R{-}CN \xrightarrow{SnCl_2 + HCl} RCH{=}NH \xrightarrow{H_3O^+} RCHO + NH_3$ (If equation is not given and only explanation or statement is given, give ½ mark /Award Full marks for the equation with conditions). (or any other suitable equation)	 1×3
10.	**OR** *(b) (i)* (I) $F\text{-}CH_2COOH$, due to -I effect of F. (II) CH_3COOH, acetate ion is more resonance stabilised than phenoxide ion. *(ii)* Heat both the compounds with NaOH and I_2, pentan-2-one gives yellow ppt. of iodoform while pentan-3-one does not. (Or any other suitable test)	 ½, ½ ½, ½ 1
11.	*(i)* Variable or multiple oxidation state / ability to form complexes / they provide large surface area for adsorption (utilises (n-1) d and ns electrons for bonding). *(ii)* Zn, Cd and Hg have completely filled *d*-orbitals in its ground state as well as in its oxidised state. *(iii)* Because of lanthanoid contraction / poor shielding effect of 4f orbitals.	 1×3
	SECTION—C	
12.	*(i)* Aniline is a Lewis base and it reacts with $AlCl_3$ to form a salt / N of aniline acquires positive charge with $AlCl_3$ and hence is a deactivating group. *(ii)* $(CH_3)_3N < C_2H_5NH_2 < NH_3 < C_6H_5NH_2$ / $C_2H_5\ NH_2 < (CH_3)_3N < NH_3 < C_6H_5NH_2$ (As no medium (aqueous /gaseous) or phase is given both answers to be considered). *(iii)* Add Hinsberg reagent (benzene sulphonyl chloride) to both the compounds. $CH_3CH_2NH_2$ gives ppt. that is soluble in alkali while the ppt. formed by $(CH_3CH_2)_2$ NH is insoluble in alkali.	1 1 1

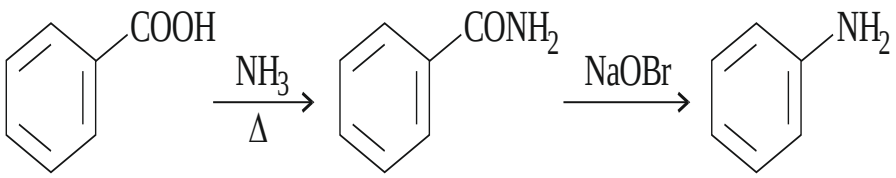
(iv) (a)

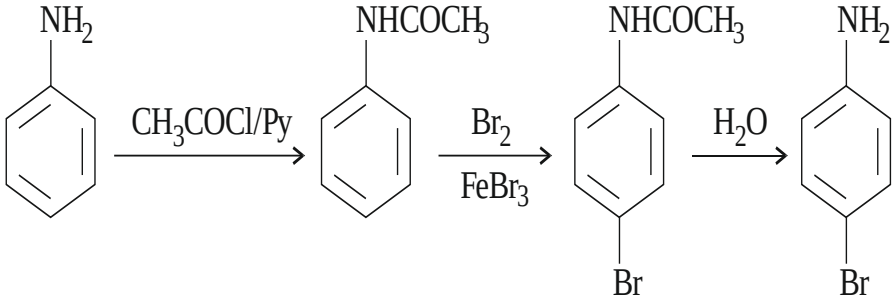
(I) (A)  (B)  ½+½

(II) (A) $CH_3CH_2NH_2$ (B) $CH_3CH_2NHCOCH_3$ ½+½

OR

(b)

(I)  1

(II) 

(or any other suitable method of conversion) 1

* * *