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 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 **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
Time allowed : 2 hours

अधिकतम अंक : 35
Maximum Marks : 35

खण्ड क

1. निम्नलिखित को उनके इंगित गुणधर्म के बढ़ते क्रम में व्यवस्थित कीजिए : 1×2=2

   (a) एथेनॉल, प्रोपेनोन, प्रोपेनॉल, ब्यूटेनोन (नाभिकरागी योगज के प्रति सक्रियता)

   (b) 4-नाइट्रोबेन्ज़ोइक अम्ल, बेन्ज़ोइक अम्ल, 3,4-डाइनाइट्रोबेन्ज़ोइक अम्ल, 4-मेथॉक्सीबेन्ज़ोइक अम्ल (अम्लता सामर्थ्य)

2. निम्नलिखित अभिक्रियाओं की व्याख्या कीजिए : 1×2=2

   (a) क्लीमेन्सन अपचयन

   (b) स्टीफैन अभिक्रिया

3. निम्नलिखित प्रश्नों के उत्तर लिखिए (कोई दो) : 1×2=2

   (a) किसी अभिक्रिया के वेग स्थिरांक की निम्नलिखित इकाई से उस अभिक्रिया की कोटि की पहचान कीजिए :

   $Lmol^{-1}s^{-1}$

   (b) अणु A का B में रूपांतरण द्वितीय कोटि की बलगतिकी के अनुरूप होता है। यदि A की सांद्रता तीन गुनी कर दी जाए तो B के निर्माण होने के वेग पर क्या प्रभाव पड़ेगा ?

   (c) शून्य कोटि की अभिक्रिया के लिए समाकलित वेग समीकरण का व्यंजक लिखिए।

खण्ड ख

4. (क) (i) स्कंदन की परिभाषा लिखिए। 1×3=3

   (ii) हार्डी-शुल्से नियम लिखिए।

   (iii) वैद्युत कण संचलन क्या है ?

अथवा

   (ख) भौतिक अधिशोषण एवं रासायनिक अधिशोषण के मध्य तीन अंतर लिखिए। 1×3=3

Read the following instructions very carefully and strictly follow them:

1. *This question paper contains **12** questions. **All** questions are compulsory.*

2. *This question paper comprises of **three** sections- **Section A, B** and **C**.*

3. ***Section A** – Q. No. 1 to 3 are very short-answer type questions carrying **2** marks each.*

4. ***Section B** – Q. No. 4 to 11 are short-answer type questions carrying **3** marks each.*

5. ***Section C** – Q. No. 12 is case based question carrying **5** marks.*

6. *Use of log tables and calculators is **not** allowed.*

SECTION A

1. Arrange the following in the increasing order of their property indicated : $1\times2=2$

    (a) Ethanal, Propanone, Propanal, Butanone (reactivity towards nucleophilic addition)

    (b) 4-Nitrobenzoic acid, benzoic acid, 3,4-Dinitrobenzoic acid, 4-Methoxy benzoic acid (Acid strength)

2. Explain the following reactions : $1\times2=2$

    (a) Clemmensen reduction 1

    (b) Stephen reaction 1

3. Answer the following questions (Do any two) : $1\times2=2$

    (a) Identify the order of reaction from the following unit for its rate constant : $L mol^{-1}s^{-1}$

    (b) The conversion of molecules A to B follow second order kinetics. If concentration of A is increased to three times, how will it affect the rate of formation of B?

    (c) Write the expression of integrated rate equation for zero order reaction.
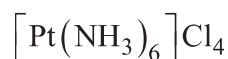
SECTION B

4. (a) (i) Define coagulation. $1\times3=3$

        (ii) State Hardy-Schulze rule.

        (iii) What is Electrophoresis?

        OR

    (b) Write three differences between Physisorption and Chemisorption. $1\times3=3$

5. (क) (i) निम्न संकुल का IUPAC नाम लिखिए :   1×3=3

$$\left[Pt(NH_3)_6 \right] Cl_4$$

(ii) क्रिस्टल क्षेत्र सिद्धांत के आधार पर d^4 आयन का इलेक्ट्रॉनिक विन्यास लिखिए, यदि $\Delta_0 < P$ हो।

(iii) हेट्रोलेप्टिक संकुल क्या हैं ?

अथवा

(ख) (i) IUPAC नियमों के आधार पर निम्नलिखित के लिए सूत्र लिखिए :   2+1=3
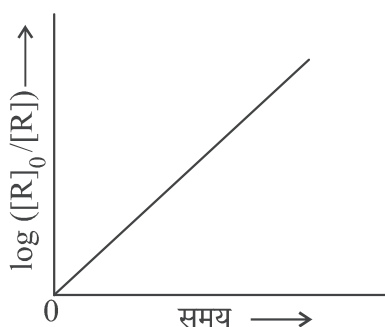
(i.i) पेन्टाऐम्मीननाइट्रिटो-N-कोबाल्ट (III)

(i.ii) टेट्राहाइड्रोऑक्साइडोजिंकेट (II)

(ii) क्रिस्टल क्षेत्र विपाटन ऊर्जा क्या है ?

6. (a) लैन्थेनॉयड आकुंचन के कोई दो परिणाम लिखिए।   2+1=3

(b) 3d श्रेणी के उस तत्त्व का नाम लिखिए जो ऑक्सीकरण अवस्थाओं की सर्वाधिक संख्या प्रदर्शित करता है। कारण दीजिए।

7. चित्र में दिए गए आलेख का अवलोकन कीजिए और निम्न प्रश्नों के उत्तर लिखिए :   1×3=3

(a) अभिक्रिया की कोटि क्या है ?

(b) वक्र का ढाल क्या है ?

(c) k और $t_{1/2}$ (अर्धायु काल) के मध्य संबंध लिखिए।

8. निम्नलिखित कथनों के लिए कारण दीजिए :   1×3=3

(a) स्कैंडियम (Z=21) एक संक्रमण तत्त्व है किन्तु Zn (Z=30) नहीं है।

(b) $[Ti(H_2O)]^{3+}$ रंगीन है जबकि $[Sc(H_2O)_6]^{3+}$ रंगहीन है।

(c) संक्रमण तत्त्वों की 4d और 5d श्रेणियाँ अपेक्षा से अधिक एकसमान हैं।

5. (a) (i) Write the IUPAC name of the following complex :   1×3=3

$$\left[Pt(NH_3)_6\right]Cl_4$$

      (ii) On the basis of crystal field theory, write the electronic configuration of d^4 ion, if $\Delta_0 < P$.

      (iii) What are Heteroleptic complexes?

<div align="center">OR</div>

  (b) (i) Using IUPAC norms write the formulas for the following :   2+1=3
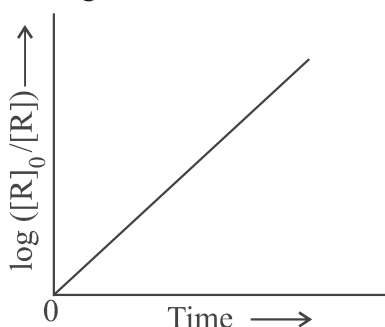
      (i.i) Pentaamminenitrito-N-Cobalt (III)

      (i.ii) Tetrahydroxidozincate (II)

      (ii) What is crystal field splitting energy ?

6. (a) Write any two consequences of Lanthanoid Contraction.   2+1=3

  (b) Name the element of 3d series which exhibits the largest number of oxidation states. Give reason.

7. Observe the graph shown in figure and answer the following questions :   1×3=3

(a) What is the order of the reaction ?

(b) What is the slope of the curve?

(c) Write the relationship between k and $t_{1/2}$ (half life period)

8. Give reasons for the following statements :   1×3=3

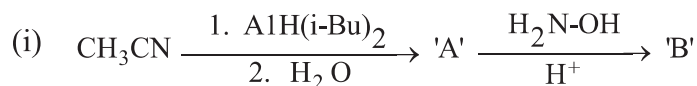(a) Scandium (Z=21) is a transition element but Zn (Z=30) is not.

(b) $[Ti(H_2O)]^{3+}$ is coloured while $[Sc(H_2O)_6]^{3+}$ is colourless.

(c) Physical and chemical properties of the 4d and 5d series of the transition elements are quite similar than expected.
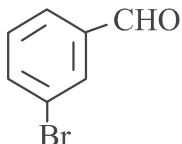
9. (क) निम्नलिखित को पूर्ण कीजिए: $1 \times 3 = 3$

(i) $CH_3CN \xrightarrow[\text{2. } H_2O]{\text{1. } AlH(i\text{-}Bu)_2} 'A' \xrightarrow[H^+]{H_2N\text{-}OH} 'B'$

(ii) निम्नलिखित यौगिक का IUPAC नाम लिखिए:

(iii) निम्नलिखित यौगिकों के मध्य विभेद करने के लिए रासायनिक परीक्षण लिखिए:
फ़ीनॉल और बेन्ज़ोइक अम्ल

अथवा

(ख) निम्नलिखित रूपान्तरण कीजिए: $1 \times 3 = 3$

(i) बेन्ज़ोइक अम्ल से बेन्ज़ैल्डिहाइड

(ii) प्रोपेन–1–ऑल से 2–ब्रोमोप्रोपेनोइक अम्ल

(iii) ऐसीटैल्डिहाइड से ब्यूट–2–ईनैल

10. एक प्राथमिक ऐमीन 'A' C_2H_7N ऐल्किल हैलाइड (C_2H_5I) के साथ अभिक्रिया करके द्वितीयक ऐमीन 'B' देता है। 'B', $C_6H_5SO_2Cl$ के साथ अभिक्रिया करके एक ठोस 'C' देता है जो क्षार में अविलेय है। 'A', 'B' और 'C' की पहचान कीजिए और सभी संबद्ध रासायनिक अभिक्रियाएं लिखिए। 3

11. (क) निम्नलिखित के लिए कारण लिखिए: $1 \times 3 = 3$

(i) मेथिलऐमीन की तुलना में ऐनिलीन का pk_b मान अधिक होता है।

(ii) ऐनिलीन फ्रीडेल–क्राफ्ट्स अभिक्रिया नहीं देता है।

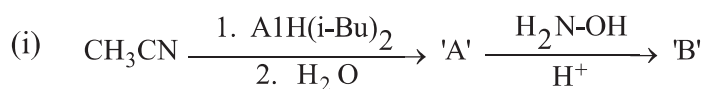(iii) तृतीयक ऐमीनों की तुलना में प्राथमिक ऐमीनों के क्वथनांक उच्चतर होते हैं।

अथवा

(ख) (i) निम्नलिखित यौगिकों को जलीय विलयन में उनकी क्षारकता सामर्थ्य के बढ़ते क्रम में व्यवस्थित कीजिए: $1 \times 3 = 3$
CH_3NH_2, $(CH_3)_3N$, $(CH_3)_2NH$

(ii) हिन्सबर्ग अभिकर्मक क्या है?

(iii) ऐमीनों की ऐसिलन अभिक्रिया में पिरीडीन की भूमिका क्या है?

9. (a) Complete the following : 1×3=3
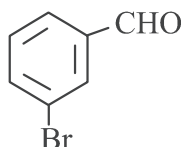
(i) $CH_3CN \xrightarrow[\text{2. } H_2O]{\text{1. } AlH(i\text{-}Bu)_2} \text{ 'A' } \xrightarrow[H^+]{H_2N\text{-}OH} \text{ 'B'}$

(ii) Write IUPAC name of the following compound:

(iii) Write chemical test to distinguish between the following compounds :
Phenol and Benzoic acid

OR

(b) Convert the following : 1×3=3

(i) Benzoic acid to Benzaldehyde

(ii) Propan-1-ol to 2-Bromopropanoic acid

(iii) Acetaldehyde to But-2-enal

10. A primary amine 'A' C_2H_7N reacts with alkyl halide (C_2H_5I) to give secondary amine 'B'. 'B' reacts with $C_6H_5SO_2Cl$ to give a solid 'C' which is insoluble in alkali. Identify 'A', 'B', 'C' and write all the chemical reactions involved. 3
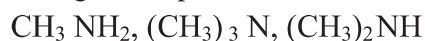
11. (a) Account for the following : 1×3=3

(i) pk_b of aniline is more than that of methylamine.

(ii) Aniline does not undergo Friedel-Crafts reaction.

(iii) Primary amines have higher boiling points than tertiary amines.

OR

(b) (i) Arrange the following compounds in the increasing order of their basic strength in aqueous solution : 1×3=3
CH_3NH_2, $(CH_3)_3N$, $(CH_3)_2NH$

(ii) What is Hinsberg's reagent ?

(iii) What is the role of pyridine in the acylation reaction of amines?

12. नीचे दिए गए अनुच्छेद को पढ़िए और निम्नलिखित प्रश्नों के उत्तर लिखिए : 1+1+1+2=5

ऑक्सीकरण–अपचयन अभिक्रियाएं सामान्यतः रेडॉक्स अभिक्रियाओं के रूप में जानी जाती हैं। ये एक स्पीशीज़ से दूसरी में इलेक्ट्रॉन स्थानांतरण से संबद्ध होती हैं। एक स्वतः प्रवर्तित अभिक्रिया में उत्सर्जित ऊर्जा को लाभदायक कार्य करने के लिए उपयोग किया जा सकता है। अभिक्रिया को दो अर्ध अभिक्रियाओं में विपाटन किया जाता है। भिन्न पात्रों का उपयोग किया जाता है और इलेक्ट्रॉनों को एक ओर से दूसरी ओर संचालन हेतु एक तार उपयोग में लाया जाता है और इस प्रकार एक वोल्टाई/गैल्वेनी सेल बन जाता है। यह एक वैद्युत रासायनिक सेल है जो स्वतः प्रवर्तित रेडॉक्स अभिक्रियाओं को विद्युत उत्पादन हेतु उपयोग करता है। एक लवण–सेतु दो अर्ध–सेलों को जोड़ता है। वोल्टमीटर का पाठ्यांक सेल वोल्टेज या सेल विभव या सेल वैद्युत वाहक बल बताता है। यदि $E^o_{सेल}$ धनात्मक है तो अभिक्रिया स्वतः प्रवर्तित है और यदि यह ऋणात्मक है तो अभिक्रिया स्वतः अप्रवर्तित है और इसे वैद्युत अपघटनी सेल के रूप में उल्लिखित किया जाता है। वैद्युत अपघटन को किसी पदार्थ के विद्युत द्वारा अपघटन के रूप में उल्लिखित किया जाता है। किसी सेल में से जब एक मोल आवेश प्रवाहित किया जाता है तो यह Cu^{2+} जैसे द्विसंयोजक धात्विक आयन के अर्ध मोल को विसर्जित करता है। यह फैराडे ने सर्वप्रथम वैद्युत अपघटन के नियमों के रूप में प्रतिपादित किया था।

पदार्थ का चालकत्व, पदार्थों का वह गुणधर्म है जिसके अनुसार वह आयनों को अपने में से प्रवाहित होने देता है और इस प्रकार विद्युत धारा का चालन करता है। चालकता को k से निरूपित किया जाता है जो वैद्युत अपघट्य की प्रकृति एवं सांद्रता पर निर्भर करती है। एक अधिक सामान्य पद विलयन की मोलर चालकता है जो दी हुई सांद्रता पर विलयन के उस आयतन का चालकत्व है जिसमें वैद्युत अपघट्य का एक मोल घुला हुआ हो और वह परस्पर इकाई दूरी पर स्थित, इकाई अनुप्रस्थ–काट क्षेत्रफल के दो इलेक्ट्रॉडों के मध्य रखा गया हो। दुर्बल वैद्युत अपघट्य की सीमांत मोलर चालकता आलेखीय विधि द्वारा प्राप्त नहीं की जा सकती है।
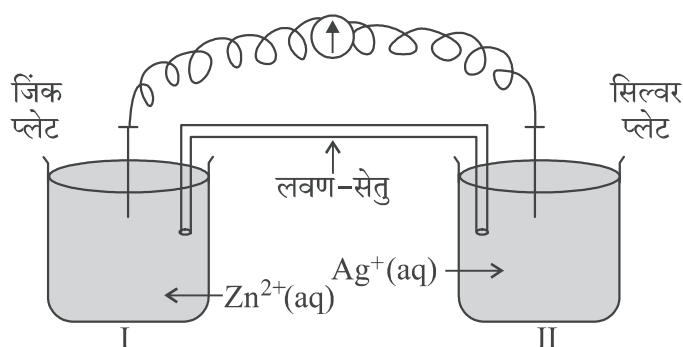
SECTION C

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

Oxidation-reduction reactions are commonly known as redox reactions. They involve transfer of electrons from one species to another. In a spontaneous reaction, energy is released which can be used to do useful work. The reaction is split into two half reactions. Two different containers are used and a wire is used to drive the electrons from one side to the other and a Voltaic/Galvanic cell is created. It is an electrochemical cell that uses spontaneous redox reactions to generate electricity. A salt bridge also connects to the half cells. The reading of the voltmeter gives the cell voltage or cell potential or electromotive force. If E^o_{cell} is positive the reaction is spontaneous and if it is negative the reaction is non-spontaneous and is referred to as electrolytic cell. Electrolysis refers to the decomposition of a substance by an electric current. One mole of electric charge when passed through a cell will discharge half a mole of a divalent metal ion such as Cu^{2+}. This was first formulated by Faraday in the form of laws of electrolysis.

The conductance of material is the property of materials due to which a material allows the flow of ions through itself and thus conducts electricity. Conductivity is represented by k and it depends upon nature and concentration of electrolyte, temperature etc. A more common term molar conductivity of a solution at a given concentration is conductance of the volume of solution containing one mole of electrolyte kept between two electrodes with the unit area of cross-section and distance of unit length. Limiting molar conductivity of weak electrolytes cannot be obtained graphically.
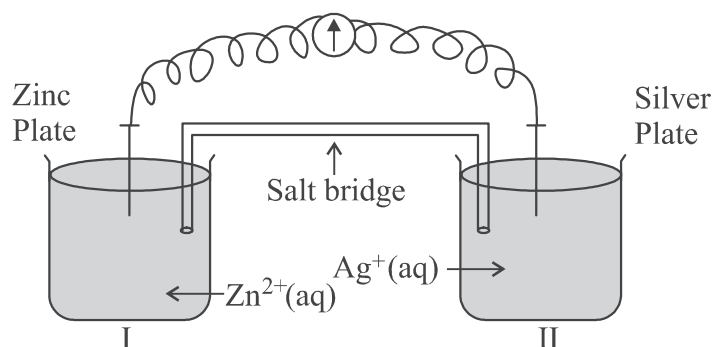
(a) क्या सिल्वर प्लेट एनोड है अथवा कैथोड ? 1

(b) क्या होगा जब लवण–सेतु को हटा दिया जाए ? 1

(c) वैद्युत रासायनिक सेल कब वैद्युत अपघटनी सेल की भांति व्यवहार करता है ? 1

(d) (i) जब $E_{सेल} = 0$ हो तो Zn^{2+} और Ag^+ आयनों की सांद्रता को क्या होगा ? 1×2=2

(ii) विलयन की चालकता तनुता के साथ क्यों घटती है ?

अथवा

(d) एक वैद्युत अपघट्य के 1.5 M विलयन की मोलर चालकता 138.9 S cm² mol⁻¹ है। इस विलयन की चालकता परिकलित कीजिए। 2

_____

(a) Is silver plate the anode or cathode?   1

(b) What will happen if the salt bridge is removed?   1

(c) When does electrochemical cell behaves like an electrolytic cell?   1

(d) (i) What will happen to the concentration of Zn^{2+} and Ag^+ when $E_{cell} = 0$.   1×2=2

   (ii) Why does conductivity of a solution decreases with dilution?

OR

(d) The molar conductivity of a 1.5 M solution of an electrolyte is found to be   2
   138.9 S cm^2 mol^{-1}. Calculate the conductivity of this solution.

Senior Secondary School Term–II Examination, 2022

Marking Scheme: CHEMISTRY (Subject Code: 043)

[Paper Code: 56/5/2]

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: 56/5/2]

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks
	SECTION—A	
1.	(a) Butanone < Propanone < Propanal < Ethanal	1
	(b) 4-Methoxybenzoic acid < Benzoic acid < 4-Nitrobenzoic acid < 3,4-Dinitrobenzoic acid	1
2.	(a)	1
	(b)	
	(or any other suitable equation)	1
	(If equation is not given and only explanation or statement is given, give ½ mark / Award full marks for the equation with appropriate conditions)	
3.	(a) Second order	
	(b) Nine or 9 times	
	(c) $k = \dfrac{[R]_0 - [R]}{t}$	
	(Any two)	1×2
	SECTION—B	
4.	(a) (i) **Coagulation**: The settling of colloidal particles / conversion of colloidal sol into precipitate.	1
	(ii) **Hardy-Schulze rule:** Greater the valence of the flocculating ion added, greater is its power to cause precipitation / Greater the charge of oppositely charged ion added, greater is its power to cause precipitation.	1
	(iii) **Electrophoresis**: The movement of colloidal particles under an applied electric potential.	1
4.	**OR**	
	(b)	

	Physisorption	Chemisorption
1.	Arise from weak van der Waals forces	Strong chemical bonds
2.	Reversible	Irreversible
3.	Multimolecular layers	Unimolecular layer

	(or any other correct difference)	1×3
5.	(a) (i) Hexaammineplatinum (IV) chloride	1
	(ii) $t_{2g}^3 e_g^1$	1
	(iii) Complexes in which a metal atom / ion is bound to more than one kind of donor groups / ligands.	1

5.	**OR**	
	(b) (i) (i.i) $[Co(NH_3)_5NO_2]^{2+}$ (i.ii) $[Zn(OH)_4]^{2-}$	1+ 1
	(ii) The energy separation between t_{2g} and e_g levels (splitting of d orbitals) due to the presence of ligands.	1
6.	*(a)* *(i)* Similarity in the size of the atoms of the elements belonging to same group of 2nd / 4d and 3rd/ 5d transition series / the second and the third *d*-series exhibit similar atomic / ionic radii. *(ii)* Difficulty in separation of Lanthanoids in pure state. *(iii)* Similar physical and chemical properties. *(iv)* Basic character of the lanthanide hydroxides $M(OH)_3$ decreases with increase in atomic number. (Any two consequences) *(b)* Mn, it has maximum number of unpaired electrons / It has maximum number of electrons that will participate in bonding.	1 x 2 ½ + ½
7.	*(a)* First order (b) Slope = k / 2.303 (c) $k = \dfrac{0\cdot693}{t_{1/2}}$	1 1 1
8.	*(a)* Sc has incompletely filled 3*d*-orbital in its ground state but Zn atom has completely filled *d*-orbitals in its ground state as well as in its oxidised state. *(b)* Due to *d-d* transition of electron in Ti^{3+} but no d-d transition in Sc^{3+} / Due to presence of unpaired electron in Ti^{3+} while Sc^{3+} does not have unpaired electrons. **(Give one mark if question is attempted in any way because the formula of Ti complex is wrong)** *(c)* Due to lanthanoid contraction / due to poor shielding effect of 4f orbitals.	1 1 1 1
9.	*(a)* (i) $A=CH_3CHO$, $B=$ *(ii)* 3-Bromobenzaldehyde / 3-Bromobenzene carbaldehyde *(iii)* Benzoic acid gives brisk effervescence liberating carbon dioxide on reaction with sodium hydrogen carbonate while phenol does not. / In terms of chemical reaction mentioning brisk effervescence. (Or any other suitable test)	½+½ 1 1
9.	**OR** *(b)* (i)	1

	(ii) $CH_3CH_2CH_2OH \xrightarrow[\text{2. } H_3O^+]{\text{1. Alk. } KMnO_4} CH_3CH_2COOH$ $\xrightarrow[(ii)\ H_2O]{(i)\ Br_2/\text{Red P}}$ $CH_3—\underset{\underset{Br}{|}}{CH}—COOH \leftarrow$	1
	(iii) (Or any other suitable method of conversion)	1
10.	A= $CH_3CH_2NH_2$ / Ethanamine, B= $(C_2H_5)_2NH$ / N-Ethyl ethanamine, C = $C_6H_5SO_2N(C_2H_5)_2$ / N, N-Diethylbenzenesulphonamide $CH_3CH_2NH_2 \xrightarrow{\textbf{C}_2\textbf{H}_5\textbf{I}} (C_2H_5)_2NH$ $(C_2H_5)_2NH \xrightarrow{C_6H_5SO_2Cl} C_6H_5SO_2N(C_2H_5)_2$	1+ ½ + ½ ½ + ½
11.	*(a)* (i) lone pair of electrons are delocalised over benzene ring due to resonance, electron density decreases and hence less available for protonation / Due to electron withdrawing nature of the aryl group in aniline while electron donating nature of methyl group in methyl amine /Aniline is a weaker base than methylamine. (ii) 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. (iii) Presence of intermolecular hydrogen bonding in primary amines which is absent in tertiary amines.	1 1 1
11.	**OR**	
	(b) (i) $(CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$ (ii) $C_6H_5SO_2Cl$/ Benzenesulphonyl chloride (iii) Pyridine is used to remove HCl from the reaction mixture.	1 1 1
12.	*(a)* Ag acts as cathode	1
	(b) Cell will stop working /No current flows / E_{cell} become zero / Electrical neutrality gets disturbed.	1
	(c) $E_{external} > E_{cell}$ / $E_{ext} > E_{int}$. *(d) (i)* Concentration of Zn^{2+} and Ag^+ ions will not change / Cell attains	1

equilibrium	1
(ii) Because the number of ions per unit volume decreases.	1
OR	1
$\Lambda_m = \dfrac{\kappa \times 1000}{M}$	½
$\kappa = \dfrac{\Lambda_m \times M}{1000}$	
$\kappa = \dfrac{138 \cdot 9 \ \text{S cm}^2 \, \text{mol}^{-1} \times 1 \cdot 5 \, \text{mol L}^{-1}}{1000 \, \text{cm}^3 \text{L}^{-1}}$	
$= 0 \cdot 208 \ \text{S cm}^{-1}$ (Deduct ½ mark for incorrect unit or no unit)	½
	1

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