SP-IV/Chemistry-404/SEC-2/19

B.Sc. 4th Semester (Programme) Examination, 2019

CHEMISTRY

[Pharmaceutical Chemistry (T_2)]

Paper : SPCHE/404/SEC-2

Course ID : 41410

Time : 2 Hours **Full Marks : 40**

The figures in the right hand side margin indicate marks.
Candidates are required to give their answers in their own words as far as practicable.

দক্ষিণ প্রান্তস্থ সংখ্যাগুলি প্রশ্নের পূর্ণমানের নির্দেশক।
পরীক্ষার্থীদের যথাসম্ভব নিজের ভাষায় উত্তর দিতে হবে।

1. Answer *any five* questions: 2×5=10
যে কোনো পাঁচটি প্রশ্নের উত্তর দাও ঃ

(a) What are drugs?
ড্রাগ কী?

(b) What is fermentation?
সন্ধান প্রক্রিয়া (fermentation) বলতে কী বোঝো?

(c) Give name of the two foods rich in Vitamin C.
ভিটামিন সি যুক্ত দুটি খাদ্যের নাম লেখো।

(d) What do you mean by antipyretic agents? Give example.
জ্বররোধী ঔষধ বলতে কী বোঝো? উদাহরণ দাও।

(e) What is LD_{50}?
LD_{50} কী?

(f) Name the raw materials used for the industrial production of alcohol (at least two).
শিল্পপদ্ধতিতে অ্যালকোহল তৈরির দুটি কাঁচামালের নাম লেখো।

(g) Give two examples of water soluble vitamin.
জলে দ্রবীভূত হয় এমন দুটি ভিটামিন-এর নাম লেখো।

(h) Give two examples of anticancer drug.
ক্যানসাররোধী দুটি ড্রাগ-এর নাম লেখো।

2. Answer *any four* questions: 5×4=20

যে কোনো চারটি প্রশ্নের উত্তর দাও ঃ

(a) Write down the name of one sulpha-drug. Describe its synthesis. Mention the limitations of sulpha drugs. 1+3+1=5

একটি সালফা ড্রাগের নাম লেখো। এর সংশ্লেষণ আলোচনা করো। সালফা ড্রাগের সীমাবদ্ধতা উল্লেখ করো।

(b) What is rectified spirit? How is it obtained from dilute fermented liquor? 2+3=5

রেকটিফায়েড স্পিরিট কী? লঘু সন্ধান পানীয় থেকে কীভাবে এটি পাওয়া যায়?

(c) What is Lysine? Give its structure. What kind of amino acid is Lysine? What is its role in human body? 1+1+1+2=5

লাইসিন কী? এর গঠনাকৃতি দেখাও। এটি কী ধরনের অ্যামিনো অ্যাসিড? মানবদেহে এর ভূমিকা কী?

(d) What is an antibiotic? What are the differences between antibiotic and antibacterial agent? Is soap an antibiotic? 2+2+1=5

অ্যান্টিবায়োটিক কী? অ্যান্টিবায়োটিক এবং অ্যান্টিব্যাকটেরিয়াল এজেন্ট-এর মধ্যে তফাত কী? সাবান কী অ্যান্টিবায়োটিক?

(e) What are the differences between aerobic and anaerobic fermentation? Give example of an antiviral agent. 4+1=5

সবাত ও অবাত সন্ধান প্রক্রিয়ার তফাতগুলি কী কী? সংক্রামক রোগপ্রতিরোধী ড্রাগের একটি উদাহরণ দাও।

(f) Give an example of the medicine that is used to prevent and treat HIV-AIDS. Write the structure and two side effects of the medicine. 1+2+2=5

HIV-AIDS-এর চিকিৎসা ও প্রতিরোধকারী একটি ঔষধের নাম লেখো। এর গঠন সংকেতটি লেখো এবং এর দুটি পার্শ্বপ্রতিক্রিয়ার উল্লেখ করো।

3. Answer *any one* question: 10×1=10

যে কোনো একটি প্রশ্নের উত্তর দাওঃ

(a) What is the chemical structure of Ibuprofen? How does it work in human body? Give the synthesis and use of Ibuprofen. 1+3+4+2=10

Ibuprofen-এর রাসায়নিক গঠনটি লেখো। এটি মানব দেহে কীভাবে কাজ করে? এটির সংশ্লেষণ ও ব্যবহার লেখো।

(b) What is Aspirin? What kind of drug is it? How do you prepare Aspirin from phenol? What are the uses of Aspirin? Give the adverse effects of Aspirin. 1+1+3+2½+2½=10

Aspirin-কী? এটি কোন শ্রেণির ড্রাগের মধ্যে পড়ে? ফেনল থেকে প্রস্তুতি বর্ণনা করো। এর ব্যবহার ও পার্শ্বপ্রতিক্রিয়াগুলি উল্লেখ করো।

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SH-IV/Chemistry-401/C-8/19

B.Sc. 4th Semester (Honours) Examination, 2019

CHEMISTRY

[Physical Chemistry-III (T-8)]

Paper : SHCHE/401/C-8

Course ID : 41411

Time: 1 Hour 15 Minutes **Full Marks: 25**

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer *any five* questions from the following: 1×5=5

(a) "Depression of boiling point may occur in solution." — Comment.

(b) What are the thermodynamic criteria for ideal solution?

(c) "Colligative properties are intensive in nature." — Comment.

(d) Set up a suitable electrochemical cell where the following process takes place:

$ZnCl_2\ (a_1) \longrightarrow ZnCl_2\ (a_2)$

(e) Apply phase rule to determine the 'degrees of freedom' for a binary alloy system at the 'eutectic point'.

(f) Draw a neat phase diagram for H_2O system.

(g) For a rigid rotator one observes the eigen value $\hat{L}^2$ as $12\hbar^2$. Find the value of *l*.

(h) Hartree–Fock equation is called integro-differential equation. — Explain.

2. Answer *any two* questions from the following: 5×2=10

(a) Derive thermodynamically the relation between depression of freezing point and molal concentration of ideal solution. 5

(b) For the concentration cell with transference—

Ag(s) / AgCl(s) / HCl (a_1) / HCl (a_2) / AgCl(s) / Ag(s)

(i) Write the various processes at the two electrodes and at the liquid junction.

(ii) Derive expression for ΔG and e.m.f. of the cell. 2+3=5

(c) Write down the Debye equation for polarisation. Show how this equation be used to determine the dipole moment of a substance. Draw the plot of total molar polarisation vs. temperature in case of benzene and explain. 1+2+2=5

(d) Calculate the expectation value of the potential energy for a H-atom in the ground state. Show that the average kinetic energy is equal to the total energy with the change in sign.

Given: $\psi_{15}(\mathrm{H}) = (\pi a_0^3)^{-\frac{1}{2}} e^{-\frac{r}{a_0}}$ 5

3. Answer *any one* question from the following: 10×1=10

(a) (i) Calculate the ionic strength of solution which is 0·01 M with respect to both KCl and $BaCl_2$.

(ii) Arrive at the expression of mean ionic activity $(a \pm)$ in terms of activities of individual ions of an electrolyte.

(iii) For $M \rightarrow M^{+n} + ne$, the emf changes by 0·02 *V* for a tenfold increase in the concentration of M^{+n}. Find the value of n.

(iv) Phase rule is valid even if some of the components may not be present in all the phases. — Explain. 2+3+2+3=10

(b) (i) Draw the temperature-composition curve of a system of two partially miscible liquids, phenol and water. What is the effect of addition of NaCl on CST of this system?

(ii) "If one component of a binary completely miscible liquid mixture obeys Raoult's law then the other component will also obey the same." — Explain.

(iii) If the linear combination $N(0 \cdot 89\psi_A + 0 \cdot 45\psi_B)$ is a molecular orbital, than find a linear combination of ψ_A and ψ_B that is orthogonal to this molecular orbital.

(iv) Show that $[\widehat{L^2}, \widehat{L_Z}] = 0$. 2½+2½+2+3=10

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SH-IV/Chemistry-402/C-9/19

B.Sc. 4th Semester (Honours) Examination, 2019

CHEMISTRY

[Inorganic Chemistry III (T9)]

Paper : SHCHE/402/C9

Course ID : 41412

Time : 1 Hour 15 Minutes **Full Marks : 25**

The figures in the right hand side margin indicate marks.
Candidates are required to give their answers in their own words as far as practicable.

1. Answer *any five* questions: 1×5=5

(a) What is hydrometallurgy?

(b) Why is ICl more reactive than I_2?

(c) What is inorganic rubber?

(d) Explain the term ambidentate ligand with one example.

(e) The trans-isomer of complex $CoCl_2(en)_2$ is optically inactive.—Why?

(f) Give one example each of ionisation and hydrated isomers.

(g) Why does solubility of iodine in water increases in presence of potassium iodide?

(h) Write down the IUPAC name of $[Pt(NH_3)_4]$ $[PtCl_4]$ and $Na[Co(CO)_4]$

2. Answer *any two* questions: 5×2=10

(a) (i) Describe shortly the extraction procedure of very pure titanium by van Arkel-de Boer process.

(ii) Copper can be extracted by hydrometallurgy but not Zinc.—Explain. 3+2=5

(b) (i) Write a short note on basic properties of iodine.

(ii) Identify 'X' and 'Y':

$$PCl_5 + NH_4Cl \xrightarrow{heat} X + HCl \xrightarrow{NaOCH_3} Y + NaCl$$ 3+2=5

(c) What are silicons? How are they prepared? Draw the structures of silicones. 1+2+2=5

(d) (i) How is diborane prepared?

(ii) According to VB & MO theory explain the bonding of diborane. 2+3=5

3. Answer *any one* question: 10×1=10

(a) (i) Draw the structural formula of two isomers of the complex ion $[CO(NH_3)_5NO_2]^{2+}$. Name the type of isomerism and give their IUPAC names.

(ii) How many isomers are obtained in the following reaction?

$[CoCl_2(NH_3)_4]^{+} + Cl^{-} \rightarrow [CoCl_3(NH_3)_3] + NH_3$

Draw the probable structures of the isomers.

(iii) Write a brief account of the preparation and shapes (according to VSEPR theory) of the following compounds XeF_6 and $XeOF_4$. 3+2+(2+3)=10

(b) (i) How is polythiozyl compound prepared? Discuss its structure and conductance property.

(ii) Explain why $SnCl_2$ is unstable but $PbCl_2$ is stable.

(iii) "Polyhalide anion contains even number of halogen atoms while anions of interhalogens have odd number of halogens."— Comment. (2+3)+2+3=10

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SH-IV/Chemistry-403/C10/19

B.Sc. 4th Semester (Honours) Examination, 2019

CHEMISTRY

[Organic Chemistry IV (T-10)]

Paper : SHCHE/403/C-10

Course ID : 41413

Time: 1 Hour 15 Minutes **Full Marks: 25**

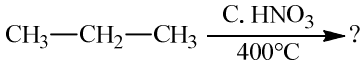
The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

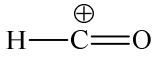
1. Answer *any five* questions: 1×5=5

(a) Why excess diazomethane is used during Arndt-Eistert synthesis of carboxylic acid?

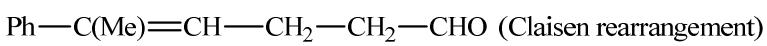
(b) Give the product(s) in the following reaction:



(c) Give the synthetic equivalents corresponding to the following synthon:



(d) Identify the starting materials to obtain the following product involving reaction indicated in parenthesis:



(e) What is "fingerprint" region in IR spectroscopy?

(f) Define the term: Hyperchromic shift

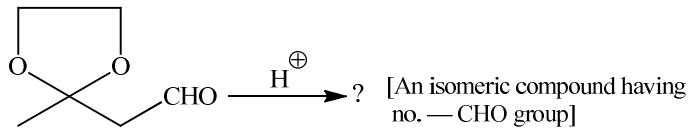
(g) What is used as reference compound for ^{1}HNMR–spectroscopy?

(h) Give the intermediate(s) (name and structure) of Hofmann and Curtius reaction.

2. Answer *any two* questions: 5×2=10

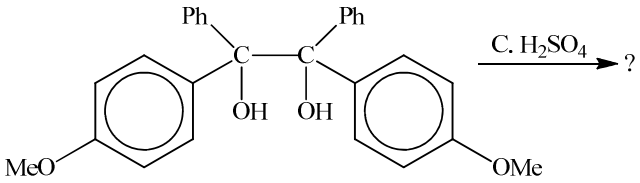
(a) (i) What is Perkin reaction? Give an example with mechanism.

(ii) Give the product of the following reaction and explain its formation. (1+2)+2=5

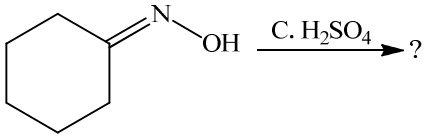


(b) Predict the product(s) with mechanism: 2½×2=5

(i)

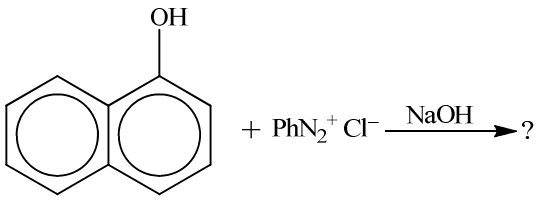


(ii)

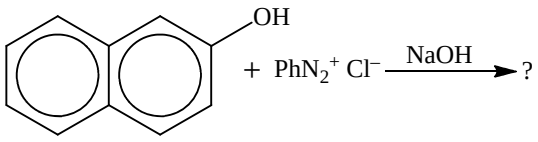


(c) (i) Give the product(s) in the following reactions and explain their formation.

(I)



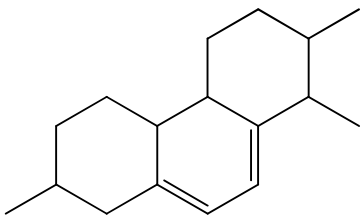
(II)



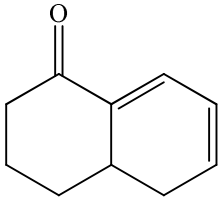
(ii) p-Nitrobenzenediazonium cation is 10^4 times more reactive than p-methoxy benzene diazonium cation under the same conditions. —Explain. (1½+1½)+2=5

(d) (i) Calculate λ max values for the following molecules according to Woodward's rule.

(I)



(II)

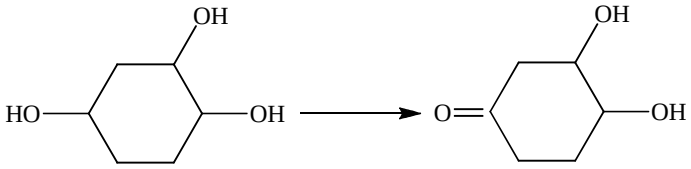


(ii) Comment on the change in UV-VIS spectra of phenol on basification and of aniline on acidification. (1½+1½)+2=5

3. Answer *any one* question: 10×1=10

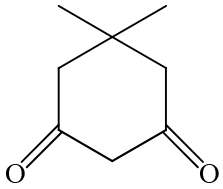
(a) (i) What is dinone-phenol rearrangement? Give mechanism with suitable example.

(ii) Use protecting group(s) to transform the following:

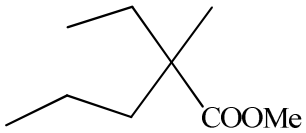


(iii) Show the retrosynthetic analysis of the following compounds and carryout the synthesis.

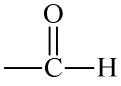
(I)



(II)

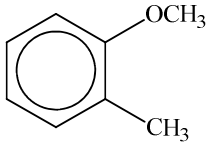


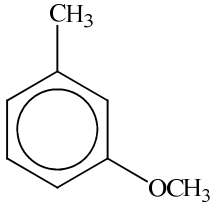
3+2+5=10

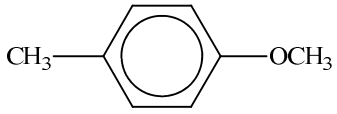
(b) (i) Explain why C—H stretching absorption of  group generally appears as a doublet of almost equal intensities.

(ii) Which of the following compounds below most closely matches the following ^{1}HNMR data? Explain.

7·6δ	2H	(doublet)
7·3δ	2H	(doublet)
3·5δ	3H	(singlet)
2·2δ	3H	(singlet)

(I) 

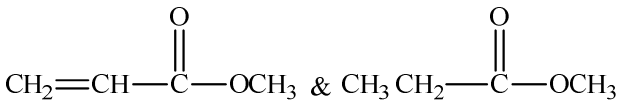
(II) 

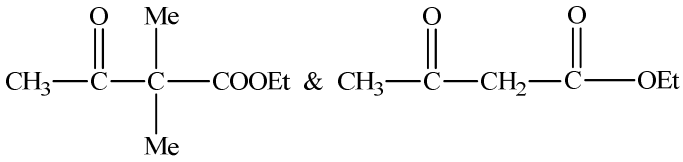
(III) 

(iii) From the following spectral data of organic molecule C_3H_8O, suggest most possible structure:

1R (cm^{-1})	:	3200, 2980, 1100;
^{1}HNMR (δ)	:	0·9 (triplet, 3H, J = 6·8 Hz)
		1·2 (broad, sextet, 1H)
		1·6 (triplet, 2H, J = 6·7 Hz)
		4·1 (singlet, 1H)

(iv) How is IR-spectroscopy helpful in distinguishing the following pairs of compounds:

(I) 

(II) 

2+2+3+(1½+1½)=10

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SH-IV/Chemistry-404/GE-4/19

B.Sc. 4th Semester (Honours) Examination, 2019

CHEMISTRY

(Transition Metal & Coordination Chemistry, Functional Group Organic Chemistry)

Paper : 404/GE-4

Course ID : 41414

Time : 1 Hour 15 Minutes **Full Marks : 25**

The figures in the right hand side margin indicate marks.
Candidates are required to give their answers in their own words as far as practicable.

দক্ষিণ প্রান্তস্থ সংখ্যাগুলি প্রশ্নের পূর্ণমানের নির্দেশক।
পরীক্ষার্থীদের যথাসম্ভব নিজের ভাষায় উত্তর দিতে হবে।

1. Answer *any five* questions: 1×5=5
যে কোনো পাঁচটি প্রশ্নের উত্তর দাও ঃ

(a) What is the electronic configuration of Mn^{2+}?
Mn^{2+}-এর ইলেকট্রন বিন্যাসটি লেখো।

(b) What do you mean by systematic error?
পদ্ধতিগত ত্রুটি বলতে কী বোঝো?

(c) Give an example of fertilizer having nitrogen as special element.
নাইট্রোজেনযুক্ত একটি রাসায়নিক সারের নাম লেখো।

(d) What is the coordination number of Ni in $[Ni(CO)_4]$?
$[Ni(CO)_4]$-এর Ni-এর সর্বগাঙ্ক কত?

(e) Give an example of dibasic aliphatic acid.
একটি দ্বিক্ষারীয় অ্যালিফ্যাটিক অ্যাসিডের উদাহরণ দাও।

(f) Why is Sucrose called invert sugar?
সুক্রোজকে ইনভার্ট সুগার বলা হয় কেন?

(g) Why is glycine amphoteric in nature?
গ্লাইসিন কেন অ্যাসিড-ক্ষারকীয় (amphoteric) প্রকৃতির?

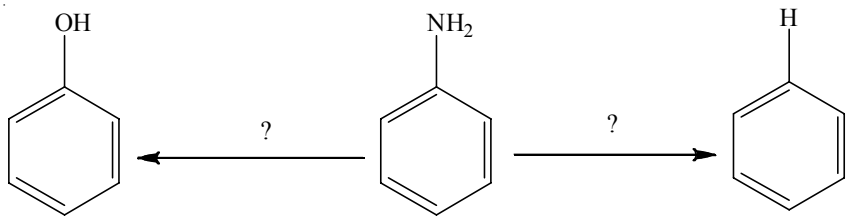
(h) What is the monomer of the peptide?
পেপটাইডের গঠনকারী এককটি কী?

2. Answer *any two* questions: 5×2=10
যে কোনো দুটি প্রশ্নের উত্তর দাও ঃ

(a) What are the basic difference between double salt and complex salt? Give one example each. 3+(1+1)=5
যুগ্ম লবণ ও জটিল লবণের মধ্যে পার্থক্যগুলি কী কী? প্রত্যেকটির একটি করে উদাহরণ দাও।

(b) Aqueous solution of Mn (II) is stable whereas Mn(III) is not. —Explain. What is your view on the colour of Mn-complexes with its different oxidation state? 2+3=5
Mn (II)-এর জলীয় দ্রবণ স্থায়ী কিন্তু Mn(III) নয়। —ব্যাখ্যা দাও। Mn-এর যৌগগুলির রং জারণ সংখ্যার সাথে সহিত কীভাবে সম্পর্কিত— মতামত দাও।

(c) Give a synthetic outline of primary amine from alkylhalide with proper explanation. Complete the conversions with proper reagents. (2+1)+2=5



উপযুক্ত ব্যাখ্যাসহ অ্যালকিল হ্যালাইড থেকে প্রাইমারি অ্যামিন সংশ্লেষণ-এর পথ দেখাও। উপযুক্ত বিকারকসহ উপরের রাসায়নিক পরিবর্তনটি সম্পূর্ণ করো।

(d) Outline strecker synthesis and Gabriel's phthalimide synthesis for amino acid. What is the isoelectric point? 2+2+1=5
অ্যামিনো অ্যাসিড সংশ্লেষণ-এর স্ট্রেকার সংশ্লেষণ ও গ্যাব্রিয়েল ফ্যালিমাইড সংশ্লেষণগুলির রূপরেখা দেখাও। সমবৈদ্যুতিক বিন্দু বলতে কী বোঝো?

3. Answer *any one* question: 10×1=10
যে কোনো একটি প্রশ্নের উত্তর দাওঃ

(a) (i) On account of hydrolysis explain the term $B_{AC}2$ and $A_{AC}2$ mechanisms with one example each.
আর্দ্র বিশ্লেষণ সংক্রান্ত $B_{AC}2$ এবং $A_{AC}2$ পদ্ধতিগুলির প্রত্যেকটির অন্তত একটি করে উদাহরণসহ আলোচনা করো।

(ii) With appropriate example state the main postulates of Werner's Coordination Theory.
উপযুক্ত উদাহরণসহ ভার্নারের সবর্গীয় মতবাদের মূল বক্তব্যগুলি লিপিবদ্ধ করো।

(iii) Glucose is a hemiacetal compound. — Explain.
গ্লুকোজ একটি হেমিঅ্যাসিট্যাল যৌগ—ব্যাখ্যা করো।

(iv) Give the IUPAC nomenclature of following compounds:
নীচের জটিল যৌগগুলির IUPAC নামকরণ করো ঃ

I. $K_4[Fe(CN)_6]$

II. $[Co(NH_3)_4(H_2O)_2]Cl_3$ 3+3+2+2=10

(b) (i) What is super phosphate of lime? How can it be prepared?
সুপার ফসফেট অব লাইম কী? কীভাবে এটি তৈরি করা হয়?

(ii) Identify A and B in the following reaction:
নীচের বিক্রিয়ায় A এবং B-কে সনাক্ত করো ঃ

$$C_6H_5NO_2 \xrightarrow[65^oC]{Zn/NH_4Cl} A \xrightarrow[Heat]{Ag_2O} B$$

(iii) Transform salicylic acid to salol.
পরিবর্তন করো ঃ স্যালিসাইলিক অ্যাসিড $\rightarrow$ স্যালল

(iv) Glucose can reduce Tollen's reagent but sucrose does not. —Explain.
গ্লুকোজ টলেন্স বিকারককে বিজারিত করতে পারে কিন্তু সুক্রোজ পারে না। — ব্যাখ্যা করো।

(v) Define accuracy and precision and differenciate between them.
2+1+2+2+(1+1+1)=10
সংজ্ঞা লেখো—ভ্রমশূন্যতা এবং সূক্ষ্মতা এবং তাদের মধ্যে পার্থক্য লেখো।

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SH-IV/Chemistry-405/SEC-2/19

B.Sc. 4th Semester (Honours) Examination, 2019

CHEMISTRY

[Pharmaceutical Chemistry (T-2)]

Paper : SHCHE/405/SEC-2

Course ID : 41415

Time: 2 Hours **Full Marks: 40**

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer *any five* questions: 2×5=10

(a) What do you mean by analgesics and antipyretics?

(b) Why molasses solution is made slightly acidic before fermentation?

(c) What is the chemical name of Vitamin B12? What metal does it contain?

(d) State any two requirements for a drug to be an ideal one.

(e) What are the differences between aerobic and anaerobic fermentation?

(f) What is LD_{50}?

(g) Name two common sources of Vitamin C. Write the structure of L-ascorbic acid.

(h) Name two industrially important chemicals produced by fermentation process.

2. Answer *any four* questions: 5×4=20

(a) (i) Draw the structure of sulphacetamide. 1

(ii) Give one use of sulphacetamide. 1

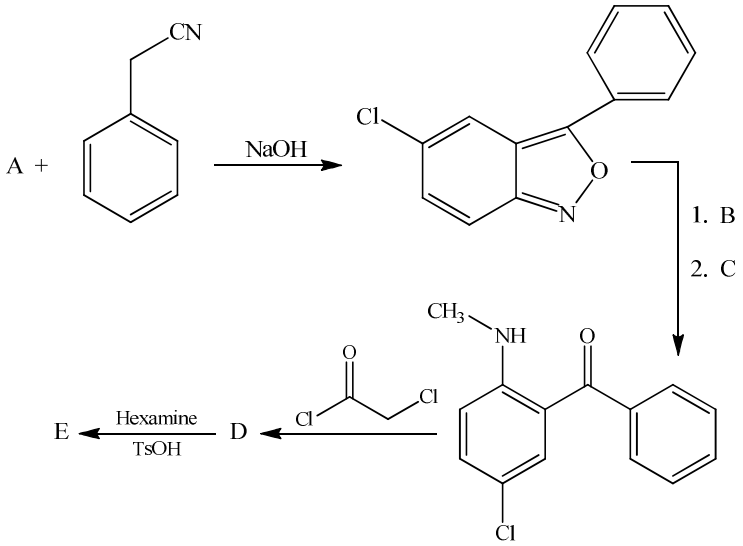
(iii) Synthesize sulphonamide starting from benzene using common reagents. 3

(b) (i) What is the chemical formula of aspirin. 1

(ii) Mention two important uses of aspirin. 2

(iii) What are the side effects of aspirin? 2

(c) (i) Complete the following reaction sequence: 1+½+½+1+1=4



(ii) Write the name of the final product E. 1

(d) (i) Name the raw materials and microorganism used to manufacture ethyl alcohol. 2

(ii) Outline a microbial synthesis of citric acid using any known techniques. 3

(e) Describe the mechanism of biosynthesis of Vitamin C from glucose. 5

(f) (i) What is rectified spirit? How is it obtained from dilute fermented liquor? 1+2=3

(ii) How is absolute alcohol prepared commercially? 2

3. Answer *any one* question: 10×1=10

(a) (i) What do you mean by antibiotics? 1

(ii) Name two classes of antibiotics. 1

(iii) Draw the structure of penicillin-V and synthesize it from phthalimide using common organic reagents 1+4=5

(iv) The structure of streptomycin is known to be composed of three units. Name them and draw their structures. 1+1+1=3

(b) (i) Propose a retrosynthetic path for the synthesis of Ibuprofen. 4

(ii) Suggest a forward reaction for the synthesis of Ibuprofen from benzene. 4

(iii) Mention two clinical conditions for which ibuprofen is administered. 2

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SP-IV/Chemistry-401/C-1D/19

B.Sc. 4th Semester (Programme) Examination, 2019

CHEMISTRY

(Functional Group Organic Chemistry, Inorganic Chemistry, Coordination Chemistry and Transition Metal Chemistry)

Paper : SPCHE/401/C-1D

Course ID : 41418

Time : 1 Hour 15 Minutes **Full Marks : 25**

The figures in the right hand side margin indicate marks.
Candidates are required to give their answers in their own words as far as practicable.
The questions are of equal value.
দক্ষিণ প্রান্তস্থ সংখ্যাগুলি প্রশ্নের পূর্ণমানের নির্দেশক।
পরীক্ষার্থীদের যথাসম্ভব নিজের ভাষায় উত্তর দিতে হবে।

1. Answer *any five* questions from the following: 1×5=5
যে কোনো পাঁচটি প্রশ্নের উত্তর দাও ঃ

(a) What is mutarotation of D-glucose.?
D-গ্লুকোজ-এর মিউটারোটেশন বলতে কী বোঝো?

(b) Write down how nitrobenzene can be converted to aniline.
কিভাগে নাইট্রোবেঞ্জিনকে অ্যানিলিনে রূপান্তরিত করা যায় লেখো।

(c) Define isoelectric point of an α-amino acid.
α-amino acid-এর আইসোইলেকট্রিক পয়েন্ট-এর সংজ্ঞা দাও।

(d) What do you mean by transition element?
ট্রনিজিশ্ন এলিমেন্ট বলতে কী বোঝো?

(e) What is Lanthanide contraction?
ল্যান্থানাইড সংকোচন কাকে বলে?

(f) Give an example of a bidentate ligand.
একটি দ্বিযোজী লিগ্যান্ডের উদাহরণ দাও।

(g) What is significant number?
অর্থবহ সংখ্যা কাকে বলে?

(h) Give one example of Biofertilizers.
বায়োফার্টিলাইজার-এর একটি উদাহরণ দাও।

2. Answer *any two* questions from following: 5×2=10

যে কোনো দুটি প্রশ্নের উত্তর দাও ঃ

(a) (i) What is Grignard reagent? How will you prepare acetic acid from CH_3MgBr?
গ্রিগনার্ড বিকারক কী? CH_3MgBr থেকে কীভাবে তুমি অ্যাসেটিক অ্যাসিড প্রস্তুত করবে?

(ii) Among C_6H_5COCl and CH_3COCl, which undergoes nucleophilic substitution reaction in faster rate and why? (1+2)+2=5
নিউক্লিওফিলিক প্রতিস্থাপন বিক্রিয়া C_6H_5COCl ও CH_3COCl — এদের মধ্যে কার রাসায়নিক সক্রিয়তা বেশি এবং কেন?

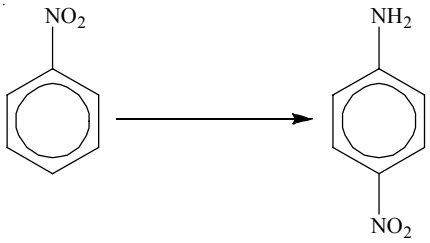
(b) (i) What is reducing sugar and non-reducing sugar? Explain each with a suitable example.
বিজারক সুগার ও অবিজারক সুগার বলতে কী বোঝো? প্রতিটির একটি করে উদাহরণ সহযোগে ব্যাখ্যা করো।

(ii) Write down the structure of two geometrical isomers of $[Cr(en)_2Cl_2]^+$ ion [en = ethylene diamine]. 2+3=5
$[Cr(en)_2Cl_2]^+$ আয়নের দুটি জ্যামিতিক সমাবয়বের গঠন লেখো। [en = ইথিলিন ডাইঅ্যামিন]

(c) (i) Write down the postulates of Werner's Coordination Theory.
ভর্নারের সবর্গীয় তত্ত্ব বিবৃত করো।

(ii) How can amide group be detected?
কীভাবে অ্যামাইড গ্রুপকে সনাক্ত করা যায়?

(iii) Convert (রূপান্তর করো) : 2+1+2=5



(d) (i) Mention any two important methods for minimizing errors in quantitative analysis.
পরিমাণগত বিশ্লেষণের ত্রুটি কমানোর জন্য দুটি গুরুত্বপূর্ণ উপায় উল্লেখ করো।

(ii) 'High precision and low accuracy is possible but reverse is not true.' — Justify.
'উচ্চ যথাযথ এবং নিম্ন নির্ভুলতা সম্ভব কিন্তু উল্টোটি সত্য নয়।' — ব্যাখ্যা করো।

(iii) What is water gas? 2+2+1=5
ওয়াটার গ্যাস কী

3. Answer *any one* question from the following: 10×1=10

যে কোনো একটি প্রশ্নের উত্তর দাওঃ

(a) (i) Complete the reaction (নীচের বিক্রিয়াটি সম্পন্ন করো ঃ):

$$C_2H_5COOH \xrightarrow{?} ? \xrightarrow{?} ? \xrightarrow{?} CH_3-\underset{\displaystyle COOH}{\underset{|}{CH}}-COOH$$

(ii) Write down the electronic configuration of Cr and mention its position in the periodic table.

ক্রোমিয়াম-এর ইলেকট্রন বিন্যাস লেখো এবং পর্যায় সারণিতে এর অবস্থান উল্লেখ করো।

(iii) Explain with mechanism, how RNH_2 is prepared from $RCONH_2$ using Hoffman degradation reaction.

হফ্ম্যান অবনমন বিক্রিয়ার সাহায্যে কীভাবে $RCONH_2$ থেকে RNH_2 প্রস্তুত করা হয়, বিক্রিয়া কৌশল সহযোগে দেখাও।

(iv) Write down the IUPAC names of the following compounds:

নিম্নলিখিত যৌগগুলির IUPAC নাম লেখো ঃ

(I) $K_3[Fe(CN)_6]$

(II) $[Cr(H_2O)_4Cl_2]^+$

(v) Give an example of antiknock agent.

একটি অ্যান্টিনক অ্যাজেন্ট-এর উদাহরণ দাও।

(vi) Draw the structure of C_4 epimer of D-glucose. 2½+2+1½+2+1+1=10

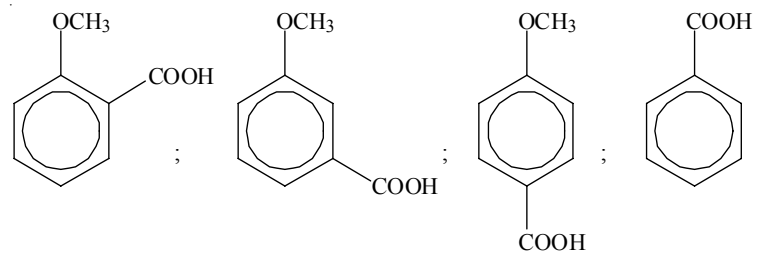
D-গ্লুকোজের C_4 এ্যাপিমার-এর গঠন চিত্র অঙ্কন করো।

(b) (i) What is the composition of LPG. Name one compound which is used in LPG to identify the leakage in LPG cylinder.

LPG-এর উপাদানগুলি লেখো। একটি যৌগের নাম লেখো যেটি LPG সিলিন্ডারের Leakage-এর সনাক্তকরণের জন্য ব্যবহৃত হয়।

(ii) Arrange in increasing order of acidity with justification:

যুক্তি সহযোগ অ্যাসিডিটির ঊর্ধ্বক্রমে সাজাও ঃ



(iii) Using a chemical reaction prove that aldehyde carbonyl group is present in glucose.

একটি রাসায়নিক বিক্রিয়ার সাহায্যে প্রমাণ করো যে গ্লুকোজে একটি অ্যালডিহাইডীয় কার্বনিল গ্রুপ বর্তমান।

(iv) Outline Gabriel's synthesis of Alanine.

Gabriel's synthesis পদ্ধতিতে Alanine প্রস্তুত করো।

(v) Which among Zn and Cu is really a transition metal? Give reason. 2+2+2+2+2=10

Zn এবং Cu-এর মধ্যে কোনটি যথার্থই সন্ধিগত ধাতু? যুক্তি দাও।

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SH-IV/Chemistry/401/C-8/(PR)/19

B.Sc. 4th Semester (Honours) Practical Examination, 2019

CHEMISTRY

[Physical Chemistry III (P-8)]

Paper : SHCHE/401/C-8

Course ID : 41421

Time: 2 Hours **Full Marks: 15**

The figures in the right hands side margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

1. Perform *any one* of the following experiments as assigned: 11

A. Determine the solubility of the sparingly soluble salt MgX (Marked SP) in aqueous medium. Perform two sets of Experiment as follows:

Set-I : 0·5 g Salt + 100 ml pure water; Set-II: 0·5 g Salt + 80 ml pure water + 20 ml of Electrolyte EL.

Report the solubility product of MgX in Set-I and the solubilities of Mg^{2+} for all the sets.

B. Determine the critical solution temperature of phenol water system. Take 3 g phenol and add water stepwise. Draw an inverted U-shaped curve by plotting the temperatures against weight percentage of phenol and calculate the critical solution temperature of phenol water system.

2. Laboratory Notebook 2

3. Viva voce 2

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SH-IV/Chemistry/402/C-9(PR)/19

B.Sc. 4th Semester (Honours) Practical Examination, 2019

CHEMISTRY

[Inorganic Chemistry-III (P-9)]

Paper : SHCHE/402/C-9

Course ID : 41422

Time: 2 Hours **Full Marks: 15**

The figures in the right hand side margin indicate marks.

1. (a) Report total hardness of the given water sample in ppm of $CaCO_3$. 11

Or,

(b) Prepare the complex by the method given.

2. Viva voce 2

3. Laboratory Notebook. 2

Distribution of marks for 1(a):

(i) Preparation of primary standard solution 2

(ii) Presentation of data in tabular form 1

(iii) Correct calculation 2

(iv) Quality of result of experiment 6

Distribution of marks for 1(b):

(i) Preparation of complex 3

(ii) Quality of product 5

(iii) Yield 3

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SH-IV/Chemistry/402/C-9(PRI)/19

B.Sc. 4th Semester (Honours) Practical Examination, 2019

CHEMISTRY

(Inorganic Chemistry-III (P-9)

Paper : SHCHE/402/C-9

Course ID : 41422

Instructions to the Examiners.

1. 'Keys' should be kept in the safe custody of the Principal/T.I.C. of the centre. The keys must not be opened before examinations for all the batches are over. Keys should be collected from Convenor of the examination.

2. The examiners must put their signatures against weighing of material for standard solution preparation, burette reading and experimental data.

3. The time of examination should not be extended beyond the scheduled hours.

4. Samples for the examination will be supplied by the Convenors and are to be collected through a responsible person authorized by the Principal/T.I.C. of each centre.

5. Method of quantitative analysis will be supplied in the sample box. Any method other than the recommended one will not be permitted to the candidates.

6. The examiners are requested to mention record book containing Roll and No. of the candidates of each batch along with sample numbers.

7. No candidate should be allowed to appear at the examination without Laboratory Notebook.

8. The name of examiner in full with his/her college address, phone number should be included in the record book.

9. Minimum 1/3 of the students of each group should be given one experiment.

10. Distribution of marks for Titration:

(i)	Preparation of primary standard solution	2
(ii)	Presentation of data in tabular form	1
(iii)	Correct calculation	2
(iv)	Quality of results:	
	Error– 0 to 5%	6
	above 5% to 7%	4
	above 7% to 10%	2
	above 10%	0

Distribution of marks for preparation of complexes:

(i)	Preparation	3
(ii)	Quality of product	5
(iii)	Yield	3

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SH-IV/Chemistry/403/C-10/(PR)/19

B.Sc. 4th Semester (Honours) Practical Examination, 2019

CHEMISTRY

[Organic Chemistry-IV(P-10)]

Paper : SHCHE/403/C-10

Course ID : 41423

Time: 2 Hours **Full Marks: 15**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as possible.

1. Estimate the quantity of total glycine in $g.L^{-1}$ in the supplied solution marked 'O'. 11

2. Viva voce 2

3. Laboratory Notebook 2

Distribution of marks for Q 1:

(i) Principle of estimation 1

(ii) Presentation of data in tabular form 2

(iii) Correct calculation 2

(iv) Quality of results of estimation 6

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SH-IV/Chemistry/403/C-10/(PRI)/19

B.Sc. 4th Semester (Honours) Practical Examination, 2019

CHEMISTRY

[Organic Chemistry (P-10)]

Paper : SHCHE/403/C-10

Course ID : 41423

Conveners:

1. **Dr. Santanu Mandal**
   Bankura Christian College,
   Bankura – 722101
   Mobile – 9434216278.

2. **Dr. Samir Kumar Mandal**
   Saldiha College,
   Saldiha, Bankura
   Mobile – 9433356499.

Instruction to the Examiners

(Please follow the instructions strictly.)

1. The Chemistry (Honours) Practical Examination should have a duration of 2 hours.
2. Examiners are requested to ensure the availability of reagents and apparatus including other laboratory utensils are ready on the preparation day.
3. The examiners are requested to maintain a book for recording UID number of candidates of each batch, sample numbers marked 'O' used by candidates and also the marks awarded in laboratory record book and viva voce and any other relevant data they may consider necessary.
   (i) **Laboratory Notebook:** Candidate without the Laboratory Notebook signed regularly by class teacher must not be allowed to appear at the examination. Laboratory notebooks recorded in a systematic way and signed regularly will get higher credit.
   (ii) **Viva voce:** Simple questions on basic theory of analysis and reactions involved in the analysis of organic compounds may be asked.
4. Candidate should not be allowed to keep books/notes/mobile phone with them inside the laboratory particularly while writing in the answer-scripts but they may be allowed strictly outside the laboratory.
5. Examiners are requested to put their signatures in the answer-scripts titre value as possible done by the candidates.

6. The key to the sample must be kept in the safe custody of the Officer-in-Charge of the centre and must not be opened before the expiry of the examination at the centre.

7. The examiners are requested to allot marks for each part of a question separately in a systematic way as given under distribution of marks in a tabular form. [Result: ≥ 95%, 6 marks; 90-95%, 5 marks; 85-90%, 4 marks; 80-85%, 3 marks, <80%, 0 marks]. **No marks** to be awarded if it appears that the student has not performed the experiments.

8. Sample for the examination will be supplied by the Conveners and are to be collected through a responsible person authorised by the Principle/TIC of the centre.

9. Methods of analysis will be supplied in the sample box. Any method other than the recommended one will not be permitted to the candidates.

10. The sample to be dispense in the presence of both external and internal examiners. Examiners are requested to record the sample volume given to the examinee in the record book.

11. If the number of samples supplied falls short of the requirement, the examiner should consult with convenor(s) and examiners make few samples of their own and preserve the key in sealed cover until the examination is over and send a copy of the same duly signed to the convenor.

12. The name of the examiners in full with their respective college addresses and the number of candidates examined by them should be included in the record book.

13. The record book together with a copy of the key to the sample signed by the examiners should be sent to the Controller of Examination (BKU) along with the answer-scripts.

14. Examiners are requested to send the examined answer-scripts in separate sealed covers for individual college to the Controller of Examination (BKU). The packet of answer-scripts must contain a top sheet for individual colleges.

Materials to be supplied

1. Standard (0·1N) oxalic acid solution: for determination of strength of NaOH solution
2. Approx. (0·1N) NaOH solution: strength of NaOH to be determined/supplied by examiner(s)
3. 40% formalin indicator: supplied by the centre
4. Phenolphthalein indicator: 1·0 g of phenolphthalein in 100 mL of 1 : 1 ethanol
5. Unknown glycine solution: Neutral solution to be supplied by convenor

Glass apparatus to be supplied

1. 250 mL conical – two
2. 100 mL beaker – one
3. 50 mL burette – one
4. Funnel – one

Neutralisation of formalin solution: 25mL of formalin solution is pipetted into 250 mL of conical flask. To it 1-2 drops of phenolphthalein indicator is added. The resulting solution is titrated with standard (0·1N) NaOH solution till pink color appear.

1. **Estimation of unknown glycine:** 25 mL of unknown neutral glycine solution is pipetted into 250 mL of conical flask. To it 1-2 drops of phenolphthalein indicator added, pink color appeared. To the 40% glycine solution, 10 mL neutral formalin solution is added and titrated with standard (0·1N) NaOH solution till pink color appear.

2. **Calculation**

   $V_1 = (V_2 - V_0)$ mL for estimation of glycine

   Strength of NaOH = N1(N)

   25 mL of glycine solution ≡ V1 × N1(N) NaOH solution

   1000 mL of 1(N) NaOH solution ≡ 75 g of glycine

   So, V1 × N1(N) NaOH solution ≡ 0·075 × V1 × N1 g of glycine in 25 mL unknown solution

   Therefore, glycine in the unknown solution = 0·075 × V1 × N1 × 1000/25 g/L

   = 0·075 × V1 × N1 × 40 g/L

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SH-IV/Chemistry/404/GE-4/(PR)/19

B.Sc. 4th Semester (Honours) Practical Examination, 2019

CHEMISTRY

(Transition Metal and Coordination Chemistry; Functional Gr. Org. Chem.)

Paper : SHCHE/404/GE-4

Course ID : 41424

Time: 2 Hours **Full Marks: 15**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer any one *questions*

1. Estimate the quantity of Zinc (in gL^{-1}) by complexometric titration with standard ~$\left(\frac{M}{20}\right)$ EDTA solution. 11

2. Prepare the organic compound following the supplied procedure. Record the yield. 11

Distribution of marks for Question No. 1

(i)	Theory	1
(ii)	Preparation of standard EDTA	2
(iii)	Presentation of data in tabular form	1
(iv)	Calculation	1
(v)	Quality of Result	6

3. Viva voce 2

4. Laboratory Notebook 2

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SP-IV/Chemistry-401/C-1D/19

B.Sc. 4th Semester (Programme) Practical Examination, 2019

CHEMISTRY

(Financial Group Org. Chem., Inorg. Chem., Coordination Chem. and Transition Metal Chem.)

Paper : SPCHE/401/C-1D

Course ID : 41428

Time: 2 Hours **Full Marks: 15**

The figures in the right hand side margin indicate marks.

পরীক্ষার্থী যথাসম্ভব নিজের ভাষায় উত্তর দাও এবং উত্তরপত্র লেখার সময় বই বা নোট দেখতে দেওয়া হবে না।

Answer *any one* questions. 11×1=11

যে কোনো একটি প্রশ্নের উত্তর দাও।

1. Estimate the quantity of Zince (in g L^{-1}) by Complexometric titration with standard ~ $\left(\frac{M}{20}\right)$ EDTA solution. 11

কমপ্লেক্সোমেট্রিক টাইট্রেশনের দ্বারা প্রমাণ $\left(\frac{M}{20}\right)$ EDTA দ্রবণের সাহায্যে জিঙ্কের পরিমাণ নির্ণয় করো (গ্রাম/লিটার এককে)।

2. Prepare the organic compound following the supplied procedure. Record the yield. 11

প্রদত্ত পদ্ধতির সাহায্যে জৈব যৌগটি প্রস্তুত করো এবং yield নির্ণয় করো।

Distribution of marks for Question No. 1

Theory —	1
Preparation of standard EDTA —	2
Presentation of data in tabular form —	1
Calculation —	1
Quality of Result —	6

3. Viva voce 2

4. Labortary Notebok 2

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SHP-IV/Chemistry/404/GE-4/401/C-1D(PRI)/19

B.Sc. 4th Semester (Honours & Programme) Practical Examination, 2019

CHEMISTRY

(Transition Metal and Coordination Chemistry; Functional Gr. Org. Chem.)

(Financial Group Org. Chem., Inorg. Chem., Coordination Chem. And Transition Metal Chem)

Paper : SHCHE/404/GE-4 & SPCHE/401/C-1D

Course ID : 41424 & 41428

Instruction to the Examiner

1. The practical examination should have a duration of 2 hours and another 30 minutes may be provided for preparation.
2. The examiners are requested to maintain a book for recording Roll and Number of candidates of each batch, sample number marked '*I*' and 'O' used by candidates and also the marks awarded in laboratory records and viva voce. The record book together with a copy of the key signed by the examiners should be sent to the Controller along with the answer-script.
3. Candidate without laboratory record must not be allowed to appear at the examination.
4. Candidates should not be allowed to keep books or notes with them inside the laboratory.
5. The key is to be kept in the safe custody of the Officer-in-Charge of the centre and must not be opened before the expiry of the examination at the centre.
6. The examiners are requested to allot marks for each part of a question separately in a systematic way as given under distribution of marks in a tabular form.
7. If a number of samples supplied falls short of the requirement, the examiners should make a few samples of their own, preserve the key in sealed cover with the examination is over and send a copy of the same duly signed to the Convener.
8. The sample box is to be opened in presence of both external and internal examiners.
9. Marks-slips are to be filled accordingly.
10. The name of the examiners in full with their college addresses and the number of candidates examined by them should be included in the record book.
11. Examiners are requested to send the examined answer-scripts in separate sealed covers and packets under insured postal parcel etc. addressed to the Controller. The packets of answer-scripts must contain a top sheet.
12. Samples and key for the practical examination will be supplied by the convenors. Method of organic preparation will be available in the sample box.

For Inorganic Chemistry

1. The examiners must put their signature against burette reading and other experimental data.

Detailed distribution of marks:

Theory	1
Preparation of standard EDTA	2
Presentation of data in tabular form	1
Calculation	1
Quality of Result	6
Error up to 3%	6

(Next deduct 1 mark for each 2% error)

For Organic Chemistry

2. The examiners may kindly re-weight the compounds after proper drying. Following showed be the way of marking

(a) Yield above 90% of the expected value (Next deduct 1 mark for each 10% less yield) 8

(b) Quality of the product 3

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SH-IV/Chemistry/401/C-8/(PRI)/19

B.Sc. 4th Semester (Honours) Practical Examination, 2019

CHEMISTRY

(Physical/Lab/Chemistry Practical)

Paper : SHCHE/401/C-8

Course ID : 41421

Instruction to the Examiners for Physical Chemistry Experiments

1. "Key" should be kept on the safe custody of Principal Officer-in-Charge of the centre. The keys must never be opened before examinations are over at the centre. A copy of the keys signed by the examiners should be sent to the Convenor along with the assessed answerscript.

2. The time of the examination should not be extended beyond the scheduled hour.

3. Samples for the examination will be supplied by the Conveners and are to be collected through a responsible person authorised by the Principal Officer-in-Charge of each centre.

4. The examiners must put their signatures against weighing of materials for standard solution preparation, burette readings and other experimental data.

5. Physical chemistry experiments are to be allotted to the candidates on the basis of "drawing a card" in the respective day.

6. A record book to be maintained for that purpose specifying the allotment of experiments against each candidate.

7. Allotment of marks:

A. ?

B. Laboratory Notebook

The candidate are to be asked to submit their Laboratory Notebook after entering the examination hall. While evaluating notebook, credits will be given to the following points:

I. Amount of work done

II. Regulatory of submission

III. Neatness

IV. Overall impression etc.

Any tampering in the notebook should be seriously discredited. Laboratory Notebook without. signature of the teacher will be credited zero.

C. Viva voce:

Simple questions are to be asked with relevance to practical chemistry.

Information related to the Physical Chemistry experiments:

1. ***P-1 : Determination of solubility product of*** **MgX.**

Examiners have to provide

(i) Sold $MgCO_3$

(ii) $\frac{M}{100}$ EDTA solution

(iii) EBT indicator

(iv) Buffer solution of pH = 10

(v) Whatman – 42 filter paper.

Convenor supply

(i) Electrolyte solution

P-2 : Determination of critical solution temperature of phenol water system.

Examiners have to provide

(i) Phenol

(ii) Minimum 1°C division thermometer.

List of reagents and chemicals

1. $MgCO_3$
2. EBT indicator
3. Buffer solution of pH = 10
4. Phenol

List of minor equipments and glass apparatus:

1. 250 mL stoppered bottle
2. 50 mL Hard glass test tube
3. Minimum 1°C division thermometer
4. Water bath.
5. Glass stirrer

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