SH-II/CHE/201/C-3/19

B.Sc. 2nd Semester (Honours) Examination, 2019

CHEMISTRY

(Inorganic Chemistry-I)

Paper : SH/CHE/201/C3

Course ID : 21411

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) Calculate the number of unpaired electrons in Cr^{2+}.

(b) Work out the ground state term symbol of Ni(II) ion.

(c) Why is the electron affinity value of Cl greater than that of F?

(d) Specify the number of radial and angular nodes present in 3p and 3d orbitals.

(e) Cite one example of a super acid.

(f) What information do we get from Latimer's diagram?

(g) Furnish one example of secondary periodicity.

(h) Work out the oxidation state of sulfur in $K_2S_2O_8$.

2. Answer *any two* questions: 5×2=10

(a) (i) The first Bohr radius of hydrogen atom is 0·529Å; find the same for He^+ ion.

(ii) Enunciate de Broglie's concept on wave-particle duality. Derive Bohr's quantum restriction from de Broglie's equation. 2+3=5

(b) (i) State Slater's rules and apply those to calculate the screening constant and effective nuclear change experienced by a *d* electron of copper (II) ion.

(ii) Of nitrogen and oxygen atoms which one has higher ionisation potential and why? 3+2=5

(c) (i) Define formal potential. On this context explain the statement that a neutral solution of $K_3[Fe(CN)_6]$ cannot oxidise iodide to iodine but it can do so in presence of Zn^{2+}. [Given: $E^0_{Fe(CN)_6^{3-}/Fe(CN)_6^{4-}} = 0 \cdot 36V$; $E^0_{I_2/2I^-} = 0 \cdot 54V$]

(ii) Enumerate the potential at the equivalence point in the titration of 25mL 0·1M Fe^{2+} by 0·5M $KMnO_4$. [Given: $E^0_{Fe^{3+}/Fe^{2+}} = 0 \cdot 77V, E^0_{MnO_4^-,H^+/Mn^{2+}} = 1 \cdot 51V$] 3+2=5

(d) (i) Point out the main reason why Al and Ni are, respectively found as oxide and sulphide in nature.

(ii) Calculate the change of pH when 1 mL 0·1M HCl is added to 1L of a buffer solution containing 0·1M CH_3COOH and 0·1M CH_3COONa. (pKa of CH_3COOH=4·74) 2+3=5

3. Answer *any one* question: 10×1=10

(a) (i) Relate the Rydberg constant of H-atom and He^+ ion.

(ii) Write down the Schrödinger's wave equation indicating the terms involved.

(iii) Calculate the radius of Na^+ and F^- ions from Pauling's concept of univalent radii. Equilibrium inter-ionic distance in NaF crystal is 2·31Å.

(iv) HI is a stronger acid than HCl, while $HClO_4$ is stronger acid then HIO_4. — Explain. 2+2+3+3=10

(b) (i) Interpret comproportionation and disproportionation reactions on the basis of Frost diagram.

(ii) NH_4HF_2 fulfils two requisites in the iodometric estimation of copper in presence of ion. — Explain. [Given: $E^0_{I_2/2I^-} = 0 \cdot 54V, E^0_{Cu^{2+}/Cu} = 0 \cdot 17V, E^0_{Fe^{3+}/Fe^{2+}} = 0 \cdot 77V$]

(iii) What is common ion effect? State with equation(s) what happens when H_2S gas is passed through an acidified aqueous solutions of $CuSO_4$ and $ZnSO_4$.

(iv) The solubility of CaF_2 in water at 18°C is $2{\cdot}0\times10^{-4}$ mol L^{-1}. Calculate the solubility product of CaF_2. 2+3+3+2=10

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SH-II/CHE/201/C3(P3)/(PR)/19

B.Sc. 2nd Semester (Honours) Practical Examination, 2019

CHEMISTRY

(Inorganic Chemistry-I)

Paper : SHCHE/201/C3(P3)

Course ID : 21421

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.

1. Estimate the quantity of iron (II) in the Supplied Solution marked I. 11

2. Viva voce 2

3. Laboratory Notebook 2

Distribution of Marks for Q1:

(i) Preparation of Primary Standard Solution 1

(ii) Standardisation of Secondary Standard Solution 2

(iii) Presentation of data in tabular form 2

(iv) Correct calculation 2

(v) Quality of results of experiment 4

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SH-II/CHE/202/C-4/19

B.Sc. 2nd Semester (Honours) Examination, 2019

CHEMISTRY

(Organic Chemistry-II)

Paper : SH/CHE/202/C-4

Course ID : 21412

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

The figures in the margin indicate full marks.

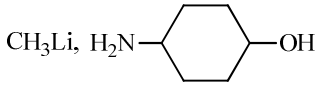
Candidates are required to give their answers in their own words as far as practicable.

1. Answer *any five* questions: 1×5=5

(a) Which of the following is an ambident nucleophile?

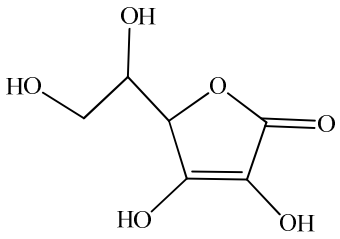
HCO_2^-, EtO^-, PhO^-

(b) Write down the conjugate acids for the following:

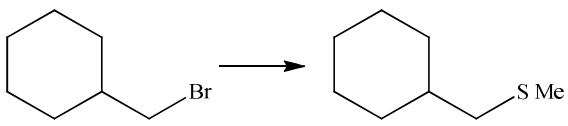


(c) What does the term "Chiral axis" mean?

(d) Indicate the most acidic hydrogen in the following molecule.



(e) What nucleophile is needed in the following conversion?



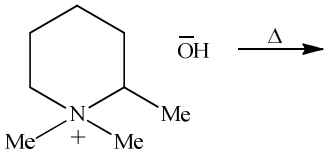
(f) Give an example of valence tantomerism.

(g) What two different alkyl halides yield $(CH_3)_2C = CH_2$ as the only product of delydrohalogenation?

(h) Chloral remains in hydrate form — Explain.

2. Attempt *any two* questions: 5×2=10

(a) (i) Give the structure of the major product of the following reaction and explain its formation.

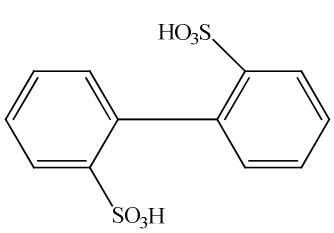


(ii) What do you mean by the term "Crown ether"? Give the structural formulation of 18–crown–6–ether.

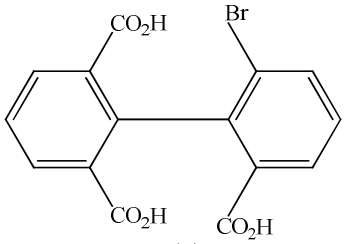
(iii) 4-Fluoroaniline shows nearly the same basicity as aniline— Explain. 1½+2+1½=5

(b) (i) A hydrocarbon, C_6H_{14}, gives a mixture containing only two monochlorides in photochemical chlorination. One of these compounds solvolyzes very rapidly in ethanol, whereas the other is very slow. Give the structures of hydrocarbon and monochlorides.

(ii) Explain whether the following compounds are resolvable or not:



(A)

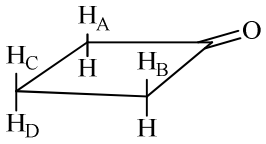


(B)

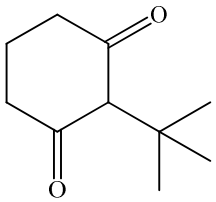
(iii) Draw the torsional curve for propane showing the different conformers. 2+1+2=5

(c) (i) Benzoic acid and acetic acid have approximate pKa values of 4·20 and 4·80. Suggest with explanation which pKa value belongs to which acid.

(ii) Find out the relationship (topicity) of hydrogens marked as H_A/H_B and H_C/H_D in the following compound:

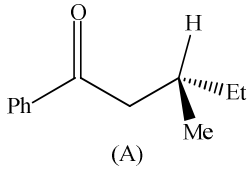


(iii) Explain why the following compound is 100% ketone. 2+2+1=5



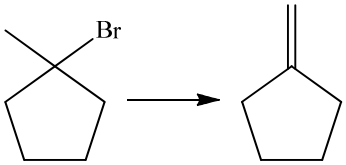
(d) (i) Write a short note on "Kinetic Isotope Effect".

(ii) Would optically active ketone (A) undergo acid-or base-catalysed racemization? Explain.



(A)

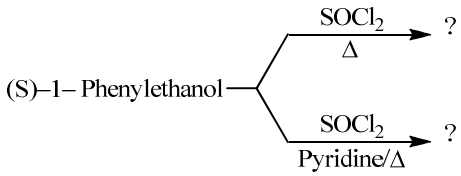
(iii) Carry out the following conversion:



2+2+1=5

3. Attempt *any one* question: 10×1=10

(a) (i) Give the stereochemical products with mechanism.

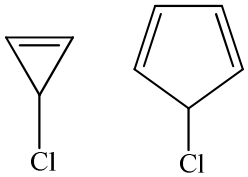


(ii) What is meant by nucleofuge? Arrange the following in order of nucleofugality:

$PhSO_3^-, Cl^-, \bar{O}H$

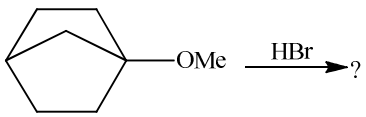
(iii) Et — S — CH_2CH_2 — Cl undergoes hydrolysis at faster rate than Et — O — CH_2 — CH_2 — Cl. Explain.

(iv) Compare the rate of solvolysis of (A) and (B) in ethanol.



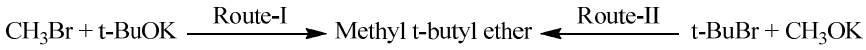
(A) (B)

(v) Give the product(s).



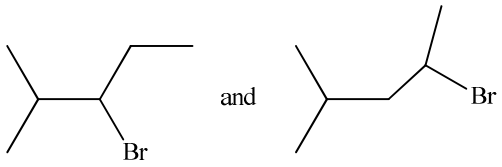
3+2+2+2+1=10

(b) (i) Your task is to prepare methyl t-butyl ether by one of the following routes.

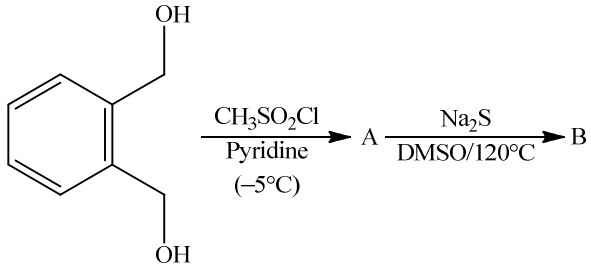


Indicate the route of your choice and explain.

(ii) Compare with reason the ease of E2 reaction of the following:

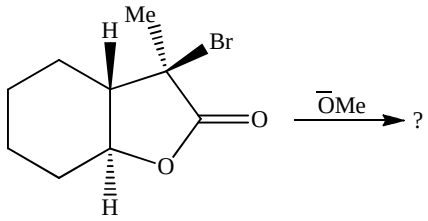


(iii) Identify the product A and B.



(iv) Draw the preferred conformation through Newmann Projection of n-pentane and 2-chloroethanol.

(v) Write the product(s) of the following E2 reaction and explain the stereochemical outcome.



2+2+2+2+2=10

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SH-II/CHE/202/C-4P(4)/(PR)/19

B.Sc. 2nd Semester (Honours) Practical Examination, 2019

CHEMISTRY

(Organic Chemistry-II)

Paper : SHCHE/202/C-4 (P-4)

Course ID : 21422

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 and would not be allowed to consult the books/notes/mobile phone while writing the report in answer scripts.

1. Prepare the organic compound from the supplied starting materials as the instructions supplied with the question paper. Submit the product and report the followings:

(a) Yield of the crude product (gm) 8

(b) Recrystallize a small portion of the crude product and dried. Measure the melting point of purified product. 3

2. Laboratory Notebook 2

3. Viva vice 2

N.B: (i) No candidate will be allowed to appear at the practical examination unless he/she submits his/her laboratory record book regularly signed by the teacher.

(ii) During record yield and melting point of the product must be signed by the examiner(s).

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SH-II/CHE-203/GE-2/19

B.Sc. 2nd Semester (Honuors) Examination, 2019

CHEMISTRY

(Sates of Matter and Chemical Kinetics; Chemical Bonding and Moleculer Structure etc.)

Paper : SH/CHE/203/GE-2

Course ID : 21414

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

The figures in the right and side margin indicate full 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) Write down the relation between average kinetic energy of gas molecules with temperature.
গ্যাসের গড় গতিশক্তির সাথে তাপমাত্রার সম্পর্কটি লেখো।

(b) What is specific reaction rate?
আপেক্ষিক বিক্রিয়া হার বলতে কী বোঝো?

(c) Write down the S.I. unit of coefficient of viscosity.
S.I. পদ্ধতিতে সান্দ্রতাঙ্কের একক লেখো।

(d) Draw the structure of Borazole.
বোরাজলের গঠন অঙ্কন করো।

(e) Give an example of Interhalogen compound.
''আন্তঃহ্যালোজেন'' যৌগের একটি উদাহরণ দাও।

(f) What is Marshall's acid?
মার্শাল অ্যাসিড কী?

(g) Draw the structure of PCl_5.
PCl_5-এর গঠন অঙ্কন করো।

(h) What do you mean by Boyle Temperature of a gas?
গ্যাসের বয়েল তাপমাত্রা বলতে কী বোঝো?

2. Answer *any two* questions: 5×2=10

যে কোনো দুটি প্রশ্নের উত্তর দাও ঃ

(a) (i) Which one is more stable — N_2 or N_2^+ ? Discuss it from Moleculer Orbital Theory.

N_2 এবং N_2^+-এর মধ্যে কোনটি বেশি সুস্থিত? আণবিক কক্ষক তত্ত্ব (Moleculer Orbital Theory) অনুযায়ী ব্যাখ্যা করো।

(ii) Which has higher Bond Dissociation Energy — F_2 or Cl_2? (1+3)+1=5

F_2 এবং Cl_2-এর মধ্যে কোনটির বন্ধন বিয়োজন শক্তি বেশি?

(b) (i) Write down the Born-Lande equation for Lattice Energy.

জালক শক্তির বর্ন-ল্যানডে সমীকরণটি লেখো।

(ii) Describe the structure of unit cell of CsCl crystal. 2+3=5

CsCl কেলাসের একক কোষের গঠন বর্ণনা করো।

(c) (i) What is Pseudo first order reaction? Give an example.

"Pseudo first order reaction" বলতে কী বোঝো? একটি উদাহরণ দাও।

(ii) Half-life of a first order reaction is 15 minutes at 25°C. But at 32°C temperature the half-life of the same reaction is 10 minutes. Calculate the ratio of rate constant at said temperature.

25°C উষ্ণতায় একটি প্রথম ক্রম বিক্রিয়ার অর্ধায়ু হল 15 মিনিট, আবার 32°C উষ্ণতায় ওই বিক্রিয়ার অর্ধায়ু হল 10 মিনিট। উক্ত উষ্ণতাদুটিতে rate constant-এর অনুপাত নির্ণয় করো।

(iii) In which condition(s) a real gas behaves like an ideal gas? 2+2+1=5

কোন কোন শর্তে একটি বাস্তাব গ্যাস আর্দশ গ্যাসের ন্যায় আচরণ করে?

(d) (i) Draw the structure of NH_3 according to VSEPR Theory.

VSEPR তত্ত্ব থেকে NH_3-র গঠন অঙ্কন করো।

(ii) Explain the stability order $PbCl_2$ and $PbCl_4$. 3+2=5

$PbCl_2$ এবং $PbCl_4$-এর স্থায়িত্বের ক্রম ব্যাখ্যা করো।

3. Answer *any one* question: 10×1=10

যে কোনো একটি প্রশ্নের উত্তর দাও ঃ

(a) (i) Arranage $HClO_3$, $HClO_2$, $HClO_4$, and HClO acids according to increasing acidity citing appropiate reasons.

$HClO_3$, $HClO_2$, $HClO_4$ এবং HClO অম্লগুলিকে ক্রমবর্ধমান অম্লতা অনুসারে সাজাও এবং কারণ উল্লেখ করো।

(ii) For a gas T_c = 304·2 K; P_c = 72·8 atm. Calculate van der Waals constants for the gas.

একটি গ্যাসের T_c = 304·2 K; P_c = 72·8 atm, গ্যাসটির van der Waals ধ্রুবকগুলি নির্ণয় করো।

(iii) Explain at room temperature why CO_2 is a gas but SiO_2 solid.
সাধারণ অবস্থায় CO_2 একটি গ্যাস কিন্তু SiO_2 কঠিন পদার্থ। — ব্যাখ্যা করো।

(iv) Give the chemical formula and one important use of borax. 3+3+2+2=10
বোরাক্সের রাসায়নিক সংকেত এবং একটি গুরুত্বপূর্ণ ব্যবহার লেখো।

(b) (i) Give two important differences between order and molecularity of a reaction.
আণবিকতা এবং ক্রমের মধ্যে দুটি গুরুত্বপূর্ণ পার্থক্য লেখো।

(ii) What happens when white P is boiled with NaOH solution (Give equation)?
সমীকরণসহ বিবৃত করো যখন সাদা P-কে NaOH দ্রবণ সহ ফোটানো হয়।

(iii) Give two differences between Schottky and Frenkel defect.
স্কটকি এবং ফ্রেঙ্কল ত্রুটির মধ্যে দুটি পার্থক্য লেখো।

(iv) Waht is the effect of increase of temperature and pressure on coefficient of viscosity of gases. 2+3+2+3=10
তাপ এবং চাপ বৃদ্ধির প্রভাব গ্যাসের সান্দ্রতাঙ্কের উপর কী হবে?

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SH-II/CHE/203/GE-2/(PR)/19

B.Sc. 2nd Semester (Honours) Practical Examination, 2019

CHEMISTRY

[States of Matter & Chemical Kinetics; Chemical Bonding & Molecular Structure, p-Block Elements (p2)]

Paper : SHCHE/203/GE-2

Course ID : 21424

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

The figures in the margin indicate full marks.
Candidates would not be allowed to consult the books/notes while writing the report in answer scripts.
দক্ষিণ প্রান্তস্থিত সংখ্যাগুলি পূর্ণমানের নির্দেশক।
উত্তরপত্র লেখার সময় বই বা নোট দেখতে দেওয়া হবে না।

1. Perform the experiment of the following on the basis of 'drawing a card' (*any one*): 11×1=11
কার্ড তোলার ভিত্তিতে নিম্নলিখিত পরীক্ষা (*যে কোনো একটি*) সম্পাদন করো।

(A) Make a systematic and complete quantitative analysis of Inorganic sample (Marked-I) containing not more than three radicals with respect to the following in tabular form. A detailed description of the experimental procedure is not necessary.
অনধিক তিনটি মূলক সমন্বিত প্রদত্ত 'I' চিহ্নিত অজৈব নমুনাটির রীতিবদ্ধ পদ্ধতিতে গুণগত বিশ্লেষণ করো নিম্নলিখিত ছকের আকারে। পরীক্ষাসমূহের বিস্তৃত বিবরণের প্রয়োজন নেই।

(a) Physical characteristics ½+½=1
ভৌত ধর্মাবলী

Colour and solubility
বর্ণ এবং দ্রাব্যতা

(b) Preliminary test for the basic radicals: 1+½+½=2
ক্ষারকীয় মূলকের প্রাথমিক পরীক্ষা ঃ

Experiment পরীক্ষা	Observation পর্যবেক্ষণ	Inference সিদ্ধান্ত
(i) Fusion test for Mn and Cr-compounds বিগলন (Mn ও Cr যৌগের জন্য)		
(ii) Flame test শিখা পরীক্ষা		
(iii) Test for NH_4^+ NH_4^+ আয়ন-এর পরীক্ষা		

(c) Special test for basic radicals: Fe, Ni, Cu compounds ½×3=1½
নীচের ক্ষারকীয় মূলকগুলির বিশেষ পরীক্ষা ঃ
Fe, Ni, Cu যৌগ

(d) Preliminary test for acid radicals: ½+½=1
আম্লিক মূলকের প্রাথমিক পরীক্ষা ঃ

Experiment পরীক্ষা	Observation পর্যবেক্ষণ	Inference সিদ্ধান্ত
(i) With Conc. H_2SO_4 and MnO_2 ঘন H_2SO_4 এবং MnO_2 দ্বারা (ii) With Conc. H_2SO_4 and Cu-turnings ঘন H_2SO_4 এবং (Cu) কপার ছিবড়া দ্বারা		

(e) Test for interfering acid radicals and special test for S^{2-} 1½
বিঘ্ন সৃষ্টিকারী আম্লিক মূলকের পরীক্ষা এবং S^{2-} মূলকের বিশেষ পরীক্ষা

(f) Wet test for acid radicals: 2
আম্লিক মূলকের সিক্ত পরীক্ষা ঃ

Experiment পরীক্ষা	Observation পর্যবেক্ষণ	Inference সিদ্ধান্ত
(i) $AgNO_3$ solution $AgNO_3$ দ্রবণ দ্বারা (ii) $BaCl_2$ solution $BaCl_2$ দ্রবণ দ্বারা (iii) Nitropruside solution নাইট্রোপ্রুসাইড দ্রবণ দ্বারা (iv) Ring test বলয় পরীক্ষা		

(g) Write the correct formulae of the radicals and mention the group and group reagent(s) of the basic radical(s). 2
বর্তমান মূলকগুলির সঠিক সংকেত লেখো এবং ক্ষারকীয় মূলকটির শ্রেণি এবং শ্রেণি বিকারক উল্লেখ করো।

(B) Prepare 7·5% and 5% solution (V/V) of the supplied 10% solution (marked ST) in water. Calculate densities of prepared solutions theoretically from the density of 10% solution. Determine their surface tensions. (Density and surface tension of water and density of 10% solution will be supplied at the time of calculation). 11
প্রদত্ত 10% (ST চিহ্নিত) দ্রবণ থেকে 7·5% এবং 5% (V/V) জলীয় দ্রবণ প্রস্তুত করো। 10% দ্রবণের ঘনত্ব থেকে তাত্ত্বিকভাবে দ্রবণগুলির ঘনত্ব গণনা করো। উক্ত দ্রবণগুলির পৃষ্ঠটান নির্ণয় করো।
(গণনার সময় জলের ঘনত্ব, পৃষ্ঠটান এবং 10% দ্রবণের ঘনত্ব দেওয়া হবে)

(C) Prepare 8% and 6% solutions (V/V) of the supplied 10% solution (marked VIS) in water. Calculate densities of prepared solutions theoretically from the density of 10% solution. Determine their viscosity coefficient. (Density and viscosity coefficient of water and density of 10% solution will be supplied at the time of calculation) 11

প্রদত্ত 10% (VIS চিহ্নিত) দ্রবণ থেকে 8% এবং 6% (V/V) জলীয় দ্রবণ প্রস্তুত করো। 10% দ্রবণের ঘনত্ব থেকে তাত্ত্বিকভাবে দ্রবণগুলির ঘনত্ব গণনা করো। উক্ত দ্রবণগুলির সান্দ্রতা গুণাঙ্ক নির্ণয় করো। (গণনার সময় জলের ঘনত্ব, সান্দ্রতা গুণাঙ্ক এবং 10% দ্রবণের ঘনত্ব দেওয়া হবে)

(D) Prepare a set of experiment with 90 ml of acid and 10 ml of ester to study the acid-catalysed hydrolysis of the given ester with the supplied acid solution (marked A). Calculate the observed rate constant by plotting suitable graph. 11

অ্যাসিড আর্দ্র বিশ্লেষণ অধ্যয়ন করার জন্য প্রদত্ত অ্যাসিড দ্রবণ (A-চিহ্নিত) এবং এস্টার দ্বারা একটি পরীক্ষার সেট সম্পাদন করো। সেটটি 90 ml অ্যাসিড এবং 10 ml এস্টার দ্বারা প্রস্তুত করো। উপযুক্ত লেখচিত্রের সাহায্যে পরীক্ষালব্ধ হার ধ্রুবক গণনা করো।

2. Viva voce 2

মৌখিক

3. Laboratory Notebook 2

ল্যাবরেটরি খাতা

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SP-II/CHE/201/C-1B/19

B.Sc. 2nd Semester (Programme) Examination, 2019

CHEMISTRY

(Bonding and Molecular Structure...Chemical Kinetics T_2)

Paper : SP/CHE/201/C-1B

Course ID : 21418

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) In between Li and Cs which one has higher ionic character?
Li ও Cs-এর মধ্যে কার তড়িৎযোজী চরিত্র বেশি?

(b) Write mathematical expression of Bragg's law.
Bragg-এর সূত্রটির গাণিতিক রূপটি লেখো।

(c) Write electronic configuration of Fe^{3+}.
Fe^{3+}-এর ইলেকট্রন বিন্যাস লেখো।

(d) Give one example of 1st order reaction.
একটি প্রথম ক্রম বিক্রিয়ার উদাহরণ দাও।

(e) What is carborundum?
কার্বোরান্ডাম কী?

(f) What is the unit of surface tension in C.G.S. system?
C.G.S. পদ্ধতিতে পৃষ্ঠটানের একক কী?

(g) State the reason behind diagonal relationship of elements.
মৌলের কৌণিক সম্পর্কের কারণ কী?

(h) What is lattice energy?
ল্যাটিশ শক্তি কী?

2. Answer *any two* questions: 5×2=10

যে কোনো দুটি প্রশ্নের উত্তর দাও ঃ

(a) (i) Discuss the effect of temperature on surface tension of the liquid.
তরলের পৃষ্ঠটানের ওপর উষ্ণতার প্রভাব ব্যাখ্যা করো।

(ii) "1st order reaction can never be completed." — Explain.
"১ম ক্রম বিক্রিয়া কখনও শেষ হয় না।" — ব্যাখ্যা করো।

(iii) Draw the PV vs. P curve for an ideal gas. 2+2+1=5
আদর্শ গ্যাসের ক্ষেত্রে PV – P লেখচিত্রটি অঙ্কন করো।

(b) (i) Write the units of van der Waal's constant '*a*' and '*b*'.
ভ্যান্ডার ওয়ালের '*a*' এবং '*b*' ধ্রুবকের এককগুলি লেখো।

(ii) Write down the Arrhenius equation for rate constant.
বিক্রিয়ার হার ধ্রুবক সংক্রান্ত আরহেনিয়াসের সমীকরণটি লেখো।

(iii) What do you mean Critical Temperature of a gas? 2+2+1=5
সংকট তাপমাত্রা বলতে তুমি কী বোঝ?

(c) (i) HNO_2 behaves both as oxidising and reducing agent — Explain.
HNO_2 জারক ও বিজারক দুভাবেই কাজ করতে পারে— ব্যাখ্যা করো।

(ii) Explain why electron-affinity of fluorine is less than chlorine.
ফ্লোরিনের ইলেকট্রন আসক্তি ক্লোরিনের অপেক্ষা কম কেন— ব্যাখ্যা করো।

(iii) Write the formula of two oxyacids of sulphur. 2+2+1=5
সালফারের দুটি অক্সিঅ্যাসিডের সংকেত লেখো।

(d) (i) State Fajan's rule. Compare and explain the ionic character between $SnCl_4$ and $SnCl_2$.
ফ্যাজানের সূত্রটি বিবৃত করো। $SnCl_4$ এবং $SnCl_2$-এর আয়নীয় ধর্মের তুলনা করো।

(ii) NF_3 is pyramidal while BF_3 is triangular planar— Explain. (1½+1½)+2=5
NF_3-এর গঠন পিরামিডাকার কিন্তু BF_3 সামতলিক ত্রিকোণাকার— ব্যাখা করো।

3. Answer *any one* question: 10×1=10

যে কোনো একটি প্রশ্নের উত্তর দাওঃ

(a) (i) Iodine is slightly soluble in water but readily soluble in presence of KI. — Give reason.
জলে আয়োডিন স্বল্পদ্রাব্য কিন্তু KI-এর উপস্থিতিতে দ্রাব্যতা বহুগুণ বৃদ্ধি পায়। — কারণ দেখাও।

(ii) Compare with example the catenation property of carbon and silicon.
উদাহরণসহযোগে কার্বন ও সিলিকনের ক্যাটিনেশন ধর্মের তুলনা করো।

(iii) Explain the acidity order of HF, HCl, HBr and HI.
HF, HCl, HBr এবং HI-এর অ্যাসিডিটির ক্রম ব্যাখ্যা করো।

(iv) Write down the main differences between 1st and 2nd order reactions.
2+3+2+3=10
১ম ও ২য় ক্রম বিক্রিয়ার মূলগত পার্থক্যগুলি লেখো।

(b) (i) What do you mean by half life period of a chemical reaction?
কোনো বিক্রিয়ার অর্ধজীবন কাল বলতে কী বোঝো?

(ii) Draw the structure of B_2H_6 and explain its bonding type.
B_2H_6-এর গঠন অঙ্কন করো এবং এর বন্ধন-প্রকৃতি ব্যাখ্যা করো।

(iii) Among Cav, Crms and Cmp – which one has the largest value and why?
Cav, Crms এবং Cmp-এর মধ্যে কোনটির মান সর্বাধিক এবং কেন?

(iv) Name the two hydrides of oxygen with their formula. 2+(1+2)+(1+2)+2=10
সংকেতসহ অক্সিজেনের দুটি হাইড্রাইডের নাম লেখো।

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SP-II/CHE/201/C-1B/(PR)/19

B.Sc. 2nd Semester (Programme) Practical Examination, 2019

CHEMISTRY

[Bonding & Molecular Structure, Comparative Studies of p-Block Elements; States of Matter and Chemical Kinetics (p2)]

Paper : SPCHE/201/C-1B

Course ID : 21428

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

The figures in the margin indicate full marks.
Candidates would not be allowed to consult the books/notes while writing the report in answer scripts.
দক্ষিণ প্রান্তস্থিত সংখ্যাগুলি পূর্ণমানের নির্দেশক।
উত্তরপত্র লেখার সময় বই বা নোট দেখতে দেওয়া হবে না।

1. Perform the experiment of the followings on the basis of 'drawing a card' (*any one*): 11×1=11
কার্ড তোলার ভিত্তিতে নিম্নলিখিত পরীক্ষা (*যে কোনো একটি*) সম্পাদন করো।

(A) Make a systematic and complete qualitative analysis of Inorganic sample (Marked-I) containing not more than three radicals with respect to the following in tabular form. A detailed description of the experimental procedure is not necessary.
অনধিক তিনটি মূলক সমন্বিত প্রদত্ত 'I' চিহ্নিত অজৈব নমুনাটির রীতিবদ্ধ পদ্ধতিতে গুণগত বিশ্লেষণ করো নিম্নলিখিত ছকের আকারে। পরীক্ষাসমূহের বিস্তৃত বিবরণের প্রয়োজন নেই।

(a) Physical characteristics ½+½=1
ভৌত ধর্মাবলী

Colour and solubility
বর্ণ এবং দ্রাব্যতা

(b) Preliminary test for the basic radicals: 1+½+½=2
ক্ষারকীয় মূলকের প্রাথমিক পরীক্ষা ঃ

Experiment পরীক্ষা	Observation পর্যবেক্ষণ	Inference সিদ্ধান্ত
(i) Fusion test for Mn and Cr-compounds বিগলন (Mn ও Cr যৌগের জন্য)		
(ii) Flame test শিখা পরীক্ষা		
(iii) Test for NH_4^+ NH_4^+ আয়ন-এর পরীক্ষা		

(c) Special test for basic radicals: Fe, Ni, Cu compounds. ½×3=1½
নীচের ক্ষারকীয় মূলকগুলির বিশেষ পরীক্ষা ঃ
Fe, Ni, Cu যৌগ

(d) Preliminary test for acid radicals: ½+½=1
আম্লিক মূলকের প্রাথমিক পরীক্ষা ঃ

Experiment পরীক্ষা	Observation পর্যবেক্ষণ	Inference সিদ্ধান্ত
(i) With Conc. H_2SO_4 and MnO_2 ঘন H_2SO_4 এবং MnO_2 দ্বারা (ii) With Conc. H_2SO_4 and Cu-turnings ঘন H_2SO_4 এবং (Cu) কপার ছিবড়া দ্বারা		

(e) Test for interfering acid radicals and special test for S^{2-} 1½
বিঘ্ন সৃষ্টিকারী আম্লিক মূলকের পরীক্ষা এবং S^{2-} মূলকের বিশেষ পরীক্ষা

(f) Wet test for acid radicals: 2
আম্লিক মূলকের সিক্ত পরীক্ষা ঃ

Experiment পরীক্ষা	Observation পর্যবেক্ষণ	Inference সিদ্ধান্ত
(i) $AgNO_3$ solution $AgNO_3$ দ্রবণ দ্বারা (ii) $BaCl_2$ solution $BaCl_2$ দ্রবণ দ্বারা (iii) Nitropruside solution নাইট্রোপ্রুসাইড দ্রবণ দ্বারা (iv) Ring test বলয় পরীক্ষা		

(g) Write the correct formulae of the radicals and mention the group and group reagent(s) of the basic radical(s). 2
বর্তমান মূলকগুলির সঠিক সংকেত লেখো এবং ক্ষারকীয় মূলকটির শ্রেণি এবং শ্রেণি বিকারক উল্লেখ করো।

(B) Prepare 7·5% and 5% solutions (v/v) of the supplied 10% solution (marked ST) in water. Calculate densities of prepared solutions theoretically from the density of 10% solution. Determine their surface tensions. (Density and surface tension of water and density of 10% solution will be supplied at the time of calculation). 11
প্রদত্ত 10% (ST চিহ্নিত) দ্রবণ থেকে 7·5% এবং 5% (v/v) জলীয় দ্রবণ প্রস্তুত করো। 10% দ্রবণের ঘনত্ব থেকে তাত্ত্বিকভাবে দ্রবণগুলির ঘনত্ব গণনা করো। উক্ত দ্রবণগুলির পৃষ্ঠটান নির্ণয় করো।
(গণনার সময় জলের ঘনত্ব, পৃষ্ঠটান এবং 10% দ্রবণের ঘনত্ব দেওয়া হবে)

(C) Prepare 8% and 6% solutions (v/v) of the supplied 10% solution (marked VIS) in water. Calculate densities of prepared solutions theoretically from the density of 10% solution. Determine their viscosity coefficient. (Density and viscosity coefficient of water and density of 10% solution will be supplied at the time of calculation) 11

প্রদত্ত 10% (VIS চিহ্নিত) দ্রবণ থেকে 8% এবং 6% (v/v) জলীয় দ্রবণ প্রস্তুত করো। 10% দ্রবণের ঘনত্ব থেকে তাত্ত্বিকভাবে দ্রবণগুলির ঘনত্ব গণনা করো। উক্ত দ্রবণগুলির সান্দ্রতা গুণাঙ্ক নির্ণয় করো। (গণনার সময় জলের ঘনত্ব, সান্দ্রতা গুণাঙ্ক এবং 10% দ্রবণের ঘনত্ব দেওয়া হবে)

(D) Perform a set of experiment with 90 ml of acid and 10 ml of ester to study the acid-catalysed hydrolysis of the given ester with the supplied acid solution (marked A). Calculate the observed rate constant by plotting suitable graph. 11

অ্যাসিড আর্দ্র বিশ্লেষণ অধ্যয়ন করার জন্য প্রদত্ত অ্যাসিড দ্রবণ (A-চিহ্নিত) এবং এস্টার দ্বারা একটি পরীক্ষার সেট সম্পাদন করো। সেটটি 90 ml অ্যাসিড এবং 10 ml এস্টার দ্বারা প্রস্তুত করো। উপযুক্ত লেখচিত্রের সাহায্যে পরীক্ষালব্ধ হার ধ্রুবক গণনা করো।

2. Viva voce 2

মৌখিক

3. Laboratory Notebook 2

ল্যাবরেটরি খাতা

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SH-II/CHE/202/C-4(P-4)/(PRI)/19

B.Sc. 2nd Semester (Honours) Practical Examination, 2019

CHEMISTRY

(Organic Chemistry-II)

Paper : SHCHE/202/C-4 (P-4)

Course ID : 21422

INSTRUCTIONS TO THE EXAMINERS

(Please follow the instructions strictly)

1. SEM-II, Chemistry (Honours) Practical Examination should have a duration of 2 hours.
2. The examiners are requested to maintain a record book according to Batch Number and UID number of candidates of each batch. The sample ID used by candidates and also the marks awarded in laboratory record book and viva voce or any other relevant data they may consider necessary.
3. Candidate without the Laboratory Notebook signed regularly by class teacher must not be allowed to appear at the examination.
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 against as yield of the product and melting point of the purified product performed 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.
8. In case, 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.
9. The sample box is to be opened in the presence of both external and internal examiners. If any sample is found damaged or otherwise defective in opinion of examiners, such samples should be discarded.
10. Examiners are requested to collect the used sample containers/bottles after the examination is over.
11. 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.
12. Examiners are requested to send the examined answer scripts in sealed covers (separate cover for each college code) to the Controller of Examination (BKU). The packet(s) of answer-scripts must contain a top sheet.

1. **Distribution of Marks**

(a)	Yield: Yield > 90% (with actual colour of the product)	8
	Yield: 90% < Yield > 80% (with actual colour of the product)	7
	Yield: 80% < Yield > 70% (with actual colour of the product)	6
	Yield: 70% < Yield > 60% (with actual colour of the product)	5
	Yield: Product submitted, Yield < 60%	4
	Yield: No product submitted, No marks will be awarded.	0
(b)	Purification of crude product by recrystallization (mentioned solvent)	2
(c)	Measurement of melting point $(T_m - 3)$ °C.	1

2. Laboratory records: 2
3. Viva voce: 2

N.B.:

1. **No marks** to be awarded if it appears that the student has not performed the experiments.
2. **Laboratory Notebook:** Laboratory notebooks recorded in a systematic way and signed regularly will get higher credit.
3. **Viva voce:** Simple questions on basic theory of analysis and reactions involved in analysis of organic compounds and preparation of derivatives may be asked.

Conveners

1. **Dr. Ajay Kumar Manna,**
Ramananda College,
Bisnupur, Bankura, 722122
Mobile-09732130372/9064835095.
2. **Dr. Samaresh Ghosh,**
Bankura Sammalani College,
Bankura,
Mobile-09434996924.

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SH-II/CHE/201/C3(P3)/(PRI)/19

B.Sc. 2nd Semester (Honours) Practical Examination, 2019

CHEMISTRY

(Inorganic Chemistry-I)

Paper : SHCHE/201/C3(P3)

Course ID : 21421

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. If the number of samples falls short due to breakage during transit or by other means, requisite number of samples may be prepared jointly by the examiners with prior intimation to the Convenors/Controller of Examinations. Separate keys for such samples duly signed should be maintained and sent to the convenors along with the answer-scripts.

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

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

5. 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.

6. 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.

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

8. No Candidate should be allowed to appear at the examination without laboratory notebook.

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

10. **Distribution of Marks**

(i)	Preparation of primary standard solution	1
(ii)	Standardization of secondary standard solution	2
(iii)	Presentation of data in tabular form	2
(iv)	Correct calculation	2
(v)	Quality of results:	
	Error: 0 to 4%	4
	Above 4% to 6%	3
	Above 6% to 10%	2
	Above 10%	0

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SHP-II/CHE/201C-1B & 203GE-2(PRI)/19

B.Sc. 2nd Semester (Honours/Programme) Practical Examination, 2019

CHEMISTRY

(Inorganic and Physical Practical)

Paper : SHCHE/203/GE-2 and SPCHE/201/C-1B

Course ID : 21424 and 21428

INSTRUCTIONS TO THE EXAMINERS FOR CHEMISTRY EXPERIMENTS:

(Please follow the instructions strictly)

1. Student can choose their experiment either inorganic or physical by pulling a card.

2. Examiners are requested to set experiments on Physical Chemistry for 1/3rd of the total nos. student of each batch.

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

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

5. The examiners are requested to maintain a record book having UID & registration no. of candidates of each batch, sample numbers used by candidates and also marks awarded in laboratory notebook, viva voce and any other data they may consider necessary.

The answer-scripts, record book together with a copy of the key signed by the examiners should be sent to the controller department, Bankura University.

6. The names of examiners in full with their respective college address, mobile number and the number of candidates examined by them should be included in the record book.

7. Candidate without Laboratory Notebook must not be allowed to appear at the examination.

8. The examiners are requested to allot marks for each part of a question separately in a systematic way as given under distribution of marks.

9. If the number of samples supplied falls short of the requirement for damaged or any other reasons then the examiners should make few samples of their own consulting with the convener and maintaining the key. That key must be sent to the convener in sealed cover. The sample box is to be opened in presence of both external and internal examiners.

10. Separate packet are to be used for candidate of different college.

11. The UID of candidates absent must be entered in the record book with the mark "ab".

12. Marks to be awarded only for correct observation and correct inference for each portion, independently.

Distribution of marks for Inorganic portion:

(a) Physical characteristics:

(i) Colour ½

(ii) Solubility ½

(b) Preliminary tests for basic radicals:
  (i) Fusion test for Chromium and Manganese 1
  (ii) Flame test ½
  (iii) Test for NH_4^+ ½

(c) Special tests for basic radicals Fe ,Ni, Cu ½×3=1.5

(d) Preliminary test for acid radicals ½+½=1

(e) Tests for interfering acid radicals and special test for sulphide (S^{-2}) radical ½×3=1.5

(f) Wet tests for acid radicals ½×4=2

(g) Correct formulae of the radicals and for basic radical(s) mention the appropriate group reagent 2

Note: *If all the three radicals found by the student are incorrect the student would get no credit except for (a).*

For Physical Chemistry:

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

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

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

4. Allotment of marks: 11

Physical Chemistry experiments (Detailed distribution of marks for a particular experiment will be supplied by the convener(s) along with the key)

Students have to perform a single experiment as allotted to him on the basis of "drawing a Card". Presentation should be neat and in tabular form(s). In the theory portion they have to write only the working formula relevant to the experiment (no detailed discussion). All the relevant data should be recorded with proper units everywhere. Details of calculation should be shown in the answer-scripts and be checked by the examiners, and then only the allotted marks for calculations may be awarded. Graphs (with proper choice of labelling of axes) should be smooth; the data points should be clearly shown and properly put. There must be caption also. No credit on results will be given to him/her on the basis of any calculation done by examiners, even if results turn out to be accurate.

Determination of Surface Tension:

1. 100 ml exactly 10% methanol solution in water is to be given to each candidate.

2. Necessary data including density and surface tension of water and density of 10% methanol solution is to be supplied by examiners on that day.

Determination of Viscosity:

1. 100 ml of exactly 10% sucrose solution in water is to be given to each candidate.

2. Necessary data including density and viscosity of water and density of 10% sucrose solutions is to be supplied by examiners on that day.

Acid hydrolysis of methyl acetate:

1. About 15-20 ml of methyl acetate in a dry test tube is to be given to each candidate.
2. HCl solutions of accurately known strength (between 2N to 3N) are to be prepared by examiners on that day and to be supplied to each candidate by marking (A).
3. ~1(N) NaOH solution and Phenolphthaline indicator is to be supplied by examiners.

Distribution of Marks:

(Surface Tension & Viscosity)

Presentation: 3 (Theory, Data Table, deduct 0·5 marks if T is not mentioned)

Correct Calculation of density: 1·5

Correct Calculation of Viscosity/Surface Tension: 1·5

Accuracy: 1·5 × 3 = 4·5 [Full Credit for E ≤ 5%, deduct 1 for each next 1%]

Proper unit: 0·5

Ester hydrolysis:

Performing the experiment: 3

Presentation: 2 (Theory, Data Table, deduct 0·5 marks if T is not mentioned)

Graph I : 3 (1 for data pointing, 1 for axes labels and caption and 1 for mean curve drawing).

Proper unit of rate constant: 0·5

Accuracy: 1·5 [1·5 for E 25% deduct 0·5 for each 10% error].

Laboratory Notebook: 2

The candidates 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.

Viva voce: 2

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

Conveners:

1. **Uday Chand Saha**
Indas Mahavidyalaya
Indas, Bankura
Mobile: 9474493512

2. **Jnanojjal Chanda**
Sonamukhi College
Sonamukhi, Bankura
Mobile: 9735336469

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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**

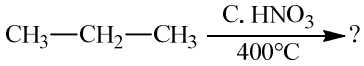
The figures in the margin indicate full marks.

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

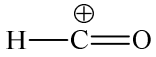
1. Answer *any five* questions: 1×5=5

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

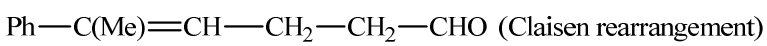
(b) Give the product(s) in the following reaction:



(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

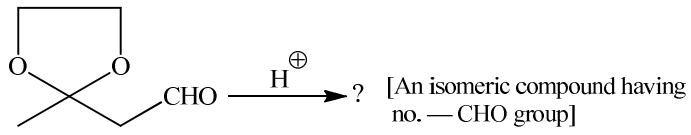
(g) What is used as reference compound for ^{1}HNMR–spectroscopy?

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

2. Answer *any two* questions: 5×2=10

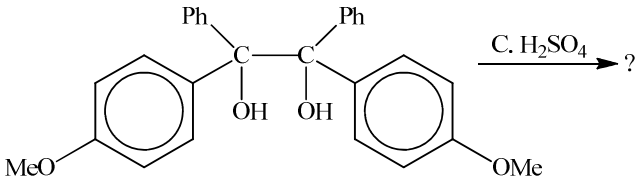
(a) (i) What is Perkin reaction? Give an example with mechanism.

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

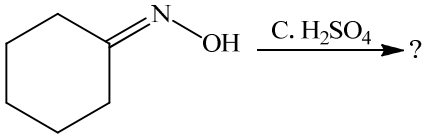


(b) Predict the product(s) with mechanism: 2½×2=5

(i)

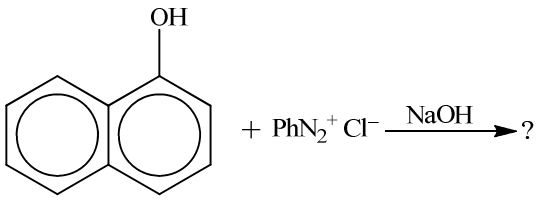


(ii)

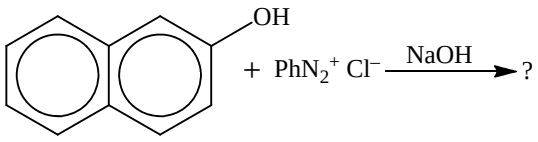


(c) (i) Give the product(s) in the following reactions and explain their formation.

(I)



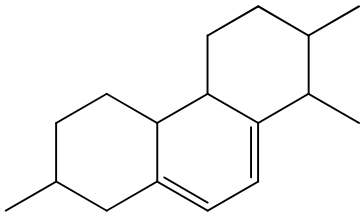
(II)



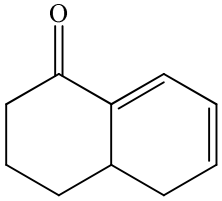
(ii) p-Nitrobenzenediazonium cation is 10^4 times more reactive than p-methoxy benzene diazonium cation under the same conditions. —Explain. (1½+1½)+2=5

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

(I)



(II)

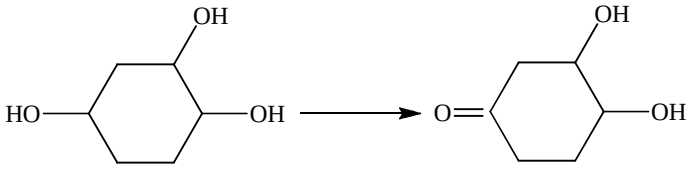


(ii) Comment on the change in UV-VIS spectra of phenol on basification and of aniline on acidification. (1½+1½)+2=5

3. Answer *any one* question: 10×1=10

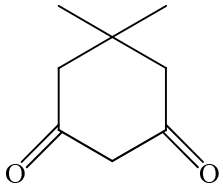
(a) (i) What is dinone-phenol rearrangement? Give mechanism with suitable example.

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

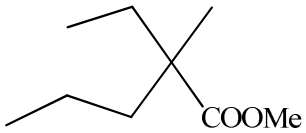


(iii) Show the retrosynthetic analysis of the following compounds and carryout the synthesis.

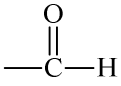
(I)



(II)

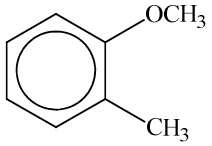


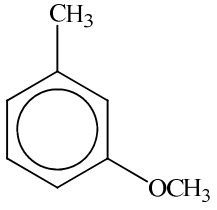
3+2+5=10

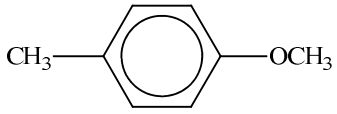
(b) (i) Explain why C—H stretching absorption of  group generally appears as a doublet of almost equal intensities.

(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) 

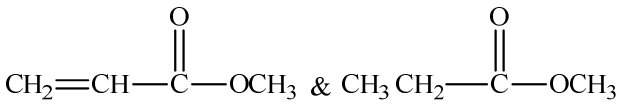
(II) 

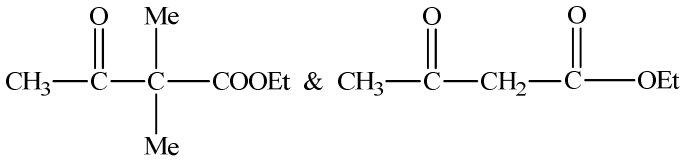
(III) 

(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?

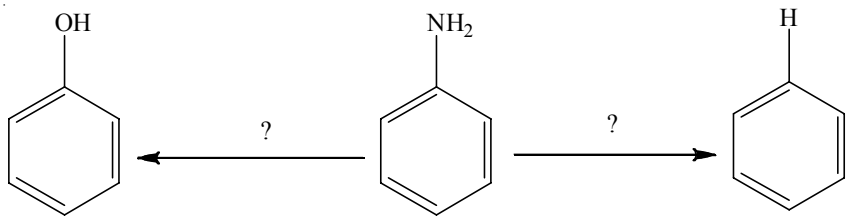
(h) What is the monomer of the peptide?
পেপটাইডের গঠনকারী এককটি কী?

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

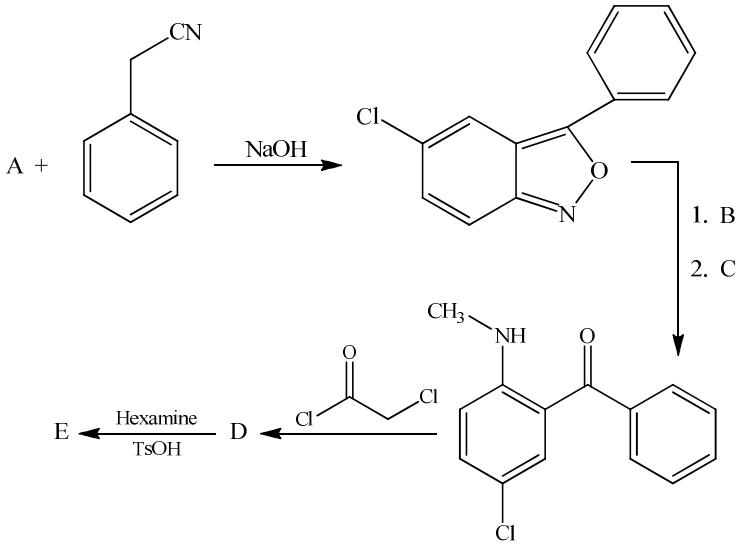
(iii) Synthesize sulphonamide starting from benzene using common reagents. 3

(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?

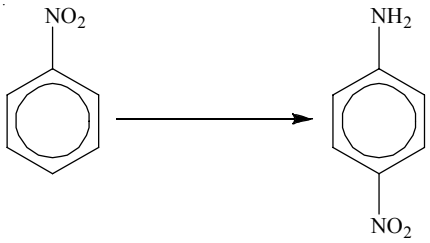
(b) (i) What is reducing sugar and non-reducing sugar? Explain each with a suitable example.
বিজারক সুগার ও অবিজারক সুগার বলতে কী বোঝো? প্রতিটির একটি করে উদাহরণ সহযোগে ব্যাখ্যা করো।

(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

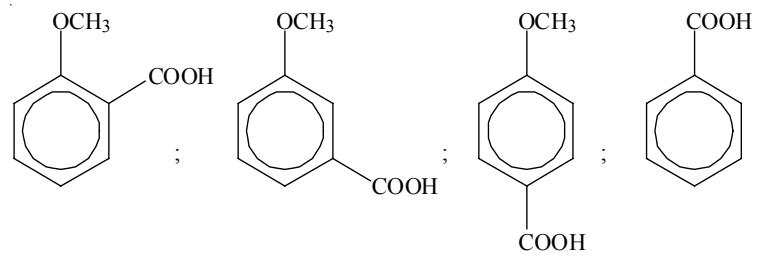
D-গ্লুকোজের C_4 এ্যাপিমার-এর গঠন চিত্র অঙ্কন করো।

(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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