SH-III/Chemistry-302C-6(T)/19

B. Sc. Semester III (Honours) Examination, 2018-2019

CHEMISTRY

Course ID : 31412 **Course Code : SHCHE-302C-6(T)**

Course Title: Inorganic Chemistry II

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) Write down the Born-Lande' equation.

(b) What is the formal charge of the central oxygen atom in O_3?

(c) Give one example of a compound where intramolecular hydrogen bond is present.

(d) State the hybridisation of sulphur atom in SF_4.

(e) I_2 forms I_3^- with I^-ion. Name the type of weak interaction involved in it.

(f) Which among NH_3 and NF_3 has higher dipole moment?

(g) Find the missing element $^{14}_{7}N + ^{4}_{2}He \rightarrow ... + ^{1}_{1}H$.

(h) Give one example of a "*n*"-type semiconductor.

2. Answer *any two* questions: 5×2=10

(a) (i) Applying radius ratio rule find out critical radius ratio for a CsCl type of lattice.

(ii) Why does metallic beryllium conduct electricity despite absence of unpaired electrons in its atom? Expalin on the basis of Band theory. 3+2=5

(b) (i) Compare Schottky defect with Frenkel defect.

(ii) The equatorial $\angle FSF$ angle is 101° in SF_4 while that in SOF_4 is 115°— Explain using Bent's rule. 2+3=5

(c) (i) Sketch a qualitative MO energy-level diagram of H_2O.

(ii) Predict the shapes of NF_3, ClF_3 and $POCl_3$ using VSEPR theory. 2+3=5

(d) (i) A helium atom is highter than the total mass of its constituent particles.-Explain.

(ii) Dissociation energy of O_2 is less than that of O_2^+ but dissociation energy of N_2 is greater than that of N_2^+— explain using MOT. 2+3=5

3. Answer *any one* question: 10×1=10

(a) (i) Which one is more covalent and why? CuCl or NaCl.

(ii) Which one has higher boiling point among $SnCl_2$ and $SnCl_4$? — Explain.

(iii) The solubility of salts in water can be rationalised by considering lattice and hydration enthalpies. Justify the statement with suitable examples.

(iv) The final product of U-238 is Pb-206. A sample of pitch blende contains 0·0453gm Pb-206 for each gram of U–238 present in it. Assuming that pitch blende is formed at the time of formation of earth and did not contain any Pb-206, calculate the age of earth. (Given that $t_{1/2}$ of U-238 is $4{\cdot}5\times10^9$ years.) 2+2+3+3=10

(b) (i) Draw the molecular orbital diagram for HF molecule. Find the number of non-bonding electrons.

(ii) 'The NaCl crystal being heated with sodium vapour becomes yellow'— Give reason.

(iii) Distinguish between nuclear fission and nuclear fusion.

(iv) Represent the Born-Haber cycle of NaI and calculate the electron affinity of iodine from the following data given in kJ mol^{-1}:

$$\Delta H_{f(NaI)} = -289, \Delta H_{sub(Na)} = 108{\cdot}8, \Delta H_{diss(I_2)} = 214{\cdot}2, \Delta H_{IE(Na)} = 497{\cdot}3, U_{NaI} = -694{\cdot}7 .$$

2+2+3+3=10

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SH-III/Chemistry-303C-7(T)/19

B. Sc. Semester III (Honours) Examination, 2018-19

CHEMISTRY

Course ID : 31413 **Course Code : SHCHE/303C-7(T)**

Course Title: Organic Chemistry III

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

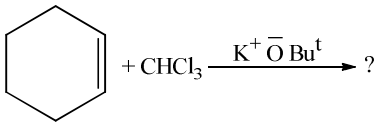
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

1. Answer *any five* questions: 1×5=5

(a) Give the product of the following reaction:

$$PhCH{=}CHCOPh \xrightarrow{CH_3Li} ?$$

(b) Give the product of the following reaction:



(c) What are Ylides?

(d) Write the first listed of twelve principles of Green Chemistry.

(e) Indicate which benzene ring of PhNHCOPh you would expect to be attacked in nitration.

(f) Which solvent acetone, benzene, water or ethanol is the greenest solvent?

(g) Write the B_{AC^2} mechanism for the hydrolysis of methyl benzoate.

(h) What is the reagent used in Meerwin-Pondorf-Verley reduction?

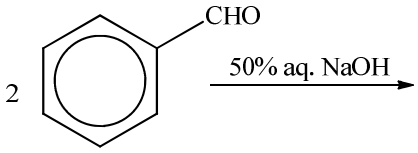
2. Answer *any two* questions: 5×2=10

(a) (i) Treatment of $(CH_3)_3CCH=CH_2$ with conc. HCl gives a mixture of two isomeric chlorides. Suggest reasonable structures for these two compounds and offer a mechanistic explanation for their formation.

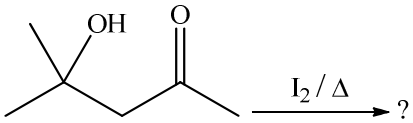
(ii) How can be the conversion of PhCHO to PhCDO be done?

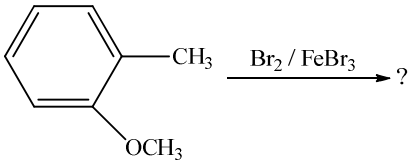
(iii) Among toluene and t-butylbenzene, which one is more reactive in electrophilic substitution and why? 2+1½+1½=5

(b) (i) Predict the product(s) of the following reaction with mechanism. Show how deuterium labelling experiment may be used to establish this mechanism.



(ii) Write down the products:

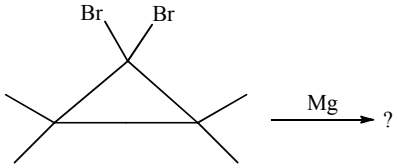
(a) 

(b) 

3+(1+1)=5

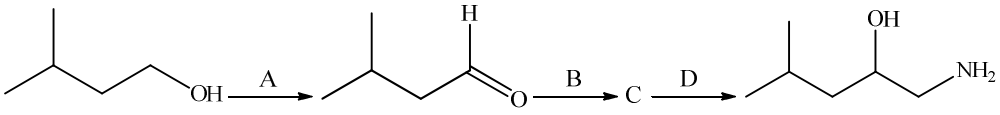
(c) (i) Discuss the stereochemical outcome of the addition of bromine to *cis*-2-butene.

(ii) What happens when acetaldehyde is treated with $H_2{}^{18}O$ in presence of a little mineral acid?

(iii) What will be the product? 

2½+1½+1=5

(d) (i) Provide the missing reagents and intermediates in the following synthesis:



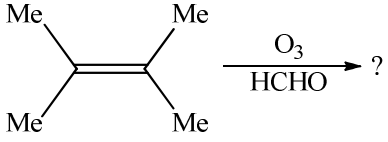
(ii) For the preparation of alkylbenzene it is advisable to carry out acylation followed by Clemensen reduction or other reduction over direct alkylation of benzene.— Justify.

(iii) Arrange the following compounds in order of increasing rate of nitration PhCl, $PhNO_2$, $PhNHCOCH_3$. 2+2+1=5

3. Answer *any one* question: 10×1=10

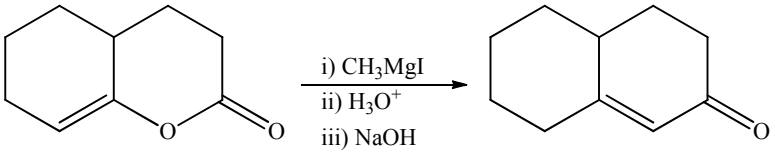
(a) (i) Give the general mechanism of electrophilic aromatic substitution and draw the energy profile diagram. How the kinetic isotope effect throws light on this mechanism regarding the stage of loss of proton from the σ-complex intermediate?

(ii) Predict the product(s) of the following reaction and give mechanism:

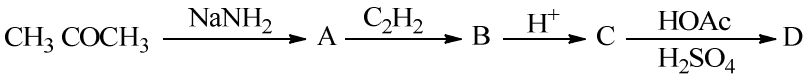


(iii) Compound A ($C_5H_8O_2$) liberated CO_2 from $NaHCO_3$. It existed in two forms neither of which is optically active. On hydrogenation, it yielded B($C_5H_{10}O_2$) which would be resolved in two enantiomorphs. Suggest the structures for A and B.

(iv) Offer reasonable mechanism for the following product formation: 4+2+2+2=10

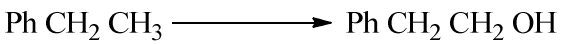


(b) (i) Identify the compounds A–D in the following reaction sequence and show mechanism for formation of D from C.

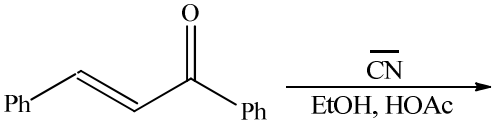


(ii) What factor accounts for the fact that two nitrogen atoms of semicarbazide are relatively non nucleophilic when reacts with a ketone (or an aldehyde)?

(iii) Carry out the following conversion:

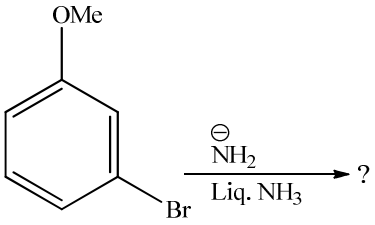


(iv) Predict the major product with plausible mechanism.



3½+1+2+1½+2=10

(v) Write product with mechanism:



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SH-III/Chemistry-304GE-3(T)/19

B. Sc. Semester III (Honours) Examination, 2018-19

CHEMISTRY

Course ID : 31414 **Course Code : SHCHE-304GE-3(T)**

Course Title: Chemical Energetics, Conductance, Organic

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.

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) Give example of one extensive and one intensive variable.
ব্যাপ্তি নির্ভর ও ব্যাপ্তি নিরপেক্ষ ধর্মের একটি করে উদাহরণ লেখো।

(b) Write the mathematical statement of the first law of thermodynamics.
তাপগতিবিদ্যার প্রথম সূত্রের গাণিতিক রূপটি বিবৃত করো।

(c) Write the relation between equilibrium constant and standard Gibbs free energy change.
সাম্যধ্রুবক ও প্রমাণ যুক্ত শক্তির পরিবর্তনের সম্পর্কটি লেখো।

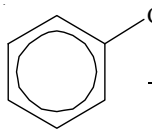
(d) Draw the plot for conductometric titration of strong acid vs strong base.
তীব্র অ্যাসিড ও তীব্র ক্ষারের টাইট্রেশনের পরিবাহিতার লেখচিত্র অঙ্কণ করো।

(e) What is Lucas reagent?
লুকাস বিকারক কী?

(f) $Me_2C(OH)-C(OH)Me_2 \xrightarrow{H_2SO_4}$ A what is A?

$Me_2C(OH)-C(OH)Me_2 \xrightarrow{H_2SO_4}$ A A যৌগটি কী?

(g) What is grignard reagent?
গ্রিগনার্ড বিকারক কী?

(h) 

A + B. What are A and B?

A এবং B কী?

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

যে কোনো দুটি প্রশ্নের উত্তর দাও ঃ

(a) (i) State Zeroth Law of thermodynamics. What is the importance of this law? 2+1=3

তাপগতিবিদ্যার শূন্যতম সূত্র বর্ণনা করো। এই সূত্রের গুরুত্ব কী?

(ii) State Kohlrausch's Law of independent migration of ions. 2

স্বাধীন আয়নের বিচরণ সংক্রান্ত কোলরাশের সূত্রটি বিবৃত করো।

(b) State Le Chatelier's principle. With its help, explain the effect of temperature and pressure on the following reaction at equilibrium.

লা-শাতেলিয়ারের নীতিটি বিবৃত করো। এই নীতি অনুযায়ী নিম্নলিখিত বিক্রিয়ার ক্ষেত্রে সাম্যবস্থায় চাপ ও তাপমাত্রা বৃদ্ধির প্রভাব আলোচনা করো।

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)\ \Delta H = (-)$

(c) (i) Give the reaction mechanism for the pinacol — pinacolone rearrangement. 2

পিনাকল—পিনাকোলন বিক্রিয়ার ক্রিয়া কৌশলটি দেখাও।

(ii) $CH_3CHO \xrightarrow{\text{dil NaOH}} ?$ 2

(iii) What is Tollens' reagent? 1

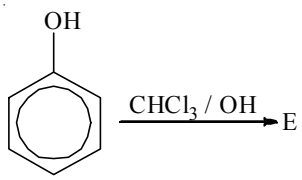
টলেন্স বিকারক কী?

(d) Complete the following reaction 2+2+1=5

নীচের বিক্রিয়াগুলি সম্পূর্ণ করো

(i) $Ph\,COOH \xrightarrow{SOCl_2} A \xrightarrow{CH_3COONa} B$

(ii) $C_6H_6 \xrightarrow{CH_3Cl\,/\,Alcl_3} C \xrightarrow[h\nu]{\text{Excess } Cl_2} D$

(iii) 

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

যে কোনো একটি প্রশ্নের উত্তর দাও ঃ

(a) (i) Write the *two statements* of the Second Law of thermodynamics. 2

তাপগতিবিদ্যার দ্বিতীয় সূত্রের মতবাদগুলি বিবৃত করো।

(ii) Draw the Carnot cycle in a PV diagram indicating all the steps. What is the efficiency of such a cycle? 2+1=3

কার্ণোচক্রের P বনাম V এর লেখচিত্র অঙ্কন করো এবং প্রতিটি ধাপ বর্ণনা করো। এই কার্ণোচক্রের কার্যক্ষমতা লেখো।

(iii) Show the variation of equivalent conductance with concentration for strong and weak elctrolyte. 2

তীব্র তড়িৎ বিশ্লেষ্য ও মৃদু তড়িৎ বিশ্লেষ্য পদার্থের তুল্যাঙ্ক পরিবাহিতা, গাঢ়ত্বের সাথে কীভাবে পরিবর্তন হয় দেখাও।

(iv) What do you mean by transport no? 1

পরিবহণ সংখ্যা বলতে কী বোঝো?

(v) Two moles of an ideal gas undergo isothermal reversible expansion from 15 lit to 60 lit at 400K. Calculate W & ΔU. 2

400K উষ্ণতায় সমোষ্ণ পরাবর্ত পদ্ধতিতে দুটি মোল আদর্শ গ্যাস এর সম্প্রসারণ 15 lit থেকে 60 lit করা হলে গ্যাসটির দ্বারা W ও ΔU নির্ণয় করো।

(b) Write short notes on *any four* from the following 4×2½=10

নিম্নলিখিত *যে কোনো চারটি* সম্পর্কে সংক্ষিপ্ত টীকা লেখো।

Fridal-Craft's reaction, Clemenson reduction, Aldol condensation.

Reiman — Timann reaction, Diazo reactions.

ফ্রিডাল ক্র্যাফ্ট বিক্রিয়া, ক্লেমেনসন বিজারণ, অ্যালডল কন্‌ডেনসেশন বিক্রিয়া, রাইমার টিম্যান বিক্রিয়া ডায়াজো বিক্রিয়া।

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SH-III/Chemistry-305SEC-1(T)/19

B. Sc. Semester III (Honours) Examination, 2018-19

CHEMISTRY

Course ID : 31415 **Course Code : SHCHE/305SEC-1(T)**

Course Title: Basic Analytical Chemistry

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) Which one of 1·005g and 1·050g is more accurate and Why?

(b) Mention major components of soil.

(c) Distinguish between eluent and effluent.

(d) Name the functional groups associated with cation and anion exchangers.

(e) Define ion-exchange capacity. Write its unit.

(f) Name and specify two adulterants used in food.

(g) Write the structure of Ni-DMG complex, where DMG = Dimethylglyoxime.

(h) What do you mean by R_f in relation to Thin Layer Chromatography (TLC)?

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

(a) (i) Mention two important characteristics of metal-ion indicator.

(ii) Which of the following separation(s) is under the category of cation exchange chromatography?

(a) Cis-trans isomeric complexes of Cobalt (II)

(b) Cations of alkali and alkaline earth metal ions

(c) NaCl and Na_2HPO_4

(d) None of the above.

Explain in favour of your answer. 2+(1+2)=5

(b) Briefly discuss the procedure for determination of iron in vitamin tablet by spectro photometric method. 5

(c) (i) Mention three important characteristics of a good ion-exchanger.

(ii) Write two important application of thin layer chromatography. 3+2=5

(d) Describe the method for determination of Ca and Mg individually in a soil sample using complexometric titration. 5

(e) (i) A 0.175 g sample of sodium chloride was passed over a cation exchange resin, previously converted into H^+ -form and the resin was eluted with deionised water. Liberated acid was titrated with 0.107 (N) NaOH. What will be the titre value?

(ii) Distinguish between precision and accuracy. 3+2=5

(f) (i) What is the role of HCl in ether extraction of Fe(III) from aqueous solution?

(ii) Discuss the mechanism of separation of Ni^{2+} and Co^{2+} from a mixture using ion-exchange resin. 2+3=5

3. Answer *any one* questions: 10×1=10

(a) (i) Write the major and minor constituents of cosmetics mentioning their function.

(ii) Perform the operations with correct significant figure: (0·69 × 1·0042) + 2·30125

(iii) What are random errors? (2+2+2)+2+2=10

(b) (i) What adulterants are used in turmeric powder, corriander powder, chilli powder, coffee powder and pulses?

(ii) Why preservatives are used in food? Give an example.

(iii) Discuss the basic principle of ion exchange chromatography.

(iv) 22.22 g of cation exchanger in the H^+ form can absorb Ca^{2+} ions fully from 1.0L of 0.1(N) $CaCl_2$ solution. Calculate the exchange capacity of the cation exchanger.

3+2+2+3=10

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SP-III/Chemistry-301C-1C(T)/19

B. Sc. Semester III (General) Examination, 2018-19

CHEMISTRY

Course ID: 31418 **Course Code : SPCHE-301C-1C(T)**

Course Title: Organic Chemistry-II, Chemical energetics, Chemical equilibrium and Conductance

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.

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) How will you prepare secondary alcohol using grignard reagent?
গ্রিগনার্ড বিকারকের সাহায্যে কী করে সেকেন্ডারি অ্যালকোহল তৈরি করবে?

(b) State Hess's law of thermochemistry.
তাপ-রসায়নে হেসের সূত্রটি বিবৃত করো।

(c) Between E, H, S and W which are not state function?
নিম্নলিখিতগুলির মধ্যে কোনগুলি তাপগতিবিজ্ঞানে অবস্থা নির্ভারক নয়— E, H, S এবং W।

(d) Why 2,2-dimethylpropanaldehyde do not undergo aldol condensation?
2,2-ডাইমিথাইলপ্রোপান্যালডিহাইড অ্যালডল বিক্রিয়ায় সাড়া দেয় না কেন?

(e) Convert —
পরিবর্তন করো
$CH_3COCH_3 \rightarrow Me_2C = CH_2CH_3$

(f) How will you distinguish between 1°, 2° and 3° alcohol using a chemical reaction?
রাসায়নিক বিক্রিয়ার সাহায্যে কী করে 1°, 2° এবং 3° অ্যালকোহলের মধ্যে পার্থক্য নিরূপণ করবে?

(g) What is the relation between K_p and K_c in chemical equilibrium?
রাসায়নিক সাম্যাবস্থায় K_p এবং K_c-র মধ্যে সম্পর্ক কী?

(h) Why DC current is not used in the measurement of conductance?
পরিবাহিতা মাপার জন্য DC কারেন্ট কেন ব্যবহার করা হয় না?

2. Answer *any two* questions: 5×2=10

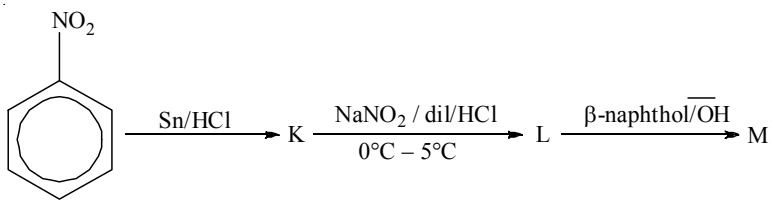
যে কোনো দুটি প্রশ্নের উত্তর দাও ঃ

(a) Deduce an expression for the efficiency of a reversible carnot cycle. Show that the efficiency of a reversible isothermal cycle is zero. 4+1=5

পরাবর্ত কার্নোচক্রের কার্যক্ষমতার গাণিতিকরূপ প্রতিষ্ঠা করো। ইহা হইতে দেখাও যে সমোষ্ণ পরাবর্ত চক্রের কর্মক্ষমতা শূণ্য হয়।

(b) (i) Nitrobenzene on nitration predominantly forms m-dinitrobenzene — explain.
নাইট্রোবেঞ্জিনের নাইট্রেশান করলে মূলত মেটাডাইনাইট্রোবেঞ্জিন উৎপন্ন হয়— ব্যাখ্যা করো।

(ii) Predict the product:
নীচের বিক্রিয়াটির বিক্রিয়াজাত পদার্থগুলি লেখো ঃ



(c) Define specific and equivalent conductance of a solution of an electrolyte. How are they related? Show with the help of a plot how do equivalent conductance vary with concentration for a strong and weak electrolyte. 2+1+2=5

তড়িৎ বিশ্লেষ্য পদার্থের দ্রবণের আপেক্ষিক পরিবাহিতা এবং তুল্যাঙ্ক পরিবাহিতার সংজ্ঞা দাও। তাহারা কীভাবে সম্পর্কিত? রেখচিত্রের সাহায্যে দেখাও কীভাবে তীব্র এবং মৃদু তড়িৎ বিশ্লেষ্য পদার্থের তুল্যাঙ্ক পরিবাহিতা গাঢ়ত্বের সহিত পরিবর্তিত হয়?

(d) Convert

Benzene ⟶ phenol

Benzene ⟶ Benzoic acid 2½×2=5

বেঞ্জিন ⟶ ফেলন

বেঞ্জিন ⟶ বেঞ্জোয়িক অ্যাসিড

3. Answer *any one* question: 10×1=10

যে কোনো একটি প্রশ্নের উত্তর দাও ঃ

(a) (i) Write short notes on (*any two*):

সংক্ষিপ্ত টীকা লেখো (*যে কোনো দুটি*) ঃ

(A) Aldol condensation

অ্যালডল কনডেনশেস্‌ন

(B) Cannizzaro reaction
ক্যান্নিজারো বিক্রিয়া

(C) Reformatsky reaction
রিফরম্যাস্কি বিক্রিয়া

(ii) Correlate K_p and K_c for the following chemical equilibrium.
নিম্নলিখিত রাসায়নিক সাম্যের ক্ষেত্রে K_p এবং K_c এর মধ্যে সম্পর্ক স্থাপন করো ঃ
$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

(iii) Heat of combustion of methane gas is 210,800 Calorie. Heat of formation of $CO_2(g)$ and $H_2O(l)$ are 91000 and 68300 Calorie respectively. Calculate the heat of formation of methane gas. 2½×2+2+3=10
মিথেন গ্যাসের দহনতাপের মান 210,800 ক্যালরি। $CO_2(g)$ এবং $H_2O(l)$ এর গঠনতাপের মান যথাক্রমে 91000 এবং 68300 ক্যালরি। মিথেন গ্যাসের গঠনতাপের মান গণনা করো।

(b) (i) What happens when —
কী ঘটে লেখো—

(A) Benzene reacts with acetyl chloride in presence of anhydrous $AlCl_3$.
অর্নাদ্র $AlCl_3$ এর উপস্থিতিতে বেঞ্জিনের সঙ্গে অ্যাসিটাইল ক্লোরাইডের বিক্রিয়া ঘটান হয়।

(B) Chlorine gas is passed through acetone in alkaline solution.
অ্যাসিটোনের ক্ষারীয় দ্রবণের মধ্য দিয়ে ক্লোরিন গ্যাস চালনা করা হয়।

(ii) State and explain Kohlrausch's law of independent migration of ions. Show how will you calculate $\wedge^{\circ}_{CH_3COOH}$ with the help of this equation. 2½×2+(3+2)=10
আয়নের স্বাধীন বিচরণ সম্পর্কিত কোলরাউসের সূত্রটি বর্ণনা করো। এই সূত্রের সাহায্যে ব্যাখ্যা করো কীভাবে $\wedge^{\circ}_{CH_3COOH}$ নির্ণয় করবে?

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SH-III/Chemistry-301C-5(P)/19

B.Sc. Semester III (Honours) Practical Examination, 2018-2019

CHEMISTRY

Course ID : 31421 **Course Code : SHCHE-301C-5(P)**

Course Title: Physical Chemistry-II

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

(a) Prepare exactly 8% and 6% solutions (V/V) from the supplied 10% solution marked VIS-in water. Measure their densities by using specific gravity bottle. Determine their viscosity coefficients (η). Plot η against concentration (in g/100ml).

(b) Determine conductrometrically the strength of supplied $\left(\frac{N}{10}\right)$ order acid solution (marked cond-) by titrating it against a solution of NaOH. Standaise the NaOH solution using suitable indicator.

(c) Determine the partition coefficient for the distribution of I_2 between water and the supplied organic solvent. Perform one set of experiment using 80ml water and 40ml I_2-organic solvent.

(d) Determine the equilibrium constant of the reaction $KI + I_2 \rightleftharpoons KI_3$ by partition method. Perform one set of experiment using 100ml supplied KI solution +30ml of I_2 solution in organic solvent.

Exact strength of supplied KI solution and partition coefficient (K_D) of I_2 between organic solvent and water will be given at the time of calculation.

2. Laboratory Notebook 2

3. Viva voce 2

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B.Sc. Semester III (Honours) Practical Examination, 2018-2019

CHEMISTRY

Course ID : 31421 **Course Code : SHCHE-301C-5(PI)**

Course Title: Physical Chemistry-II

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 examination are over at the centre. A copy of the keys signed by the examiners should be sent to the Convenor along with the assessed answer script.

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. Physical Chemistry experiments (Detailed distribution of marks for a particular experiment will be supplied by the convenor(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. Graph (with proper choice of lebeling 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 from out to be accurate. 11

B. Laboratory Note Book

The candidate are to be asked to submit their laboratory note book 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 Note book without signature of the teacher will be credited zero. 2

C. Viva voce:

Simple question are to be asked with relevance to practical chemistry. 2

Information related to the Physical Chemistry experiments:

1. P-1: Determination of viscosity coefficient
   (i) 100 ml exact 10% sucrose solution in water marked by VIS ... is to be supplied to each candidate.
   (ii) Necessary data for the viscosity coefficient and density of water at the experimental temperature is to be supplied.

   P-2: Conductometric titration
   (i) ~1(N) NaOH solution is to be supplied.
   (ii) Phenolphthalein indicator solution is to be supplied.
   (iii) Candidates should prepare (N/2) order oxalic acid solution.

   P-3: Partition coefficient

   Examiners have to provide the following:
   (i) Stock solution of (N/10) $Na_2S_2O_3$
   (ii) 10% KI solution
   (iii) Freshly prepared starch solution
   (iv) Saturated solution of I_2 in CCl_4

   For titration of aqneous layer, $Na_2S_2O_3$ solution should be diluted according by the candidates.

   P-4: Equilibrium constant

   Examiners have to provide the following:
   (i) Stock solution of (N/10) $Na_2S_2O_3$
   (ii) Saturated solution of I_2 in CCl_4
   (iii) Standard (N/20) KI solution
   (iv) 10% KI solution
   (v) Freshly prepared starch solution
   Candidate should prepare standard (N/10) $K_2Cr_2O_7$

   List of reagents and chemicals:
   1. Sucrose
   2. NaOH
   3. Oxalic acid
   4. Phenolphthalein
   5. KI
   6. $K_2Cr_2O_7$
   7. $Na_2S_2O_3$
   8. Starch
   9. Conc.HCl
   10. $NaHCO_3$

   List of minor equipments:
   1. Oxtwald viscometer
   2. Specific gravity bottle
   3. Conductometer
   4. Stopwatch

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SH-III/Chemistry-301C-5(P)/19

B.Sc. Semester III (Honours) Practical Examination, 2018-2019

CHEMISTRY

Course ID : 31421 **Course Code : SHCHE-301C-5(P)**

Course Title: Physical Chemistry-II

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

(a) Prepare exactly 8% and 6% solutions (V/V) from the supplied 10% solution marked VIS-in water. Measure their densities by using specific gravity bottle. Determine their viscosity coefficients (η). Plot η against concentration (in g/100ml).

(b) Determine conductrometrically the strength of supplied $\left(\frac{N}{10}\right)$ order acid solution (marked cond-) by titrating it against a solution of NaOH. Standaise the NaOH solution using suitable indicator.

(c) Determine the partition coefficient for the distribution of I_2 between water and the supplied organic solvent. Perform one set of experiment using 80ml water and 40ml I_2-organic solvent.

(d) Determine the equilibrium constant of the reaction $KI + I_2 \rightleftharpoons KI_3$ by partition method. Perform one set of experiment using 100ml supplied KI solution +30ml of I_2 solution in organic solvent.

Exact strength of supplied KI solution and partition coefficient (K_D) of I_2 between organic solvent and water will be given at the time of calculation.

2. Laboratory Notebook 2

3. Viva voce 2

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B.Sc. Semester III (Honours) Practical Examination, 2018-2019

CHEMISTRY

Course ID : 31421 **Course Code : SHCHE-301C-5(PI)**

Course Title: Physical Chemistry-II

Instruction to the Examiners for Physical Chemistry Experiments

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

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IV. Overall impression etc.

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C. Viva voce:

Simple question are to be asked with relevance to practical chemistry. 2

Information related to the Physical Chemistry experiments:

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   (ii) Necessary data for the viscosity coefficient and density of water at the experimental temperature is to be supplied.

   P-2: Conductometric titration
   (i) ~1(N) NaOH solution is to be supplied.
   (ii) Phenolphthalein indicator solution is to be supplied.
   (iii) Candidates should prepare (N/2) order oxalic acid solution.

   P-3: Partition coefficient

   Examiners have to provide the following:
   (i) Stock solution of (N/10) $Na_2S_2O_3$
   (ii) 10% KI solution
   (iii) Freshly prepared starch solution
   (iv) Saturated solution of I_2 in CCl_4

   For titration of aqneous layer, $Na_2S_2O_3$ solution should be diluted according by the candidates.

   P-4: Equilibrium constant

   Examiners have to provide the following:
   (i) Stock solution of (N/10) $Na_2S_2O_3$
   (ii) Saturated solution of I_2 in CCl_4
   (iii) Standard (N/20) KI solution
   (iv) 10% KI solution
   (v) Freshly prepared starch solution
   Candidate should prepare standard (N/10) $K_2Cr_2O_7$

   List of reagents and chemicals:
   1. Sucrose
   2. NaOH
   3. Oxalic acid
   4. Phenolphthalein
   5. KI
   6. $K_2Cr_2O_7$
   7. $Na_2S_2O_3$
   8. Starch
   9. Conc.HCl
   10. $NaHCO_3$

   List of minor equipments:
   1. Oxtwald viscometer
   2. Specific gravity bottle
   3. Conductometer
   4. Stopwatch

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SH-III/Chemistry/302/C6(P)/19

B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31422 **Course Code : SHCHE/302/C6(P)**

Course Title: Inorganic Chemistry-II

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 copper (II) in gL^{L-1} 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-III/Chemistry/302/C6(PI)/19

B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31422 **Course Code : SHCHE/302/C6(PI)**

Course Title: Inorganic Chemistry-II

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 note book.
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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SH-III/Chemistry/302/C6(P)/19

B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31422 **Course Code : SHCHE/302/C6(P)**

Course Title: Inorganic Chemistry-II

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 copper (II) in gL^{L-1} 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-III/Chemistry/302/C6(PI)/19

B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31422 **Course Code : SHCHE/302/C6(PI)**

Course Title: Inorganic Chemistry-II

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.
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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 note book.
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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SH-III/Chemistry-303C-7P/19

B.Sc. Semester III (Honours) Practical Examination, 2018-2019

CHEMISTRY

Course ID : 31423 **Course Code : SHCHE-303C-7(P)**

Course Title: Organic Chemistry-II

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. Make a systematic analysis for the organic compound given in the bottle marked 'O' with respect to the followings:

(a) Perform the Lassaigne's test for the detection of special elements (N, S, Cl and Br) and report the results in tabular form. 3

(b) Perform complete solubility tests and report the results in tabular form. Give your conclusion from solubility tests. 1½+½=2

(c) Show the presence and absence of each of the following functional groups in the sample and report the results in tabular form :

(i) –COOH, (ii) –OH (Phenolic), (iii) >C=O (keto), (iv) –CHO(Aldehyde), (v) Ar-NH_2 (Aromatic primary amine), (vi) Ar-NO_2 (Aromatic nitro-group), (vii) –$CONH_2$ (Amido) ½×7=3½

(d) Give the confirmatory test of any one of the functional groups. ½

(e) Determine the melting point of the given organic compound. 1

(f) Overall conclusion of your analysis. 1

(g) Laboratory records. 2

(h) Viva voce. 2

Or,

Perform the following tests and prepare a suitable solid derivative of the given functional group of organic compound marked 'DFG' and submit the product.

(a) Perform the complete solubility tests of the supplied sample and report the results in tabular form. 1½+½=2

(b) (i) Give the name(s) of solid derivative(s) of functional group. 1

(ii) Give the chemical reaction(s) and reagent(s) for the preparation of any one of its derivatives. 1

(c) Submit crude product 4

(d) Recrystallize and determine the melting point of the derivative. 1+1=2

(e) Give overall conclusion. 1

2. Laboratory records. 2

3. Viva voce 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) Confirmatory tests are to be countersigned by the examiners.]

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B.Sc. Semester III (Honours) Practical Examination, 2018-2019

CHEMISTRY

Course ID : 31423 **Course Code : SHCHE-303C-7(PI)**

Course Title: Organic Chemistry-II

Instruction to the Examiners

(Please follow the instructions strictly)

1. The Chemistry (Honours) Practical Examination should have a duration of 2 hours.
2. The examiners are requested to maintain a book for recording UID number of candidates of each batch, sample numbers marked 'O' and 'DFG' used by candidates and also the marks awarded in laboratory record book and viva voce and any other relevant data they may consider necessary.
3. The record book together with a copy of the key to the sample signed by the examiners should be send to the Controller of Examination (BKU) along with the evaluated answer scripts.
4. Candidate without the Laboratory Note Book signed regularly by class teacher must not be allowed to appear at the examination.
5. 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.
6. Examiners are requested to put their signatures in the answer scripts against as many tests as possible done by the candidates.
7. 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.
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 in a tabular form.
9. 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.
10. 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.
11. Examiners are requested to collect the used sample containers/bottles after the examination is over.
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. 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.

Distribution of Marks

1. (a) Detection of special elements (N, S, Cl &Br) 1+1+1=3

(b) Solubility tests (at least in three solvents) and conclusion. 1½+½=2

(c) Presence or absence of the following functional groups:
(i) –COOH (ii) –OH (Phenolic) (iii) >C=O (keto) (iv) –CHO (Aldehyde) (v) Ar – NH_2 (Aromatic primary amine) (vi) Ar – NO_2 (Aromatic nitro-group) vii) – $CONH_2$ (Amido) ½×7=3½

(d) Confirmatory test of functional group any one. ½

(e) Melting point of the compound, award marks in the range (T_m – 3) °C. 1

(f) Conclusion: name/structure of functional group(s) & element ½+½=1

(g) Laboratory records. 2

(h) Viva voce. 2

Or,

2. Preparation of suitable solid derivative of the given functional group of organic compound marked 'DFG'. The functional Group will be reflected in the sample pots; for example: DFG-101: Ar-COOH as well as in the key to the samples. Student should perform the following tests and prepare a suitable solid derivative of the given functional group of organic compound marked 'DFG' and submit the product.

(a) Report the melting point of the given sample marked 'DFG'. 1

(b) Perform the complete solubility tests of the supplied sample and report the results in tabular form with conclusion. (at least three) 1½+½=2

(c) (i) Based on above experimental results and literature survey, give the name(s) of solid derivative(s) of functional group. 1

(ii) Give the chemical reaction(s) and reagent(s) for the preparation of any one of its derivatives. ½+½=1

(d) Submit crude product and report Yield [quality & colour] 3+1=4

(e) Melting point of the derivative: award marks in the range. (T_m–3)°C 1

(f) Overall conclusion with probable structure of compound. 1

(g) Laboratory records. 2

(h) Viva voce 2

N.B.:

1. (a) **No marks** to be awarded if it appears that the student has not performed the experiments.

(b) No marks will be awarded for incorrect detection of element(s) or functional group(s) evaluation being done independent of each part.

2. If elements present or absent are shown as N_2, S_x and X_2, deduct ½ mark for each.

3. Solubility test must be reported in tabular form, otherwise deduct ½ mark.

4. In samples, where only one functional group is present, ½ mark will be deducted for wrong inference but for correct observation.

5. In samples, where only one functional group is present, **no** mark will be awarded for wrong observation but having correct inference.
6. In samples, where two functional groups are present, appropriate marks will be awarded for correct observation and inference of any one functional group.
7. When the given sample does not contain any special element award appropriate marks for systematic analysis and recording award full marks.
8. When the given sample contains more than one special element but the candidate has detected only one of them correctly, appropriate marks would be awarded.
9. If no conclusion is shown separately in detection of special elements and if no formula of group is written clearly, no marks will be awarded.
10. **Laboratory Notebook:** Laboratory notebooks recorded in a systematic way and signed regularly will get higher credit.
11. **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,
   Bishnupur, Bankura, 722122
   Mobile- 09732130372/ 9064835095.

2. **Dr. Samir Kumar Mandal,**
   Saldiha College,
   Saldiha, Bankura, 722173
   Mobile-09433356499/ 7602906406.

SH-III/Chemistry-303C-7P/19

B.Sc. Semester III (Honours) Practical Examination, 2018-2019

CHEMISTRY

Course ID : 31423 **Course Code : SHCHE-303C-7(P)**

Course Title: Organic Chemistry-II

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. Make a systematic analysis for the organic compound given in the bottle marked 'O' with respect to the followings:

(a) Perform the Lassaigne's test for the detection of special elements (N, S, Cl and Br) and report the results in tabular form. 3

(b) Perform complete solubility tests and report the results in tabular form. Give your conclusion from solubility tests. 1½+½=2

(c) Show the presence and absence of each of the following functional groups in the sample and report the results in tabular form :

(i) –COOH, (ii) –OH (Phenolic), (iii) >C=O (keto), (iv) –CHO(Aldehyde), (v) Ar-NH_2 (Aromatic primary amine), (vi) Ar-NO_2 (Aromatic nitro-group), (vii) –$CONH_2$ (Amido) ½×7=3½

(d) Give the confirmatory test of any one of the functional groups. ½

(e) Determine the melting point of the given organic compound. 1

(f) Overall conclusion of your analysis. 1

(g) Laboratory records. 2

(h) Viva voce. 2

Or,

Perform the following tests and prepare a suitable solid derivative of the given functional group of organic compound marked 'DFG' and submit the product.

(a) Perform the complete solubility tests of the supplied sample and report the results in tabular form. 1½+½=2

(b) (i) Give the name(s) of solid derivative(s) of functional group. 1

(ii) Give the chemical reaction(s) and reagent(s) for the preparation of any one of its derivatives. 1

(c) Submit crude product 4

(d) Recrystallize and determine the melting point of the derivative. 1+1=2

(e) Give overall conclusion. 1

2. Laboratory records. 2

3. Viva voce 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) Confirmatory tests are to be countersigned by the examiners.]

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B.Sc. Semester III (Honours) Practical Examination, 2018-2019

CHEMISTRY

Course ID : 31423 **Course Code : SHCHE-303C-7(PI)**

Course Title: Organic Chemistry-II

Instruction to the Examiners

(Please follow the instructions strictly)

1. The Chemistry (Honours) Practical Examination should have a duration of 2 hours.
2. The examiners are requested to maintain a book for recording UID number of candidates of each batch, sample numbers marked 'O' and 'DFG' used by candidates and also the marks awarded in laboratory record book and viva voce and any other relevant data they may consider necessary.
3. The record book together with a copy of the key to the sample signed by the examiners should be send to the Controller of Examination (BKU) along with the evaluated answer scripts.
4. Candidate without the Laboratory Note Book signed regularly by class teacher must not be allowed to appear at the examination.
5. 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.
6. Examiners are requested to put their signatures in the answer scripts against as many tests as possible done by the candidates.
7. 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.
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 in a tabular form.
9. 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.
10. 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.
11. Examiners are requested to collect the used sample containers/bottles after the examination is over.
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. 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.

Distribution of Marks

1. (a) Detection of special elements (N, S, Cl &Br) 1+1+1=3

(b) Solubility tests (at least in three solvents) and conclusion. 1½+½=2

(c) Presence or absence of the following functional groups:
(i) –COOH (ii) –OH (Phenolic) (iii) >C=O (keto) (iv) –CHO (Aldehyde) (v) Ar – NH_2 (Aromatic primary amine) (vi) Ar – NO_2 (Aromatic nitro-group) vii) – $CONH_2$ (Amido) ½×7=3½

(d) Confirmatory test of functional group any one. ½

(e) Melting point of the compound, award marks in the range (T_m – 3) °C. 1

(f) Conclusion: name/structure of functional group(s) & element ½+½=1

(g) Laboratory records. 2

(h) Viva voce. 2

Or,

2. Preparation of suitable solid derivative of the given functional group of organic compound marked 'DFG'. The functional Group will be reflected in the sample pots; for example: DFG-101: Ar-COOH as well as in the key to the samples. Student should perform the following tests and prepare a suitable solid derivative of the given functional group of organic compound marked 'DFG' and submit the product.

(a) Report the melting point of the given sample marked 'DFG'. 1

(b) Perform the complete solubility tests of the supplied sample and report the results in tabular form with conclusion. (at least three) 1½+½=2

(c) (i) Based on above experimental results and literature survey, give the name(s) of solid derivative(s) of functional group. 1

(ii) Give the chemical reaction(s) and reagent(s) for the preparation of any one of its derivatives. ½+½=1

(d) Submit crude product and report Yield [quality & colour] 3+1=4

(e) Melting point of the derivative: award marks in the range. (T_m–3)°C 1

(f) Overall conclusion with probable structure of compound. 1

(g) Laboratory records. 2

(h) Viva voce 2

N.B.:

1. (a) **No marks** to be awarded if it appears that the student has not performed the experiments.

(b) No marks will be awarded for incorrect detection of element(s) or functional group(s) evaluation being done independent of each part.

2. If elements present or absent are shown as N_2, S_x and X_2, deduct ½ mark for each.

3. Solubility test must be reported in tabular form, otherwise deduct ½ mark.

4. In samples, where only one functional group is present, ½ mark will be deducted for wrong inference but for correct observation.

5. In samples, where only one functional group is present, **no** mark will be awarded for wrong observation but having correct inference.
6. In samples, where two functional groups are present, appropriate marks will be awarded for correct observation and inference of any one functional group.
7. When the given sample does not contain any special element award appropriate marks for systematic analysis and recording award full marks.
8. When the given sample contains more than one special element but the candidate has detected only one of them correctly, appropriate marks would be awarded.
9. If no conclusion is shown separately in detection of special elements and if no formula of group is written clearly, no marks will be awarded.
10. **Laboratory Notebook:** Laboratory notebooks recorded in a systematic way and signed regularly will get higher credit.
11. **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,
   Bishnupur, Bankura, 722122
   Mobile- 09732130372/ 9064835095.

2. **Dr. Samir Kumar Mandal,**
   Saldiha College,
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   Mobile-09433356499/ 7602906406.

SH-III/Chemistry-304/GE-3(P)/19

B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31424 **Course Code : SHCHE-304GE-3(P)**

Course Title: Chemical Energetics, Conductance, Organic

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.

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

(Candidates would not be allowed to consult the books or notes while writing the report in answer scripts)
(উত্তরপত্র লেখার সময় বই বা নোট দেখতে দেওয়া হবে না)

1. Perform the experiment of the following (*any one*):

নিম্নলিখিত পরীক্ষা (*যে কোনো একটি* সম্পাদন করো) ঃ

A. Identify the given organic compound marked 'O' with respect to the following:

'O' চিহ্নিত প্রদত্ত জৈব যৌগটিকে নিম্ন নির্দেশ অনুযায়ী শনাক্ত করো ঃ

(i) Physical characteristics: State, odour, colour 1½

ভৌত ধর্মাবলী ঃ অবস্থা, গন্ধ, বর্ণ

(ii) Perform Preliminary Tests: Ignition Test, Solubility Test and Litmus Test along with other identifying tests (if necessary) and report your result in tabular form. Give your conclusion from Preliminary tests. 5+1½=6½

প্রাথমিক পরীক্ষা ঃ ইগনিশন পরীক্ষা, দ্রাব্যতা পরীক্ষা, লিটমাস পরীক্ষাসহ অন্যান্য প্রয়োজনীয় শনাক্তকরণ পরীক্ষা করো ও ফলাফল সারণী আকারে লিপিবদ্ধ করো। প্রাথমিক পরীক্ষা থেকে প্রাপ্ত সিদ্ধান্তগুলি লেখো।

(iii) Perform Confirmatory Test and report your result in Tabular form. 2

নিশ্চিতকরণ পরীক্ষা করো ও ফলাফল সারণী আকারে লিপিবদ্ধ করো।

(iv) Conclusion. 1

সিদ্ধান্ত লেখো।

B. Determine the strength of a HCl solution by titrating against a standard NaOH solution conductometrically. Determine the strength of NaOH solution by titration with supplied standard oxalic acid solution using suitable indicator (strength of the oxalic acid solution will be supplied by the examiner). 11

পরিবাহিতা টাইট্রেশনের [conductivity titration] দ্বারা HCl দ্রবণের মাত্রা NaOH দ্রবণের সাহায্যে নির্ণয় করো। NaOH দ্রবণের মাত্রা জ্ঞাত মাত্রার অক্সালিক অ্যাসিড দ্রবণ দ্বারা উপযুক্ত নির্দেশকের সাহায্যে টাইট্রেশন পদ্ধতিতে নির্ণয় করো। [অক্সালিক অ্যাসিডের মাত্রা পরীক্ষকের থেকে জেনে নাও]।

2. Laboratory Notebook 2

পরীক্ষাগারে কাজের খাতা

3. Viva voce 2

মৌখিক পরীক্ষা

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B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31424 **Course Code : SHCHE-304GE-3(PI)**

Course Title: Chemical Energetics, Conductance, Organic

INSTRUCTION TO THE EXAMINERS

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 "0" and "P" used by candidates and also the marks awarded in laboratory records & viva voce. The record book together with a copy of the key signed by the examiners should be sent to the Convenor 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 systemic way as given under distribution of marks in a tabular form.
7. If the 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 until the examination is over and send a copy of the same duly signed to the convenor.
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 rolls and numbers of candidates absent must be entered in the mark slips with the mark "AB".
11. The names of the examiners in full with their college addresses and the number of candidates examined by them should be included in the record book.
12. Examiners are requested to send the mark-slips and examined answer-scripts in separate sealed covers and packets under insured postal parcel etc. addressed to the convener. The packets of answer scripts must contain a top sheet.
13. Mention the neutralization procedure of organic acidic compound, if Present, otherwise deduct 1(one) mark.
14. Examiners are requested to supply graph paper if necessary.
15. Samples and key for the organic Practical examination will be supplied by the convenors.

For Physical Chemistry (P)

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

2. Detailed distribution of marks 11

- Performing the experiment. 3
- Presentation (theory, data table). 2
- Graph (1 for data pointing, 1 for axes lables & caption and 1 for mean curve drawing). 3
- Calculation 1
- Proper unit of concentration ½
- Accuracy (1½ for E 25% deduct ½ for each 10% error) 1½

Information related to Physical Chemistry experiments
Conductometric Titration

1. About 40-50 ml ~ (N/2) (oxalic acid solution is to be gives to each candidate)

2. HCl solution of accurately known strength of the order (N/20) is to be supplied to each candidate (~ 50 ml)

3. About 90-100 ml ~ (N/2) NaOH solution is to be supplied to each candidate

4. Phenopthaline indicator is to be supplied to each candidate.

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SH-III/Chemistry-304/GE-3(P)/19

B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31424 **Course Code : SHCHE-304GE-3(P)**

Course Title: Chemical Energetics, Conductance, Organic

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.

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

(Candidates would not be allowed to consult the books or notes while writing the report in answer scripts)
(উত্তরপত্র লেখার সময় বই বা নোট দেখতে দেওয়া হবে না)

1. Perform the experiment of the following (*any one*):

নিম্নলিখিত পরীক্ষা (*যে কোনো একটি* সম্পাদন করো) ঃ

A. Identify the given organic compound marked 'O' with respect to the following:

'O' চিহ্নিত প্রদত্ত জৈব যৌগটিকে নিম্ন নির্দেশ অনুযায়ী শনাক্ত করো ঃ

(i) Physical characteristics: State, odour, colour 1½

ভৌত ধর্মাবলী ঃ অবস্থা, গন্ধ, বর্ণ

(ii) Perform Preliminary Tests: Ignition Test, Solubility Test and Litmus Test along with other identifying tests (if necessary) and report your result in tabular form. Give your conclusion from Preliminary tests. 5+1½=6½

প্রাথমিক পরীক্ষা ঃ ইগনিশন পরীক্ষা, দ্রাব্যতা পরীক্ষা, লিটমাস পরীক্ষাসহ অন্যান্য প্রয়োজনীয় শনাক্তকরণ পরীক্ষা করো ও ফলাফল সারণী আকারে লিপিবদ্ধ করো। প্রাথমিক পরীক্ষা থেকে প্রাপ্ত সিদ্ধান্তগুলি লেখো।

(iii) Perform Confirmatory Test and report your result in Tabular form. 2

নিশ্চিতকরণ পরীক্ষা করো ও ফলাফল সারণী আকারে লিপিবদ্ধ করো।

(iv) Conclusion. 1

সিদ্ধান্ত লেখো।

B. Determine the strength of a HCl solution by titrating against a standard NaOH solution conductometrically. Determine the strength of NaOH solution by titration with supplied standard oxalic acid solution using suitable indicator (strength of the oxalic acid solution will be supplied by the examiner). 11

পরিবাহিতা টাইট্রেশনের [conductivity titration] দ্বারা HCl দ্রবণের মাত্রা NaOH দ্রবণের সাহায্যে নির্ণয় করো। NaOH দ্রবণের মাত্রা জ্ঞাত মাত্রার অক্সালিক অ্যাসিড দ্রবণ দ্বারা উপযুক্ত নির্দেশকের সাহায্যে টাইট্রেশন পদ্ধতিতে নির্ণয় করো। [অক্সালিক অ্যাসিডের মাত্রা পরীক্ষকের থেকে জেনে নাও]।

2. Laboratory Notebook 2

পরীক্ষাগারে কাজের খাতা

3. Viva voce 2

মৌখিক পরীক্ষা

———————

B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31424 **Course Code : SHCHE-304GE-3(PI)**

Course Title: Chemical Energetics, Conductance, Organic

INSTRUCTION TO THE EXAMINERS

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 "0" and "P" used by candidates and also the marks awarded in laboratory records & viva voce. The record book together with a copy of the key signed by the examiners should be sent to the Convenor 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 systemic way as given under distribution of marks in a tabular form.
7. If the 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 until the examination is over and send a copy of the same duly signed to the convenor.
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 rolls and numbers of candidates absent must be entered in the mark slips with the mark "AB".
11. The names of the examiners in full with their college addresses and the number of candidates examined by them should be included in the record book.
12. Examiners are requested to send the mark-slips and examined answer-scripts in separate sealed covers and packets under insured postal parcel etc. addressed to the convener. The packets of answer scripts must contain a top sheet.
13. Mention the neutralization procedure of organic acidic compound, if Present, otherwise deduct 1(one) mark.
14. Examiners are requested to supply graph paper if necessary.
15. Samples and key for the organic Practical examination will be supplied by the convenors.

For Physical Chemistry (P)

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

2. Detailed distribution of marks 11

- Performing the experiment. 3
- Presentation (theory, data table). 2
- Graph (1 for data pointing, 1 for axes lables & caption and 1 for mean curve drawing). 3
- Calculation 1
- Proper unit of concentration ½
- Accuracy (1½ for E 25% deduct ½ for each 10% error) 1½

Information related to Physical Chemistry experiments
Conductometric Titration

1. About 40-50 ml ~ (N/2) (oxalic acid solution is to be gives to each candidate)

2. HCl solution of accurately known strength of the order (N/20) is to be supplied to each candidate (~ 50 ml)

3. About 90-100 ml ~ (N/2) NaOH solution is to be supplied to each candidate

4. Phenopthaline indicator is to be supplied to each candidate.

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SP-III/Chemistry-301C-1C(P)/19

B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31428 **Course Code : SPCHE-301C-1C(P)**

Course Title: Organic Chemistry II, Chemical Energetics, Chemical Equilibrium & Conductance

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.

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

(Candidates would not be allowed to consult the books or notes while writing the report in answer scripts.)
(উত্তরপত্র লেখার সময় বই বা নোট দেখতে দেওয়া হবে না।)

1. Perform the experiment of the following (*any one*):

নিম্নলিখিত পরীক্ষা (*যে কোনো একটি* সম্পাদন করো) ঃ

A. Identify the given Organic Compound marked 'O' with respect to the following:

'O' চিহ্নিত প্রদত্ত জৈব যৌগটিকে নিম্ন নির্দেশ অনুযায়ী শনাক্ত করো ঃ

(i) Physical characteristics: State, odour, colour 1½

ভৌত ধর্মাবলী ঃ অবস্থা, গন্ধ, বর্ণ

(ii) Perform Preliminary Tests: Ignition Test, Solubility Test and Litmus Test along with other identifying tests (if necessary) and report your result in tabular form. Give your conclusion from Preliminary tests. 5+1½

প্রাথমিক পরীক্ষা ঃ ইগনিশন পরীক্ষা, দ্রাব্যতা পরীক্ষা, লিটমাস পরীক্ষাসহ অন্যান্য প্রয়োজনীয় শনাক্তকরণ পরীক্ষা করো ও ফলাফল সারণী আকারে লিপিবদ্ধ করো। প্রাথমিক পরীক্ষা থেকে প্রাপ্ত সিদ্ধান্তগুলি লেখো।

(iii) Perform Confirmatory Test and report your result in Tabular form. 2

নিশ্চিতকরণ পরীক্ষা করো ও ফলাফল সারণী আকারে লিপিবদ্ধ করো।

(iv) Conclusion. 1

সিদ্ধান্ত লেখো।

B. Determine the strength of a HCl solution by titrating against a standard NaOH solution conductometrically. Determine the strength of NaOH solution by titration with supplied standard oxalic acid solution using suitable indicator. (Strength of the oxalic acid solution will be supplied by the examiner.)

পরিবাহিতা টাইট্রেশনের [conductivity titration] দ্বারা HCl দ্রবণের মাত্রা NaOH দ্রবণের সাহায্যে নির্ণয় করো। NaOH দ্রবণের মাত্রা জ্ঞাত মাত্রার অক্সালিক অ্যাসিড দ্রবণ দ্বারা উপযুক্ত নির্দেশকের সাহায্যে টাইট্রেশন পদ্ধতিতে নির্ণয় করো। [অক্সালিক অ্যাসিডের মাত্রা পরীক্ষকের থেকে জেনে নাও।] 11

2. Laboratory Notebook 2

পরীক্ষাগারে কাজের খাতা

3. Viva voce 2

মৌখিক পরীক্ষা

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B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31428 **Course Code : SHCHE-304GE-3(PI)**

Course Title: Chemical Energetics, Conductance, Organic

INSTRUCTION TO THE EXAMINERS

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 "0" and "D" used by candidates and also the marks awarded in laboratory records & viva voce. The record book together with a copy of the key signed by the examiners should be sent to the Convenor 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.
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12. Examiners are requested to send the mark-slips and examined answer-scripts in separate sealed covers and packets under insured postal parcel etc. addressed to the convener. The packets of answer scripts must contain a top sheet.
13. Mention the neutralization procedure of organic acidic compound, if Present, otherwise deduct 1(one) mark.
14. Examiners are requested to supply graph paper if necessary.
15. Samples and key for the organic Practical examination will be supplied by the convenors.

For Physical Chemistry (P)

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

2. Detailed distribution of marks 11

- Performing the experiment. 3
- Presentation (theory, data table). 2
- Graph (1 for data pointing, 1 for axes lables & caption and 1 for mean curve drawing). 3
- Calculation 1
- Proper unit of concentration ½
- Accuracy (1½ for E 25% deduct ½ for each 10% error) 1½

Information related to Physical Chemistry experiments
Conductometric Titration

1. About 40-50 ml ~ (N/2) (oxalic acid solution is to be gives to each candidate)

2. HCl solution of accurately known strength of the order (N/20) is to be supplied to each candidate (~ 50 ml)

3. About 90-100 ml ~ (N/2) NaOH solution is to be supplied to each candidate

4. Phenopthaline indicator is to be supplied to each candidate.

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SP-III/Chemistry-301C-1C(P)/19

B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31428 **Course Code : SPCHE-301C-1C(P)**

Course Title: Organic Chemistry II, Chemical Energetics, Chemical Equilibrium & Conductance

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.

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

(Candidates would not be allowed to consult the books or notes while writing the report in answer scripts.)
(উত্তরপত্র লেখার সময় বই বা নোট দেখতে দেওয়া হবে না।)

1. Perform the experiment of the following (*any one*):

নিম্নলিখিত পরীক্ষা (*যে কোনো একটি* সম্পাদন করো) ঃ

A. Identify the given Organic Compound marked 'O' with respect to the following:

'O' চিহ্নিত প্রদত্ত জৈব যৌগটিকে নিম্ন নির্দেশ অনুযায়ী শনাক্ত করো ঃ

(i) Physical characteristics: State, odour, colour 1½

ভৌত ধর্মাবলী ঃ অবস্থা, গন্ধ, বর্ণ

(ii) Perform Preliminary Tests: Ignition Test, Solubility Test and Litmus Test along with other identifying tests (if necessary) and report your result in tabular form. Give your conclusion from Preliminary tests. 5+1½

প্রাথমিক পরীক্ষা ঃ ইগনিশন পরীক্ষা, দ্রাব্যতা পরীক্ষা, লিটমাস পরীক্ষাসহ অন্যান্য প্রয়োজনীয় শনাক্তকরণ পরীক্ষা করো ও ফলাফল সারণী আকারে লিপিবদ্ধ করো। প্রাথমিক পরীক্ষা থেকে প্রাপ্ত সিদ্ধান্তগুলি লেখো।

(iii) Perform Confirmatory Test and report your result in Tabular form. 2

নিশ্চিতকরণ পরীক্ষা করো ও ফলাফল সারণী আকারে লিপিবদ্ধ করো।

(iv) Conclusion. 1

সিদ্ধান্ত লেখো।

B. Determine the strength of a HCl solution by titrating against a standard NaOH solution conductometrically. Determine the strength of NaOH solution by titration with supplied standard oxalic acid solution using suitable indicator. (Strength of the oxalic acid solution will be supplied by the examiner.)

পরিবাহিতা টাইট্রেশনের [conductivity titration] দ্বারা HCl দ্রবণের মাত্রা NaOH দ্রবণের সাহায্যে নির্ণয় করো। NaOH দ্রবণের মাত্রা জ্ঞাত মাত্রার অক্সালিক অ্যাসিড দ্রবণ দ্বারা উপযুক্ত নির্দেশকের সাহায্যে টাইট্রেশন পদ্ধতিতে নির্ণয় করো। [অক্সালিক অ্যাসিডের মাত্রা পরীক্ষকের থেকে জেনে নাও।] 11

2. Laboratory Notebook 2

পরীক্ষাগারে কাজের খাতা

3. Viva voce 2

মৌখিক পরীক্ষা

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B. Sc. Semester III (Honours) Practical Examination, 2018-19

CHEMISTRY

Course ID : 31428 **Course Code : SHCHE-304GE-3(PI)**

Course Title: Chemical Energetics, Conductance, Organic

INSTRUCTION TO THE EXAMINERS

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 "0" and "D" used by candidates and also the marks awarded in laboratory records & viva voce. The record book together with a copy of the key signed by the examiners should be sent to the Convenor along with the answer script.
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14. Examiners are requested to supply graph paper if necessary.
15. Samples and key for the organic Practical examination will be supplied by the convenors.

For Physical Chemistry (P)

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

2. Detailed distribution of marks 11

- Performing the experiment. 3
- Presentation (theory, data table). 2
- Graph (1 for data pointing, 1 for axes lables & caption and 1 for mean curve drawing). 3
- Calculation 1
- Proper unit of concentration ½
- Accuracy (1½ for E 25% deduct ½ for each 10% error) 1½

Information related to Physical Chemistry experiments
Conductometric Titration

1. About 40-50 ml ~ (N/2) (oxalic acid solution is to be gives to each candidate)

2. HCl solution of accurately known strength of the order (N/20) is to be supplied to each candidate (~ 50 ml)

3. About 90-100 ml ~ (N/2) NaOH solution is to be supplied to each candidate

4. Phenopthaline indicator is to be supplied to each candidate.

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SP-III/Chemistry-304SEC-1(T)/19

B. Sc. Semester III (General) Examination, 2018-2019

CHEMISTRY

Course ID : 31410 **Course Code : SPCHE-304SEC-1(T)**

Course Title: Basic Analytical Chemistry

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.

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 is significant figure? Give an example.
অর্থবহ সংখ্যা বলতে কী বোঝ? একটি উদাহরণ দাও।

(b) What do you mean by R_f value for TLC?
TLC-এর ক্ষেত্রে R_f মান বলতে কী বোঝ?

(c) What is ion exchange capacity? Mention its unit.
রেজিনের আয়ন exchange capacity কাকে বলে? ইহার পরিমাপের একক কী?

(d) What do you mean by BOD and COD of water?
জলের BOD এবং COD বলতে কী বোঝ?

(e) What is the chemical composition of 'talc', used in face powder and talcum powder?
ফেসপাউডার ও ট্যালকম পাউডারে ট্যাল্ক (talc) বলে যে পদার্থ ব্যবহৃত হয় তার রাসায়নিক পদার্থটি কী?

(f) What are the precautions necessary for sampling in chemical analysis?
রাসায়নিক বিশ্লেষণে নমুনা সংগ্রহের ক্ষেত্রে কী কী সাবধানতা অবলম্বন করা উচিত?

(g) What do you mean by Adulteration and Adulterant?
Adulteration ও Adulterant বলতে কী বোঝ?

(h) What do you mean by indicator used in volumetric analysis? Give an example.
আয়তনমাত্রিক বিশ্লেষণে নির্দেশক বলতে কী বোঝ? একটি উদাহরণ দাও।

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

যে কোনো চারটি প্রশ্নের উত্তর দাও ঃ

(a) Mention the reasons for enhancement of soil acidity. How will you reduce the acidity of soil? Write two major components of soil. 2+2+1=5

মাটির অম্লতা বৃদ্ধির কারণ কী? কীভাবে মাটির অম্লতা কমানো যায়? মাটির দুটি প্রধান উপাদানের নাম লেখো।

(b) What type of organic compounds are used in food as flavour enhancers? Give two examples. What are food preservatives? Cite one example. (1+2)+(1+1)=5

খাদ্যে যে গন্ধ দ্রব্য ব্যবহৃত হয় তারা সাধারণত কোন শ্রেণির জৈব পদার্থ? দুটি উদাহরণ দাও। খাদ্য সংরক্ষক কী? একটি উদাহরণ দাও।

(c) What do you mean by hardness of water? How hardness of water is estimated by EDTA? 2+3=5

জলের খরতা বলতে কী বোঝ? EDTA-এর সাহায্যে খরতা কীভাবে নির্ণয় করা হয়?

(d) Write down general principles of chromatographic separation using column and TLC method. 2½+2½=5

স্তম্ভ পদ্ধতি (column) ও সূক্ষ্ম আস্তরণ (TLC) পদ্ধতিতে ক্রোমাটোগ্রাফিক বিশ্লেষণের নীতিগুলি আলোচনা করো।

(e) Define accuracy and precision in quantitative analysis. What do you mean by determinate error? 1½+1½+2=5

পরিমানগত বিশ্লেষণে নির্ভূলতার (accuracy) ও যথাযথতার (precision) সংজ্ঞা দাও। নির্ণয়যোগ্য ভূল বলতে কী বোঝ?

(f) What are deodorants and antiperspirants? Discuss (short) about their composition. 2+3=5

Deodorants এবং Antiperspirants বলতে কী বোঝ? এদের উপাদানগুলি সম্বন্ধে সংক্ষিপ্ত আলোচনা করো।

3. Answer *any one* question: 10×1=10

যে কোনো একটি প্রশ্নের উত্তর দাও ঃ

(a) Discuss the method for detection of common aldulterants in following food.

(i) Asafoetida (Hing) (ii) Chilli Power (iii) Pulses (iv) Termeric Powder (v) Coffee powder 2×5=10

নিম্নলিখিত খাদ্যবস্তুগুলিতে সাধারণ aldulterants চিহ্নিতকরণের পদ্ধতি আলোচনা করো।

(i) হিং (Hing), (ii) লঙ্কা গুঁড়ো, (iii) দানাশস্য (iv) হলুদ গুঁড়ো (v) কফি গুঁড়ো

(b) Name two chelating agents and mention their use in chemical analysis. What do you mean by primary and secondary standard solution?—Explain with example. (2+2)+2+(2+2)=10

দুটি চিলেটিং এজেন্ট এর নাম লেখো এবং রাসায়নিক বিশ্লেষণে তাদের প্রয়োগের উদাহরণ দাও। ঘনায়তিক বিশ্লেষণের মূলনীতি লেখো। প্রাইমারি ও সেকেণ্ডারি প্রমাণ দ্রবণ বলতে কী বোঝো উদাহরণসহ ব্যাখ্যা করো।

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SH-III/Chemistry-301C-5(T)/19

B. Sc. Semester III (Honours) Examination, 2018-19

CHEMISTRY

Course ID : 31411 **Course Code : SHCHE/301C-5(T)**

Course Title: Physical Chemistry-II

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) Arrange the ions according to their molar ionic conductance values: Li^+, Na^+, K^+, Rb^+

(b) Draw the ψ(x) vs. *x* plot for the first excited state of an 1-dimensional harmonic oscillator.

(c) Chemical potential is an intensive property of the system. — Comment.

(d) Mention two fundamental difference between molar property and partial molar property.

(e) '$\widehat{p_x}$ is not an eigen operator for the particle-in-a 1-dimensional box wave function.' — What inference you can draw from the above fact?

(f) $y_i P = x_i\, p_i^o$ — Is it Raoult's law or not? x_i is the liquid phase molefraction and y_i is the vapour phase molefraction of the species *i*, *p* is the total pressure of the vapour phase.

(g) State whether $\frac{d}{dx}$ and $\frac{d}{dy}$ will commute or not.

(h) Debye-Hückel law is called a limiting law. — Why?

2. Answer *any two* questions: 5×2=10

(a) (i) Show that if the eigenfunctions of an Hermitian operator have different eigenvalues, then they are orthogonal.

(ii) Find the relation between mean ionic activity and ionic activities of $Na_2\, SO_4$ solution.

(iii) Expand the operator $\left(\frac{d}{dx} + x\right)\left(\frac{d}{dx} - x\right)$ 2+1+2=5

(b) (i) Calculate the $H^+ - ion$ concentration of a solution of HCOOH containing 0.092g of acid per litre. (K_a for HCOOH at 25°C is $2{\cdot}14 \times 10^{-4}$) 2

(ii) Define fugacity. Comment on its unit.

(iii) How would you define ideally-dilute solutions? 2+1½+1½=5

(c) (i) Derive an expression for de-Broglie wavelength of photoelectrons emitted when radiation of frequency ν, falls on an emitter with threshold frequency ν_0.

(ii) Explain the relevant graphical plot for the conductometric titration between HCl and NH_4OH. 3+2=5

(d) (i) For the distribution of a species between two immiscible solvents, thermodynamically derive the Nernst's distribution law. 2½

(ii) The equivalent conductance of a very dilute solution of $NaNO_3$ at 18°C is 105·2 mho cm^2. If the ionic conductance of NO_3^- ions in the solution is 61·7 mho cm^2, calculate the transport number of Na^+ ions in the solution. 2½+2½=5

3. Answer *any one* question: 10×1=10

(a) (i) If $V(x) = V(-x)$, symmetric about the origin, then show that both ψ(*x*) and ψ(–*x*) are solutions of the $\hat{H}$ (Hamiltonian Operator) with the same eigenvalue E.

(ii) Normalize ψ(*x*) = ic (where C is a constant) in the range $-L \leq x \leq L$. $\left(i = \sqrt{-1}\right)$.

(iii) K_p for a gaseous reaction increases by 2% per degree rise in temperature near 600K. Calculate ΔH of the reaction.

(iv) Calculate the molal ionic strength of a solution which is 0.01 m with respect to Na_2SO_4 and 0.02 m with respect to $AlCl_3$.

(v) Find the degeneracy of a particle in a cubical box of dimension '*l*' with energy $\frac{14h^2}{8\,ml^2}$.

2×5=10

(b) (i) In the distribution of succinic acid between ether and water at 15°C, 20 mL ethereal layer contains 0·092g of the acid. Find out the weight of the acid present in 50 mL of the aqueous solution in equilibrium with it if the K_D value for succinic acid between water and ether is 5·2.

(ii) If the percentage error in measurement of the radius of the capillary is '*x*', then show that percentage error in the measurement of the viscosity co-efficient will be equal to 4x.

(iii) If $\hat{A}\psi = a\psi$, then show that σ_a (standard deviation for the measurement of the observable *a*) is zero.

(iv) Prove that for ideal mixing $\Delta V^{mix} = 0$

(v) "Photo-eletric work function is generally less than ionization energy of the electron." — What inference one can draw for it? 3+2+2+2+1=10

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