CHE 101 **Reg. No. .....**

CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2012

CHEMISTRY

PAPER I: GENERAL CHEMISTRY

Duration: 3 hours **Max marks: 80**

PART A

1. Answer any <u>TEN</u> of the following: **2x10=20**

a) Calculate the volume of decinormal sulphuric acid required to prepare 500cm^3 of 0.025N solution.

b) In an experiment the mass of copper was found to be 0.2017g. If the true value is 0.2000g, Calculate the absolute and relative error.

c) What is the general trend of metallic behavior of elements in the periodic table?

d) Complete and Balance the equation $Al(OH)_3 + H_2SO_4 \rightarrow$

e) What is open and closed system in thermodynamics?

f) Give the mathematical expression for first law of thermodynamics.

g) State second law of thermodynamics

h) Define entropy. Give its SI unit.

i) What is catenation? Name the element which shows maximum catenation.

j) Give the IUPAC name of $CH_3 - CH_2 - CH(OH) - CH_2 - COOH$

k) What is tautomerism? Write the tautomeric forms of acetone.

l) What is pyrolysis of alkanes? Give on example.

PART-B

UNIT-I

Answer any **<u>TWO</u>** of the following. **10x2=20**

2. a) Discuss the methods involved in the minimization of various types of errors. 04

b) Discuss the safety measures to be adopted in the chemical laboratories. 03

c) Calculate the normality of the solution containing 200g of NaOH in 2 m^3 of the solution. 03

3. a) Give brief outline of the classification of chemicals. 04

b) What are determinate errors? How are they classified? 03

c) 3 g of an acid was dissolved in 500 cm^3 of the solution. 50 cm^3 of it required

39.6 cm^3 of 0.12 N sodium hydroxide for complete neutralization. Find out the equivalent mass of the acid. 03

4. a) Balance the equation for the oxidation of sulphur dioxide to sulphuric acid by acidified potassium dichromate by partial equation method. 04

   b) 0.53 g of anhydrous sodium carbonate is dissolved in water and solution is made up to 100 cm^3. Calculate the normally of the solution. 03

   c) With one example each explains the terms mean and median. 03

UNIT-II

Answer any **TWO** of the following. **10x2=20**

5. a) Show that Joule Thomson effect is isoenthalpic 04

   b) Differentiate between isothermal and adiabatic processes. 03

   c) The vanderWaal's constants *a* and *b* for hydrogen are 0.246 dm^6 $atm.mol^{-2}$ and $2.67x10^{-2}$ dm^3 mol^{-1}. Calculate the inversion temperature for hydrogen. ($R=8.206 \times 10^{-2}$ dm^3 $atm.K^{-1}$ mol^{-1}) 03

6. a) Derive Gibb's Helmholtz equation. 04

   b) Define heat capacity at constant pressure and constant volume. How are they related? 03

   c) Calculate the increase in entropy in the evaporation of 1kg of water at 100^oC. Latent heat of vaporization of water is 40.68 kJ mol^{-1}. 03

7. a) Deduce the efficiency of a Carnot engine working between two temperatures. 04

   b) Differentiate between Gibb's free energy and Helmholtz free energy. 03

   c) Convert the temperature of -40^oC to Fahrenheit. 03

UNIT-III

Answer any TWO of the following. **10x2=20**

8. a) Explain position and functional isomerism with one example each. 04

   d) Give the classification of alkadienes with examples. 03

   e) Explain the dehydrohalogenation reaction of 2-bomobutane. 03

9. a) Explain the ozonolysis reaction of ethene and ethyne. 04

   b) What are alicyclic hydrocarbons? Give general formula of cycloalkanes. 03

   c) Explain the halogenation reaction of alkanes. 03

10. a) Give any two methods for the preparation of 1,3-butadiene. 04

b) What happens when 2-chloropropane is heated with sodium in ether? Give the chemical equation. 03

c) Explain Diel's Alder reaction with one example. 03

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CHE 101 **Reg. No. .....**

CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2013

CHEMISTRY

PAPER I: GENERAL CHEMISTRY

Duration: 3 hours **Max marks: 80**

PART A

1. Answer any <u>TEN</u> of the following: 10x2=20

a) Give the variation of metallic and non metallic character in the periodic table.

b) Explain the term 'Precision of a measurement'.

c) What is the mass of sodium hydroxide required for the preparation 250 cm^3 of 0.1 N solution?

d) Calculate the volume of water to be added to convert 500 cm^3 of 0.2N sulphuric acid into 0.1 N.

e) Give the SI units of density and energy.

f) Define the term system and surroundings.

g) Write the mathematical form of the first law of thermodynamics.

h) Explain the term 'Entropy'.

i) Give an example for position isomerism.

j) Write the ozonolysis reaction of propene.

m) Explain the addition of Bromine to 1, 3 - butadiene.

n) Give an example for Wartz reaction.

PART-B
UNIT-I

Answer any **TWO** of the following. **2x10=20**

2. a) Give the principle behind the Gravimetric analysis. 04
   b) Explain the terms 'Mean' and "Median'. 03
   c) Write the formula of
      i) Ferric Sulphate ii) Ammonium Phosphate iii) Lead Nitrate 03

3. a) What are determinate errors? Explain how they are minimized. 04
   b) Write the chemical equation for the following and balance by hit and trial method. Zinc nitrate on heating gives zinc oxide, nitrogen dioxide and oxygen. 03
   d) Define molarity of a solution. Explain the preparation of one molar solution of oxalic acid. 03

4. a) What are the different types of chemicals? Explain with an example each. 04
   b) Write the chemical equation for the following reaction and balance by partial equation method.
      Chlorine oxidizes hydrogen sulphide to sulphur. 03
   c) 50 cm^3 of 10N sulphuric acid is diluted to 1 dm^3. What is the normality and molarity of the final solution? 03

UNIT-II

Answer any **TWO** of the following. **2x10=20**

5. a) Give the SI units of volume, pressure, and temperature. 03
   b) Explain why Cp is always greater than C_v and show that $C_p - C_v = R$. 03
   c) Derive an expression for entropy change in terms of temperature and volume for an ideal gas. 04

6. a) Derive Kirchoff's equation. 03
   b) State and explain Carnot theorem. How can the efficiency of a heat engine be increased? 03
   c) Derive Gibb's Helmholtz equation. 04

7. a) What is meant by Joule Thomson coefficient? 03
   b) Derive an expression for the variation of free energy change with temperature and pressure. 04
   c) Derive an expression for work done in an isothermal reversible expansion of a gas. 03

UNIT-III

Answer any TWO of the following. **2x10=20**

8. a) Explain the pyrolysis and oxidation of alkanes. 03

f) Write one method of preparation of alkane and one chemical property of Alkene. 03

g) i) Give the preparation of 1, 3 – butaldiene from 1, 4 – dichloro butane
ii) Explain Diels Alder reaction. 04

9. a) Explain the classification of organic compounds based on the structure. 03

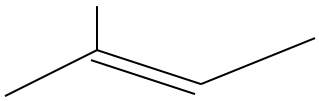
b) i) Explain the preparation of Alkynes by dehydrohalogenation of vicinal dihalides.
ii) Explain the addition of water to alkynes. 04

h) Explain the following reactions:
i) Dehydrohalogenations of alkyl halides
ii) Halogenations of alkanes 03

10. a) Explain chain isomerism with suitable example. 03

b) Give the preparation of i) Alkanes by Decarboxylation of monocarboxylic acids.
ii) Alkenes by dehydration of alcohols. 04

c) Write the IUPAC names of the following compounds.
i) $CH_3 - CHCl - CHBr - CH_2 - CH_3$ ii) $CH_3 - CH_2 - CH(C_2H_5) - CH_3$

iii)  03

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CHE 101.1 **Reg. No. .....**

CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2014

CHEMISTRY

PAPER I: GENERAL CHEMISTRY

Duration: 3 hours **Max marks: 80**

PART A

1. Answer any <u>TEN</u> of the following: **10x2=20**

a) What is Pauling's scale of electronegativity?

b) How does atomic radius vary along the period and down the group in the periodic table?

c) Arrange the following ions in the increasing order of their ionic radius:

d) What are isoelectronic ions? Give example.

e) State second law of thermodynamics.

f) State Carnot's theorem.

g) Give the mathematical form of first law of thermodynamics and explain the terms.

h) Write the relationship between Gibb's free energy and Helmholtz free energy.

i) How do you convert 1, 3 butadiene into Buna rubber.

j) What is antiaromaticity?

o) Give an example for Diels-Alder reaction.

p) What is electromeric effect? Give an example.

PART-B
UNIT-I

Answer any **TWO** of the following. **2x10=20**

2. a) Balance the equation: by ion-electron method. 04

b) Explain the factors affecting Ionisation energy. 03

c) Explain the variation of oxidizing and reducing properties of elements based on electron affinity and Ionisation energy. 03

3. a) Give a brief outline of classification of chemicals. 04

b) Define Ionic radius. Campare the radius of anion and cation with respect to its neutral atom. 03

e) Explain the determination of ionization by discharge tube method. 03

4. a) How is electron affinity evaluated by Born-Haber Cycle. 04

b) Explain briefly the trends in the metallic and non-metallic character of elements across the period and down the group in the periodic table. 03

c) How is ionic radius determined by Lande's method. 03

UNIT-II

Answer any **TWO** of the following. **2x10=20**

5. a) Show that Joule-Thomson effect is an isoenthalphic process. 04

b) Define heat capacity of gas at constant pressure and constant volume. Give the relationship between the two. 03

c) Calculate the amount of heat supplied to Carnot's cycle working between 368 K and 288 K if the maximum work obtained is 895 J. 03

6. a) Derive an expression for efficiency of a Carnot's engine working between two temperatures. 04

b) Discuss the variation of Gibb's free energy with temperature and volume. 03

c) Calculate the entropy change when 1 mole of ethanol is evaporated at 351K. The molar heat of vapourisation of ethanol is . 03

7. a) Derive Kirchoff's equation at constant pressure. 04

b) Derive an expression for entropy change of an ideal gas when temperature and pressure change. 03

c) Calculate the free energy change which occurs when one mole of an ideal gas expands reversibly and isothermally at 300 K from initial volume of 5 litres to 50 litres. 03

UNIT-III

Answer any TWO of the following. 2x10=20

8. a) Explain any two methods of preparation of cycloalkanes. 04

i) What is carbocation? Write different types of carbocations and their increasing order of stability. 03

c) Write the mechanism of Hoffmann rearrangement. 03

9. a) What is an aryne? Explain benzyne mechanism for the conversion of chlorobenzene into aminobenzene? 04

b) Compare the stability of cycloalkanes on the basis of Baeyer's strain theory. 03

j) What is Huckel rule? Verify the aromatic character of naphthalene and cyclooctatetraene using Huckel rule. 03

10. a) Explain the reactions of 1, 3 – butadiene with (1) HBr (ii) Br_2. 04

b) What is inductive effect? Explain +I and –I effects with example. 03

c) What is meant by hyperconjugation? Explain with an example. 03

CHE 101.1 **Reg. No. .....**

CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2015

CHEMISTRY

PAPER I: GENERAL CHEMISTRY

Duration: 3 hours **Max marks: 80**

PART A

1. Answer any <u>TEN</u> of the following: **10x2=20**

a) What are isoelectronic species ? Give 2 examples.

b) Arrange the alkali metals in the increasing order of reduction potential. Give reason for the trend.

c) Define ionisation energy. What is its unit?

d) Write a balanced chemical equation for the complete combustion of propane.

e) Define heat capacity of a substance. How is C_p related to C_v?

f) State the first law of thermodynamics and give its mathematical form.

g) What is the Kelvin Scale of temperature?

h) A Carnot engine operating between temperature T and 400K (T > 400k) has efficiency of 25% . What is the temperature of the source?

i) Comment on the aromaticity of cyclopropane.

j) What are cumulated dienes? Give one example.

q) How is polyvinyl chloride obtained?

r) Comment on the stability of chair and boat forms of cyclohexane.

PART-B
UNIT-I

Answer any **<u>TWO</u>** of the following. **2x10=20**

2. a) Explain Lande's method of determining ionic radius. 04

   b) What are the trends in electron affinity in the periodic table? 03

   c) Explain classification of chemicals with examples based on sources. 03

3. a) How does ionisation energy vary in the periodic table? How is it determined by discharge method? 04

   b) Balance the following reaction

   [illegible]MnOHSOFeSOKSOMnSOHO 03

   f) Explain the components of the language of chemistry. 03

4. a) Define covalent and ionic radius. What factors determine covalent and ionic behaviour? 04

   b) How is electronegativity useful in predicting type of bonds and bond angle? 03

   c) Write the chemical formula of

(1) Sodium phosphate (2) Potassium dichromate (3) Lithium nitrate 03

UNIT-II

Answer any **TWO** of the following. **2x10=20**

5. a) Derive the Gibbs-Helmholtz equation. 04
   b) Explain the significance and need for the second law of thermodynamics. 03
   c) Explain latent heat of fusion and vapourisation. 03

6. a) Deduce the total work done in a Carnot cycle along with the P-V diagram. 04
   b) Show that J-T effect is an isoenthalpic process. 03
   c) 3 moles of an ideal gas are compressed reversibly and isothermally at 27 to half its original volume. Calculate the work done on the gas. 03

7. a) Discuss the variation of Gibb's free energy with temperature and pressure. 04
   b) Give the criteria of spontaneity of a reaction in terms of entropy and free energy. 03
   c) What is enthalpy? Give its relation to work done and internal energy. 03

UNIT-III

Answer any TWO of the following. **2x10=20**

8. a) Explain the mechanism of aldol condensation. 04
   k) What are benzynes? Give a reaction involving benzynes. 03
   c) What are dienes? How are they classified? 03

9. a) Explain the stability of cycloalkanes using Sache-Mohr theory. 04
   b) Explain the mechanism of chlorination of methane. 03
   l) With an example, state Huckel rule for aromaticity. 03

10. a) Discuss the order of stability of carbocations and carbanions. 04
    b) Explain Diel's Alder reaction. 03
    c) Give the drawbacks of Bayer's strain theory. 03

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CHE 101 Reg. No. .....

CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2016

CHEMISTRY

PAPER I: GENERAL CHEMISTRY

Duration: 3 hours **Max marks: 80**

PART A

1. Answer any TEN of the following: **10x2=20**

a) What is the trend in the metallic property of elements across the period in the periodic table?

b) Give example for synthetic and natural chemicals.

c) What is the difference between accuracy and precision?

d) How do you prepare 2N sujphuric acid from 10N sulphuric acid?

e) Define the term ppm.

f) What is a primacy standard?

g) What is the criteria for spontaneity of a process?

h) Define heat capacity at constant pressure.

i) What is catenation?

j) What is Diels-Alder reaction?

k) What are alicyclic compounds? Give an example.

l) Give an example for oxidation reaction of alkanes.

m) Write the IUPAC name of

$$CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - CH_2 - COOH$$

PART-B

UNIT-I

Answer any **TWO** of the following. **2x10=20**

2. a) Explain briefly the trends in the following properties along the periodic table. 04

(i) Metallic property (ii) reducing property

(iii) electronegativity (iv) basic nature

b) Calcualte the volume of water to the added to convert 500 cm^3 of 1N NaOH into 0.05N NaOH. 03

c) Explain briefly different types of chemicals. 03

3. a) Give brief account of safety measures to be taken in the chemical laboratory. 04

b) Explain mean and median with suitable example. 03

c) Explain briefly different types of errors. 03

4. a) Explain different types of quantitative analysis. 04

b) Explain different measures taken to minimize errors. 03

c) $25cm^3$ of 0.1 N sodium carbonate solution requires 21.5 cm^3 of hydrochloric acid solution for complete neutralization. Calculate the normality of hydrochloric acid and mass of it in $100cm^3$ of the solution. 03

UNIT-II

Answer any **TWO** of the following. **2x10=20**

5. a) Derive an expression for work done during reversible isothermal expansion of an ideal gas. 04

b) Exactly 35 g of Urea is dissolved in $500cm^3$ of water. Calculate its molarity, molality and mole fraction. The density of water at laboratory temperature is $0.9964g/cm^3$. 04

c) Explain Inversion temperature. 02

6. a) Prove that $C_p - C_v = R$ .for one mole of an ideal gas. 03

b) State Carnot theorem. Derive an expression for efficiency of Carnot engine. 05

c) State and explain first law of thermodynamics. 02

7. a) Derive Kirchoff's equation. 03

b) Derive an expression for entropy change of an ideal gas with temperature and volume. 04

c) Heat supplied to a Carnot engine is 1250 kJ. How much useful work can be done by the engine working between 273 K and 373 K 03

UNIT-III

Answer any TWO of the following. **2x10=20**

8. a) Explain classification of organic compounds with suitable examples. 03

b) What is structural isomerism? Explain different types with suitable examples. 04

c) Explain classification of alkadiens. 03

9. a) Explain any two methods of preparation of alkenes. 04

b) Describe chemical properties of alkanes with reference to halogenation and pyrolysis. 04

c) Explain ozonolysis of alkynes. 02

10. a) Give two methods of preparation of alkynes. 04

b) Explain the addition of bromine and hydrogen bromide to 1, 3-butadiene. 04

c) How do you prepare alkane by Wurtz reaction? 02

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CHE 101.1 Reg. No. .....

CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2016

CHEMISTRY

PAPER I: GENERAL CHEMISTRY

Duration: 3 hours **Max marks: 80**

PART A

1. Answer any TEN of the following: **10x2=20**

a) What are Biochemicals ? Give an example.

b) Balance the following equation by Hit and Trial method

$$MnO_2 + HCl \rightarrow MnCl_2 + H_2O + Cl_2$$

c) Ionisation energy of nitrogen is higher than that of oxygen. Why?

d) Write Mullikan's electronegativity scale.

e) Define Gibb's free energy.

f) Explain Joule-Thomson effect.

g) What is the relationship between C_p and C_v ?

h) What is Kelvin's scale of temperature?

i) Cyclopropane undergoes ring opening reactions. Give reason.

j) What is a cumulative diene? Give one example.

k) Classify each of the following as an electrophile or a nucleophile.

$$N\bar{O}_3, \quad H_3\overset{+}{O}, \quad NH_3, \quad BF_3$$

l) What happens when 1, 4 - dibromobutane is heated with zinc.

PART-B

UNIT-I

Answer any **TWO** of the following. **2x10=20**

2. a) Explain the trends in the periodic table with respect to reducing and oxidizing nature of elements. 04

b) How is ionic radius determined by Lande's method? 03

c) Define electron affinity. How does it vary in the periodic table? 03

3. a) Balance the equation: $H_2O_2 + H^+ + I^- \rightarrow I_2 + O_2 + H_2O$ by ion-electron method. 04

b) Explain the determination of ionization energy by discharge tube method. 03

c) Explain Born Haber cycle for the formation of an ionic bond. 03

4. a) Explain the factors affecting ionisation energy. 04

b) Discuss the trends in the periodic table with respect to metallic properties of elements. 03

c) Define ionic radius – compare the radius of anion and cation with respect to its neutral atom. 03

UNIT-II

Answer any **TWO** of the following. **2x10=20**

5. a) Show that Joule-Thomson effect is an isoenthalpic process. 04
   b) Justify the need for second law of thermodynamics. 03
   c) Calculate the entropy change for the fusion of 1 mole of a solid which melts at 300K. The molar heat of fusion is 2.51kJ/mole. 03

6. a) Derive an expression for the efficiency of a Carnot's engine working between two temperatures. 04
   b) Derive Kirchoff's equation. 03
   c) Calculate the entropy change when 2 moles of an ideal gas are allowed to expand isothermally at 293 K. from a pressure of 10 atmospheres to a pressure of 2 atmospheres . Given R= $8.314JK^{-1}mol^{-1}$. 03

7. a) Derive Gibbs-Helmhotz equation. 04
   b) Calculate the amount of heat supplied to Carnot's cycle working between 368K and 288K if the maximum work obtained is 895J. 03
   c) Derive an expression for work done by an ideal gas during reversible adiabatic expansion. 03

UNIT-III

Answer any TWO of the following. **2x10=20**

8. a) State the postulates of Baeyer's strain theory and explain the ring strain in cyclopropane and cyclobutane. 04
   b) Write the mechanism of Hoffmann rearrangement. 03
   c) Explain the criteria for aromaticity. 03

9. a) Explain the mechanism of Reimer-Tiemann reaction. 04
   b) Explain the mechanism of addition of Br_2 to 1, 3 - butadiene. 03
   c) What is mesomeric effect? Explain +M and –M effect with example. 03

10. a) Explain elimination and substitution reactions with an example each. 04
    b) Write a note on Sachse-Mohr theory. 03
    c) Explain the mechanism of addition of HBr to propene. 03

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