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SYLLABUS (CBCS)

B. Sc. Semester I : (ONE)

CHEMISTRY

CODE NO : CECH101

With effect from June 2011

KACHCHH UNIVERSITY : BHUJ
FIRST YEAR B.Sc : CBCS : SEMESTER : I (ONE)
CHEMISTRY PAPER : (wef June 2011)
Paper name: Basic Chemistry (Core Elective)
Paper Code NO. : CECH101

UNIT-I : PHYSICAL CHEMISTRY : **[15 MARKS]**

(a) Thermodynamics : **(7 Marks)**

Isothermal and adiabatic changes (PV, PT, TV, relations), Second law of thermodynamics, state functions, Heat capacity Cp, Cv and their relations, Gas constant, entropy of gases, Joule Thomson effect, Kirchoff's law, bond energy and resonance energy, Definition of third law of thermodynamics.

(b) Ionic Equilibrium : **(8 Marks)**

Electrolytic conductance, specific conductance, molar conductance and their relations, cell constant, Variation in molar conductance with dilution, Ionic mobility, Kohlrausch law and application, Calculation of molar and ionic conductance, relation between ionic and molar conductance, Ostwald's law of dilution and its limitations, Debye-Huckel theory of strong electrolyte, asymmetric effect, inter ionic attraction theory, Electro phoretic effect, Viscous drag, Debye-Huckel, Onsager equation,

UNIT-2: INORGANIC CHEMISTRY : **[15 MARKS]**

(a) Chemical Bonding : **(8 Marks)**

Valence Bond approach for the covalent bond with example of hydrogen molecule, Hybridization in Methane, Ethane, Ethylene, Acetylene, BH₃, BeCl₂ molecules
 Molecular Orbital Theory of covalent bonding with example of F₂, F₂⁺, O₂, O₂⁺, O₂⁻¹, CO, CN, NO molecules, calculations of bond order of the above molecules, MO approach to metallic bond and its application to explain conditions of metals, Conductors, Insulators, semiconductors, superconductors, Hybridization of borane, Diborane, Borazine, Fullerenes (Chemistry & Bonding).

(b) Coordination chemistry : **(7 Marks)**

Valence bond approach (hybridization) to coordinate bond formation, Ligand + their type, formation of complexes, stability of complexes, crystal field theory, Ligand field theory, Labile and inert complexes, Stability of complexes, Factors influencing stability (properties of metal ion and properties of ligand) Inner orbital complexes, outer orbital complexes, Chelation, Biological importance of complexes.

UNIT-3 : ORGANIC CHEMISTRY : I **[15 MARKS]**

(a) Molecular formula : **(9 Marks)**

Estimation of Carbon, Hydrogen (Liebig Method), Oxygen, Nitrogen (Kjeldahl's simple method, No use of Boric acid), Halogens, Sulfur, Phosphorous (Carius method), Principle and calculation, Numerical problems to find out percentage; (No diagram of any method.)

Determination of Molecular weight : Silver salt method , Chloroplatinate method and Volumetric method . Numerical problems
Determination of Empirical formula and of organic molecules from %age composition, To find out percentage composition from molecular formula.

(b) Various electronic effects : **(6 Marks)**

Inductive effect, Resonance, Electromeric effect, Hyper conjugation, : Definitions and conditions with few examples, Fission of Covalent bond, Types of reagents and reactive intermediates, structure and formation of Alkyl and other free radicals, Carbo cations, Carb anions, comparison and stability.

UNIT-4 : ORGANIC CHEMISTRY : II **[15 MARKS]**

Aliphatic hydrocarbons (Alkanes , Alkenes & Alkynes) :

* Structure , Nomenclature , Preparation. (Reduction of R-X., Wurtz reaction, Grignard reaction, Decarboxylation of acid, Kolbe's electrolytic process), Chemical reactions (Halogenation – Chlorination of Methane - free radical mechanism) of Alkanes

* **Structure and nomenclature of Alkenes , Preparations (Dehydration , Dehalogenation , Dehydrohalogenation) and Chemical reactions (with H₂, X₂ , HX, HOCl, H₂SO₄ – Markovnikov and anti Markovnikov reactions with Mechanism), oxidation reaction with KMnO₄ (Bayer's test) Ozonolysis .**

* **In case of Alkynes, the reactions given by alkenes need not to be repeated. Reactions of terminal Acetylenes, i.e Acetylide formation. Reaction with H₂SO₄, Hg²⁺ .**

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FIRST YEAR B.Sc. : Semester : I (ONE)

SUBJECT : BASIC CHEMISTRY

Total Marks : 60 , Duration : TWO Hours

Passing standard : 24 Marks

PATTERN OF QUESTION PAPER

FOR SEMESTER-END EXAMS

1. Internal options are compulsory (i.e. Q.1 or Q.1; Q.2 or Q.2 etc.)
2. There are four questions (Q. 1 to Q. 4) each question carries 15 marks

The structure for the questions is as under:

Questions	Section	Marks
Question – 1 Unit – I	A (Objective type) (<i>no internal option</i>)	5 marks
	B (Descriptive - Essay type - Short notes <i>with internal option</i>)	10 marks
Question – 2 Unit – II	A –do-	5 marks
	B –do-	10 marks
Question – 3 Unit – III	A –do-	5 marks
	B –do-	10 marks
Question – 4 Unit – IV	A –do-	5 marks
	B –do-	10 marks

Types of questions for section A are varied: like: one line answers/ two line answers/ definitions/ reasoning/ derivations of equations/ derivations of sums/ drawing small figures/ matching the figures etc.

Kutch University : B.Sc : SEMESTER : I (ONE)
BASIC CHEMISTRY PRACTICAL

Q.1 Inorganic Qualitative analysis:**(20 Marks)**

Water soluble or insoluble salt be given for analysis. 15 Single salts to be analyzed.

- (01) Bromide (Br^{-1}) : $\text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}, \text{Sr}^{+2}$
 (02) Chloride (Cl^{-1}) : $\text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}, \text{Cu}^{+2}, \text{Cd}^{+2}, \text{Mg}^{+2}, \text{Ba}^{+2}, \text{Sr}^{+2}, \text{Mn}^{+2}, \text{Ni}^{+2}, \text{Co}^{+2}$.
 (03) Iodide (I^{-1}) : $\text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
 (04) Chromate (CrO_4^{-2}) : $\text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
 (05) Dichromate ($\text{Cr}_2\text{O}_7^{-2}$) : $\text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
 (06) Nitrate (NO_3^{-1}) : $\text{Pb}^{+2}, \text{Cu}^{+2}, \text{Co}^{+2}, \text{Ni}^{+2}, \text{Ba}^{+2}, \text{Sr}^{+2}, \text{Na}^{+1}$
 (07) Carbonate (CO_3^{-2}) : $\text{Cu}^{+2}, \text{Cd}^{+2}, \text{Bi}^{+2}, \text{Zn}^{+2}, \text{Ni}^{+2}, \text{Mn}^{+2}, \text{Ca}^{+2}, \text{Ba}^{+2}, \text{Sr}^{+2}, \text{Mg}^{+2}, \text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
 (08) Phosphate (PO_4^{-3}) : $\text{Cu}^{+2}, \text{Fe}^{+2}, \text{Al}^{+3}, \text{Zn}^{+2}, \text{Mn}^{+2}, \text{Ni}^{+2}, \text{Co}^{+2}, \text{Ba}^{+2}, \text{Ca}^{+2}, \text{Sr}^{+2}, \text{Mg}^{+2}, \text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
 (09) Sulphate (SO_4^{-2}) : $\text{Cu}^{+2}, \text{Al}^{+3}, \text{Zn}^{+2}, \text{Mn}^{+2}, \text{Ni}^{+2}, \text{Fe}^{+2}, \text{Mg}^{+2}, \text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$.
 (10) Sulfide (S^{-2}) : $\text{Zn}^{+2}, \text{Cd}^{+2}, \text{Sb}^{+2}$

Q.2 : Volumetric exercise :**(20 Marks)**

Single step titrations : One of the two standard solutions to be prepared by students.
The following exercise may be set.

Aim : for example : Prepare 0.08 N , 100 ml solution of Succinic acid and use it to find out the strength of given solution of NaOH in terms of Normality , gm/lit and Molarity.

- (1) 0.05 N to 0.1 N Succinic acid vs x N NaOH / KOH
- (2) 0.05 N to 0.1 N Oxalic acid x N KOH / NaOH
- (3) 0.01 M EDTA vs $\text{CaCl}_2 \cdot 2 \text{H}_2\text{O}$ / Hardness of water.
- (4) 0.01 M EDTA vs x M $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$
- (5) 0.01 M EDTA vs x M ZnCl_2
- (6) 0.05 – 0.1 N Oxalic acid / Pot oxalate / Sodium Oxalate vs x N KMnO_4
- (7) 0.05 – 0.1 $\text{Na}_2\text{S}_2\text{O}_3$ vs x N I_2 solution
- (8) 0.05 – 0.1 N $\text{Na}_2\text{S}_2\text{O}_3$ vs x N CuSO_4
- (9) 0.05 – 0.1 N KMnO_4 vs xN Ferrous Ammonium Sulphate or $\text{FeSO}_4 \cdot 7 \text{H}_2\text{O}$
- (10) 0.05 / 0.1 N $\text{K}_2\text{Cr}_2\text{O}_7$ vs x N $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ or FAS using internal indicator.

Q.3 Five short questions related to practicals only.**5 Marks****Q.4 Certified journal :****5 Marks**

Note : Student shall not be allowed to appear in the examination if he does not produce certified journals.

Kutch University : B.Sc : SEMESTER : I
CHEMISTRY PRACTICAL
Total Marks : 50 ; Duration : Four Hours
Passing standard : 20 Marks

(A) Inorganic Qualitative Analysis : Maximum Marks : 20

- (a) Preliminary Observations : 2 M
- (b) Dry Tests for Cation : 2 M
- (c) Dry Tests for Anion : 3 M
- (d) Wet test for Cation / Group tests : 3 M
- (e) Analysis of group / Phosphate scheme to get correct cation : 2M
- (f) Confirmative tests for cation : 1 M
- (g) Wet tests for Anion to get correct ion : 2 M
- (h) CT for anion : 1 M
- (i) Result, Chemical formula and name of compound found : 2 M
- (j) Chemical equations : Cation + Anion : 2 M

(B) Single step Volumetric Analysis: Maximum Marks : 20

One Standard solution to be prepared by students.

- (a) Calculation of weight and preparation of solution : 5 M
- (b) Correct Reading : 10 Marks (Break up : see below point -f)
- (c) Calculation : 3 M (One mark each for Normality, Gm/lit, Molarity)
- (d) Equation : 1 M
- (e) Result Table : 1 M
- (f) Break up of marks :
 $\pm 0.1 \text{ ml} : 10 \text{ M}$, $\pm 0.2 \text{ ml} : 9 \text{ M}$, $\pm 0.3 \text{ ml} : 8 \text{ M}$, $\pm 0.4 \text{ ml} : 7 \text{ M}$,
 $\pm 0.5 \text{ ml} : 6 \text{ M}$, $\pm 0.6 \text{ ml} : 4 \text{ M}$, $\pm 0.7 \text{ ml} : 2 \text{ M}$, $\pm 0.8 \text{ ml} , 1 \text{ M}$
 $\pm 0.9 \text{ ml} : \text{zero M}$.

(C) Certified Journal : 5 Marks

(D) Short Answers : 5 Marks

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K S K V KUTCH UNIVERSITY

First B.Sc : SEMESTER : I (ONE)

PRACTICALS EXAMINATION Subject : BASIC CHEMISTRY

October / November : _____

Total Marks : 50

Duration : Four Hours

GENERAL QUESTION PAPER

- NB: (1) On the Answer book, write your seat no. and table no.
(2) You are given separate answer books for each question.
(3) Calculation of weight of substance, concordant reading should be initialed by one of the examiners.
(4) Within first 10 minutes, write the answers in the given slip.
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Q.1 You are given an **Inorganic** substance in the beaker No **A** ____ . Analyze it .
Report clearly dry tests, group classification , CTs etc **(20 M)**

Q.2 Single Step titration :

Prepare **100 ml** of _____ **N** aq. solution of _____
& use it to find out the strength of given aq. solution of _____
given in the container No. **B** - _____ in terms of Normality , gm/lit and
Molarity.

Write the chemical reaction for the titration also. **(20 M)**

Q.3 Write the short answers in the given slip within first 10 minutes. **(5 M)**

Q.4 Certified Journal. **(5 M)**

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KACHCHH UNIVERSITY : F Y B Sc: CHEMISTRY

Reference Books:

(A) Physical Chemistry :

- (01) Physical chemistry : P.W.Atkins,
- (02) Elements of Physical Chemistry : Samuel Glasstone .
- (03) Principles of Phys. Chem : B.R.Puri, L.R.Sharma and Pathania, 41st edition.
- (04) A text book of Physical Chemistry : P L Soni , O P Dharmarha & UN Dash
- (05) Physical Chemistry : D R Pandit , A R Rao & Padke

(B) Inorganic Chemistry :

- (01) Concise Inorganic Chemistry : J.D.Lee, Chapman and Hall, 5th ed., 1996.
- (02) Basic Inorganic Chemistry : F A Cotton & G Wilkinson
- (03) Valence and Molecular Structure : Cartmell & Fowels
- (04) Atomic Structure and Chemical Bonding : Manas Chanda
- (05) Principles of Inorganic Chemistry : B R Puri, L R Sharma & K C Kalia

(C) Organic Chemistry :

- (01) Text Book of Organic Chemistry : P L Soni & H M Chawla : Sultan Chand & sons, New Delhi
 - (02) Organic Chemistry : R T Morrison and R N Boyd , 6th Ed, Prentice Hall
 - (03) A Text book of Organic Chemistry : R K Bansal , 3rd Ed, 2002, New Age International , New Delhi
 - (04) Advanced Organic Chemistry : Arun Bahl & B S Bahl, 2004
 - (05) Reaction Mechanism in Organic Chemistry : S M Mukherji & S P Singh ; S.Chand & Co. Ltd, New Dehli
 - (06) Advanced Organic Chemistry : Jerry March
 - (07) A text book of Organic Chemistry : K S Tewari , N K Vishnoi & S N Mehrotra
 - (08) Reaction mechanisms and reagents in organic Chemistry : Gurdeep Chatwal
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