P. R. GOVERNMENT COLLEGE (A) KAKINADA
(Affiliated to Adikavi Nannaya University)

DEPARTMENT OF CHEMISTRY

B. Sc Chemistry Syllabus under CBCS

BOARD OF STUDIES

2019-20

P.R.Govt. College (A), Kakinada

Recommended Composition of the Board of Studies of Chemistry

And it's Functions of an Autonomous College

April-2019-20

I Composition

1. **Head of the Department concerned (Chairman):**

   Sri T. Vara Prasad, M.Sc., M.Phil, M.Ed (Ph.D)

2. **The entire faculty of each specialization.**

   1. Sri D.Rama Rao, M.Sc., B. Ed., M.Phil.
   2. Sri V.Mallikarjuna Sarma,MSc, M.Phil,NET
   3. Dr.V.Narayana Rao M.Sc, NET, Ph.D
   4. Sri U.Sai Krishna M.Sc,NET

3. **ONE experts in the subject from outside the college to be nominated by the Academic Council**

   1.Dr. K . Jhansi Lakshmi, Lecturer in Chemistry, Ideal Degree College, Kakinada

4. **One expert to be nominated by the Vice-Chancellor from a panel of six recommended by the College Principal**

   1. Dr. K. Deepti, Adikavi Nannaya University, Rajahmundry

5. **One representative from industry/ Corporate Sector/ allied area relating to Placement.**

   1. Ch. V. N. S. Vara Prasad, Managing partner, DAS Pharma Ltd, Kakinada

6. **One postgraduate meritorious alumnus to be nominated by the Principal. The chairman, Board of Studies, may with the approval of the Principal of the College, Co-opt.**

   1. Dr.K.Raghavachari M.Sc., M.Phil, Ph.D.

II. Term.

The term of the nominated members shall be two years.

III. Meeting

The Principal of the College shall draw the schedule for meeting of the Board of Studies for different Departments. The meeting may be scheduled as and when necessary but at least once in a year.

IV. Functions

The Board of Studies of a Department in the College shall:

a) Prepare syllabus and various courses keeping in view the objectives of the College interest of the stakeholders and national requirement for consideration and approval of the Academic Council.
b) Suggest methodologies for innovative teaching and evaluation techniques.
c) Suggest panel of names to the Academic Council for appointment of examiners.
d) Coordinate research, Teaching, Extension and other academic activities in the Department/College.

Signatures of the members who attended the

Board of studies in Chemistry on 01.04.2019 at 10.00am

1.	Sri T. Vara Prasad	Chairman & Lecturer in Charge
2.	Dr. K. Deepti,	University representative Adikavi Nannaya University Rajamahendravaram
3.	Ch. V. N. S. Vara Prasad,	Managing partner, DAS Pharma Ltd, Kakinada
4.	Dr. K. Jhansi Lakshmi	Subject expert Lecturer in Chemistry, Ideal Degree College, Kakinada
5.	. Dr.K.Raghavachari	Retired Head of the Chemistry Department
6.	Sri D. Rama Rao	Member
7.	Sri V. Mallikarjuna Sarma	Member
8.	Dr.V.Narayana Rao	Member
9.	Sri U.Sai Krishna	Member
10.	Dr.D.S.V.N.M.Rama Murthy	Member
11.	Sri K.Babu Rao	Member
12.	Smt.S.Swarna Latha	Member
13.	Miss. M.S.T.B.V.Ratnam	Member
14.	Miss.G.Rama Lakshmi.	Member
15.	Mr.B.V.Siva Kumar	Member
16.	Miss.S.G.Kalyani	Member
17.	G.Sandhya	Member
18.	P.K.M.S.Devi	Member

Signatures of the members who attended the

Board of studies in Chemistry on 01.04.2019 at 10.00am

1.	Dr. T. Vara Prasad	Chairman & Lecturer in Charge 1/4/19
2.	Dr. K. Deepti,	University representative 1/4/19 Adikavi Nannaya University Rajamahendravaram
3.	Dr.Ch. V. N. S. Vara Prasad,	Managing partner DAS Pharma Ltd, Kakinada
4.	Dr. K. Jhansi Lakshmi	Subject expert Lecturer in Chemistry, Ideal Degree College, Kakinada
5.	. Dr.K.Raghavachari	Retired Head of the Chemistry Department
6.	Sri D. Rama Rao	Member
7.	Sri V. Mallikarjuna Sarma	Member
8.	Dr.V.Narayana Rao	Member
9.	Sri U.Sai Krishna	Member 01/4/19
10.	Dr.D.S.V.N.M.Rama Murthy	Member 1/4/19
11.	Sri K.Babu Rao	Member 01/4/2019
12.	Smt.S.Swarna Latha	Member 1/4/2019
13.	Miss. M.S.T.B.V.Ratnam	Member 01/04/19
14.	Miss.G.Rama Lakshmi.	Member 01/04/19
15.	Mr.B.V.Siva Kumar	Member 01/04/19.
16.	Miss.S.G.Kalyani	Member
17.	G.Sandhya	Member
18.	P.K.M.S.Devi	Member
19.	J.Aruna Kalyani (MPC EM)	Student Member
20.	Sankar Rao (MPC EM)	Student Member
21.	A.Sravani Devi (MBC)	Student Member

ACTION PLAN BOS MEETING -CHEMISTRY HELD ON 01 -04-2019.

1. Department activities for 2019-2020 academic year. Annexure I

Month	Activity proposed	Faculty member in charge
June-19	Departmental staff meeting to review results and class work allotment	T. Vara Prasad
	Preparation of curricular plans, time-tables etc.,	
	Remedial coaching classes for II & III year supplementary exams	
	Bridge classes for I year students	
July-19	Student awareness programmes on ragging& eve teasing - consequences , self-discipline, career guidance, higher education opportunities etc.,	T.Vara prasad
August-19	Conference on prospects in pharmaceutical industries	T. Vara Prasad
	Study tour / Field trips	
Sept-19	Ozone day	
Oct-19	MOLE Day	D.Ramarao
	Faculty development programme	V.Mallikarjuna sarma
Nov-19	11th National Education Day – Out reach Programme to nearby school	
Dec-19	World AIDS Day	
	Chemistry day & Chem fest	V.Mallikarjuna sarma
Jan-20	10 days coaching for PG entrance examinations in chemistry Study tour / Field trips	V.Mallikarjuna sarma
Feb-20	NATIONAL SCIENCE DAY	V.Mallikarjuna sarma
March-20	Consumer awareness day	T. Vara Prasad

2. Organizing National/ State level seminars/Workshops/ Conferences/ Training programmes etc., with topics and other details.
(Mandatory for each Department)

i) Staff development programme

ii) Training in the use of HPLC
iii) Awareness on OZONE protection
iv) National Chemistry day
v) Chem. fest
vi) National Science day 2019
vii) Guest lectures
viii) National seminar in chemistry
ix) Training in Soil analysis
x) Training in water analysis

3. **Change of modules in the syllabus content.**
   Syllabus changed for first and second years as per university regulations. CBCS introduced for final year w.e.f. 2018-19.

4. **Plan for utilization of funds for Autonomous/CPE/other grants available for arranging guest lectures, faculty improvement programmes, study tours, equipping laboratories, reference books& other necessary teaching-learning material with ICT enabled teaching.**

   I. Study visits to: Rs, 50,000

   1. Visakha Steel Plant, Visakhapatnam
   2. Hetero Laboratories, Nakkapally
   3. Dr. Reddy's Laboratories, Yanam.
   4. National Institute of Hydrololgy, Kakinada.
   5. SAR Chandra Environ Solutions, Kakinada.
   6. ONGC mini refinery, Tatipaka.
   7. Soil analysis laboratory, Samalkot.
   8. IICT,HYD
   9. Venky parenterals, Yanam

II.

1. Sophisticated version UV-Visible spectrophotometer- 5.0 lakhs
2. Other equipment 1.0 lakhs
3. Petrochemicals equipment 1.0 lakhs

5. **Plan for organizing subject oriented community outreach programmes & allocation of necessary funds. (Mandatory for each Department)**
   i) Adoption of village Rs. 20,000
   ii) Medical Awareness programmes Rs. 10,000
6. **Instituting of new medals/incentives/prizes etc., from alumni, philanthropists, parents, faculty etc., - Strategies to be recommended**

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7. **Introduction of new programmes –PG/UG/Diploma and certificate courses.**

New courses to be proposed.

S.No.	New course proposed	Justification	Employability
1	Under graduate course in Industrial chemistry	There is dearth of skilled persons to operate various instruments like uv visible spectrophotometer, Atomic absorption spectrophotometer, PH meter, flame photometer, rotavapour instrument, HPLC.GLC, distillation, etc which play as key role in any industry related to chemistry.	Technical assistants, Quality control managers, Plant supervisors etc.

8. **Any other programme that enhances the learning capacity of students and their employable & knowledge skills.**
   Training in the use of instruments like AAS, UV-Vis, HPLC, flame photometer, uranium analyzer, soil and water analysis projects, air quality projects.
9. **Change in internal assessment exams for conducting II mid Semester by way of Project work/Assignment.**
   Not possible as the number of students is more. However it is proposed to give 33.3% weitage for competitive exam questions pertaining to the syllabus prescribed.
10. **proposed panel of examiners/paper setters & other experts/nominees for BOS deliberations.**
    Chemistry:
    1. Sri N. Lakshmana Rao, SKBR College, Amalapuram.
    2. Dr. D. Madhava Sarma, GDC,Tadepalligudem
    3. Dr. V. Sambasiva Rao, Govt.Arts College, Rajahmundry.
    4. Dr. K. A.R.S.S.Prasad, VS Krishna College, Visakhapatnam.
    5. Sri S.V. Ramana , Arts College, Rajahmundry
    6. Sri Machi Raju, Arts College, RajahmundrY
    7. Smt. C. Jyoti, St.Therisa college,Eluru.
    8. P. Krishna kumar,S.K.B.R.College,Amalapuram.
    9. Dr. G. Venkatarao,GDC,Vijayavada
    10. Shri B.Venkatarao, GDC,Tadepalligudem
    11. Dr.Ramchadarao,Y.N.College,Narasapuram

P.R.GOVT.COLLEGE (A),KAKINADA

DEPARTMENT OF CHEMISTRY,

Minutes of board of studies(BOS) meeting 2019-20 on 01-04-2019 at 10.30am

Resolutions:

The board of studies meeting chemistry department on 01-04-19 at 10.30 am in the guest room of the college under the chairmanship of Dr. T.Vara Prasad ,in charge of the department The principal Dr. Chappidi Krishna, Dr.K.Deepthi, University Nominee., Dr.K.Jhansi Lakshimi, Head in Chemistry, Ideal College, Kakinada., all members of the faculty of chemistry and student representatives attanded the meeting. agenda items are discussed and resolutions are made.

1. It is resolved to cotinue choice based credit system in the chemistry combination programmes as per the directions of the CCE, Hydreabad to the first year and second year and second year and final year students w.e.f. 2017-2018.

2. Resolved to follow 60%-40% extenrnal and internal w.e.f. 2017-2018 admitted batch and it continued in second and third year.

3. It is resolved to allot 50 marks project work for final year students in chemistry preferably in cluster paper C_3 practicals.w.e.f 2019-20 accordance with APSCHE.

4. in the first year admitted batch w.e.f 2019-20 multiple choice questions and question bank prepared in the first year students only.

i) Mid examination –I follows online

ii)Mid examination –II follows offline

5. It is resolved to conduct departmental activities such as OZONE DAY, CHEM. FEST , CHEMISTRY DAY and SCIENCE DAY.

6. It Is Resolved to offer Subject Electives and clusters in the V and Vi Semester Respectively as per the guidelines of AKNU we adopted the folling syllabus

Elective paper -1

Cluster VIII C papers - 3 (C_1, C_2, C_3)

7. It is resolved to implement the recommended padagogy for the first semester 2018-2019

8. Resolved to conduct practical examinations semester wise.

9. It is resolved to organize guest lectures by eminent professors.

10. Resolved to implement pass minimum for internal assessment for CBSE pattern students as the pattern is learner oriented.

11. It is resolved syllabus change for I , II, III elective, clusters as per the AKNU lines.

12. CBCS introduced for final years w.e.f. 2016-2017.

13. Introduced cluster system for final year w.e.f 2017-2018.

14. cluster theory paper C_3 introduced w.e.f 2019-20 in the place of project 150 marks.

15. project 50 marks in the place of cluster theory paper practicals w.e.f 2019-20

16. followed ratio 60:40 and it continued in third year.

17.it is resolved that B.Voc Pharmaceutical Chemistry course is restructured in B.Sc professional (Pharmaceutical chemistry) w.e.f 201-20. The proposal is put followed to academic council and general body meeting.

18. It is advised to allocate only 50 marks for project in VI semester(cluster VIII-C_3)

19.It is resolved to maintain status quo for same question paper pattern in I, II, III years.

The Following Paper Setter Are Recommended.

1). Dr. V. Sambasiva Rao, Govt,Arts College, Rajahmundry.

2). Dr.K.A.R.S.S. Prasad, VS Krishna College,Visakhapatnam.

3). Sri S.V. Ramana, Arts College, Rajahmundry.

4). Sri Machi Raju, Arts College, Rajahmundry.

5). Sri U. Satyanarayana , GDC, Tuni.

6). Sri R. Brahmaji, GDC, Ramachandrapuram.

7). Sri N.V. Sudhakar, GDC, Tuni.

New Courses

20. It is resolved to explore the possibility of introducing a new course in bsc analytical chemistry ,maths,chemistry as per the Govt./CCE order w.e.f 2018-2019.

21. Resolved to submit proposals to conduct a faculty development programme in instrumentation techiniques/ advanced topics with the assistance of the industry representatives and university representatives.

22. Resolved to assist the orphan children of below two years age being taken by department of women and child welfare as an extension activity with the funds contributed by the faculty members of the department.

23.resolved to change the syllabus components in semester **I** to Semester **II** and vice versa. Sly semester **III** to **IV** and vice versa on par with the affiliating university.

24. it is proposed to give 33.3% weitage competitive exam questions pertaining to the syllabus prescribed

25. Resolved to reduce the intake of Bsc MPC TM students from 60 to 30 w.e.f from 2019-20.

26. Resolved to increase the intake of Bsc MPC EM students from 30 to 60 w.e.f. from 2019-20.

27. Resolved to take girls students also for admissions into Bsc MCPc w.e.f. from 2019-20.

Special Features of Chemistry Department

1. In the cluster system 85 students opted chemistry projects and they submitted projects to our college under the guideance of eminemt lecturers.

2.NAAC team visited our college chemistry department on 08-09-2017 and chairman commented **"chemistry department is very good"** in always.

3. CCB academic team visited our chemistry department on 21-03-2018 and team head was commented as **“ chemistry department is excellent”** always.

Modern Lecture Methods & New Techniquis

4.Power Point Presentation / LCD Teaching.

5.Virtual Class Teaching Methods.

6.Feedback on Teching Performance.

P.R.GOVERNMENT COLLEGE(A), KAKINADA

B.Sc. Chemistry Syllabus under CBCS

Structure of Chemistry Syllabus Under CBCS

YEAR	SEMESTER	PAPER	TITLE	MARKS	CREDITS
I	I	I	Inorganic and Organic Chemistry	100	03
			Practical – I	50	02
	II	II	Physical and General Chemistry	100	03
			Practical – II	50	02
II	III	III	Inorganic and organic Chemistry	100	03
			Practical – III	50	02
	IV	IV	Spectroscopy and Physical Chemistry	100	03
			Practical – IV	50	02
III	V	V	Inorganic ,Organic and Physical Chemistry	100	03
			Practical – V	50	02
		VI	Inorganic ,Organic and Physical Chemistry	100	03
			Practical – VI	50	02
	* Any one Paper from VII A, B and C ** Any one cluster from VIII, A, B and C VI	VII (A)*	Elective	100	03
			Practical - VII A	50	02
		VII (B)*	Elective	100	03
			Practical - VII B	50	02
		VII (C)*	Elective	100	03
			Practical - VII C	50	02
		VIII (A)**	**Cluster Electives - I :**		
			VIII-A-1	100	03
			VIII-A-2	100	03
			VIII-A-3	100	03
			Practica l	50	02
			Practica l	50	02
			Project	50	02
		VIII (B)**	**Cluster Electives - II ::**		
			VIII-B-1	100	03
			VIII- B-2	100	03
			VIII-B-3	100	03
			Practica l	50	02
			Practica l	50	02
			Project	50	02
		VIII (C)**	**Cluster Electives - III ::**		
			VIII-C-1	100	03
			VIII-C-2	100	03
			VIII-C-3	100	03
			Practica l	50	02
			Practica l	50	02
			Project	50	02

OBJECTIVES

- **Objectives**
  The students can obtain the knowledge in the following topics and come to know how chemistry is essential in daily life.

1. Preparation, properties and applications of some special compounds of s and p block elements.
2. Structural theory of Organic compounds.
3. Preparation, properties and applications of alkenes, alkynes and cycloalkanes.
4. Benzene structure and its reactivity.
5. Identification of some cations and anions in the unknown salt.

- **By the end of II semester, each and every I degree chemistry student can obtain the knowledge in the following topics and come to know how chemistry is essential in daily life.**

1. Features involved in gaseous state, liquid state and solid state and their applications.
2. Importance of colloids and adsorption.
3. Chemical bonding between molecules through M.O. theory.
4. Identification of some cations and anions in the unknown mixture.
5. Basic knowledge and Importance of of Stereochemistry.

- **By the end of III semester, each and every II degree chemistry student can attain the knowledge in the following topicss and come to know their role in serving the society through chemistry.**

1. Properties of d and f block elements.
2. Boding nature of the metals.
3. Preparation, properties and applications of halogen compounds, hydroxyl compounds, carbonyl Compounds and carboxylic acids.
4. Importance and synthetic applications of active methylene compounds.
5. Estimation of Fe (II) and Cu (II) in the unknown material through practical.
6. Reactions of some functional groups like phenols, carboxylic acids, aldehydes, ketones, amines and Amides.

- **By the end of IV semester, each and every II degree chemistry student can attain the knowledge in the following topicss and come to know their role in serving the society through chemistry.**

1. Different types of Electronic transitions present in Organic molecules..
2. Identification of Functional groups using IR spectrum.
3. Analysis of Cr and Mn using spectrophotometer.
4. Structural identifications of organic compounds using H^1-NMR
5. Different aspects of electrochemistry.
6. Identification of functional group present in the given organic compound by IR spectral analysis.
7. Importance of conductometric techniques by doing strength of acids and bases.

- **By the end of V semester, each and every III degree chemistry student can obtain the knowledge in the following topics and come to know how to serve the society by becoming a chemist.**

1. Involved theories and properties of coordination compounds.
2. Preparation and properties of nitrogen compounds.
3. Importance, preparations, properties and medicinal uses of heterocyclic compounds.
4. Structural elucidation of glucose and fructose.
5. Importance of Amino acids and Proteins.
5. Determination of Rate of the reactions through chemical kinetics.
6. Some photochemical reactions photophysical processes.
7. Importance of thermodynamical aspects.
8. Identification of functional group present in the given organic compound by following organic qualitative analysis.
9. Determination of surface tension and viscosity of some liquids.

- **By the end of VI semester, each and every III degree chemistry student can get the knowledge in the following topics depending on their choice/interest and come to know how to serve the society by becoming a chemist.**

1. Various types of instrumental techniques like IR and NMR spectroscopies.
2. Different aspects of Environmental Chemistry.
3. Importance of green chemistry.
4. Analyses of drugs, dairy products
6. Importance of petrochemicals.
7. Preparation of some organic compounds.
8. Synthesis of organic compounds using green synthesis.

9. Hands on experience in operating colorimeters, pH meters and potentiometers.

10. Submission of a project work.

OUT COMES

After completion of B.Sc. course the students will be able to:

1. Acquire comprehensive knowledge in physical inorganic and organic chemistry.
2. Acquire experimental skills in chemical analysis.
3. Apply their knowledge and understanding in new situations.
4. Have industrial exposure by visiting near by industry plants.
5. Achieve good ranks in PG entrance examinations.
6. Acquire employable skills and become industry ready persons.
7. Get motivation for research by carrying out projects.
8. Gain leader ship quality by participation in extension programmes and group projects etc.

OBJECTIVES:

1. Understands heterogeneous equilibria and the application of phase rule

2. Gains knowledge of principles of electrolysis and galvanic cells.

3. Understands the application of colligative properties in the determination of molecular weight.

4. Understands the application of spectrophotometry and spectroscopic interpretations.

SPECTROSCOPY 6 hrs

UNIT-I

General features of absorption-Beer-Lambert's law and its limitations. Transmittance, Absorbance and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert's law for quantitative analysis of (i)Chromium in $K_2Cr_2O_7$ (ii)Manganese in $MnSO_4$

Electronic Spectroscopy: 8 hrs

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals (σ,π,n). Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore and auxochrome

UNIT-II

Infra red spectroscopy: 8 hrs

Different regions in infra red radiations. Modes of vibrations in diatomic and poly atomic molecules. Characterisitic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic alcohols, carbonyls and amines with one example to each

Proton magnetic resonance spectroscopy (^{1}H-NMR) : 8 hrs

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals, spin-spin coupling, coupling constants. Applications of NMR with suitable examples-ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone

PHYSICAL CHEMISTRY 30hrs(2hrs/week)

UNIT-III

Dilute Solutions: 10 hrs

Colligative properties, Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties-Vant Hoff's factor

UNIT-IV

Electrochemistry-I 10 hrs

Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law. Debye-Huckel-Onsagar's equation for strong electrolytes(elementary treatment only). Definition of transport number, determination by Hittorfs method. Application of conductivity measurements – conductometric titrations.

UNIT-V

1.Electro chemistry-II 4 hrs

Single electrode potential, sign convention, Reversible and irreversible cells, Nernst equation. Reference electrode, Standard Hydrogen electrode, Calomel electrode, Indicator electrode, metal-metal ion electrode, Inert electrode, Determination of EMF of cell, Applications of EMF measurements-Potentiometric titrations.

2.Phase rule 6 hrs

Concept of phase, components, degrees of freedom. Thermodynamic Derivation of Gibbs phase rule. Phase equilibrium of one component system-water system. Phase equilibrium of two component system. Solid-liquid equilibrium. Simple eutectic diagram of Pb-Ag system, simple eutectic diagram, desilverisation of lead, NaCl-water system, Freezing mixtures.

List of Reference Books

1.Spectroscopy by William Kemp
2.Spectroscopy by Pavia
3.Organic Spectroscopy by J.R.Dyer
4.Modern Electrochemistry by J.O.M.Bockris and A.K.N.Reddy
5.Advanced Physical Chemistry by Atkins
6.Introduction to Electrochemistry by S.Glasstone
7.Elementary Organic spectroscopy by Y.R.Sharma
8.Spectroscopy by P.S.Kalsi

IV – SEMESTER CHEMISTRY Paper-II

Weightage to content

S.No	Course content	Essay	Short questions	Total no.of questions	Total No. of Marks allotted to each Unit
	SPECTROSCOPY				
1	UNIT-I	2	2	4	30
2	UNIT-II	2	2	4	30
	PHYSICAL CHEMISTRY				
3	UNIT-III	1	1	2	15
4	UNIT-IV	1	1	2	15
5	UNIT-V	2	2	4	30
	TOTAL	**8**	**8**	**16**	**120**

LABORATORY COURSE-IV

Practical Paper-IV Physical Chemistry and IR Spectral Analysis

(At the end of semester IV)

30 hrs (2hrs/w)

Physical Chemistry **25 marks**

1.Critical Solution Temperature : Phenol-Water system

2.Effect of NaCl on critical solution temperature in Phenol-water system

3.Determination of concentration of HCl conductometrically using standard NaOH solution.

4.Determination of concentration of acetic acid conductometrically using standard NaOH Solution.

5. Determination of Fe(II) by Potentiometric titration using $K_2Cr_2O_7$

IR Spectral Analysis **10 marks**

5.IR Spectral Analysis of the following functional groups with examples

a)Hydroxyl groups

b)Carbonyl groups

c)Amino groups

d)Aromatic groups

SCHEME OF VALUATION FOR SEMESTER-IV CHEMISTRY LABORATORY COURSE PHYSICAL CHEMISTRY & IR SPECTRAL ANALYSIS

Max.Marks:50 **Time:3hrs**

For Record - 10 marks
For Viva-voce - 5 marks
For Practical - 35 marks

Splitting of Practical Marks for Physical Chemistry :

i) Procedure in first five minutes : 5 marks
ii) Tabulation of the readings : 5 marks
iii) Calculation : 5 marks
iv) For result : 10 marks

Error <10% : 10 marks
Error 10-15%: 8 marks
Error >20% : 5 marks(minimum marks)

Splitting of Practical Marks for IR spectral analysis:

Identification of the frequencies of the bonds present in the IR spectrum of an organic compound : 10 marks

SEMESTER-IV Chemistry model question paper 2019-20

SPECTROSCOPY & PHYSICAL CHEMISTRY

(Revised Question paper w.e.f.2018-19)

Time:2½ hrs Marks:60

Answer **two** questions from SECTION-A, **two** questions from SECTION-B . Each question carries 10 marks.

SECTION-A (Spectroscopy) 2X10=20M

1. What is Spectrophotometry and Spectrophotometer? Explain various types of spectrophotometers.

2. i)Explain the selection rules for electronic spectra.

(ii)What are Electronic Transitions? Explain various types of Electronic transitions.

3. Explain the interpretation of IR spectra with any five examples.

4. Explain the principle of NMR spectroscopy?Explain their examples to the following molecules i)1,1,2,-tri bromo ethane ii)Toulene iii)Acetophenone

Section –B (Physical chemistry) 2X10=20M

5. What are the colligative properties ? and determine the elevation of boiling point by Cottrel's method.

6. State the main postulates of Debye-Huckel theory of strong electrolytes. Explain 'relaxation effect' and 'electrophoretic effect' from it. Write Debye-Huckel-Onsager equation.

7. i)Explain about Hydrogen electrode and Calomel electrode.

(ii)Write the principles and uses of Potentiometric titrations

8. Describe Pb-Ag system, with the help of phase diagram.

SECTION-C 4X5=20M

Answer any **four** questions. Each question carries 5 marks.

9. Explain the following (i)Transmittance and (ii)Absorbance

10. Explain (i)chromophore and (ii)Auxochrome

11. Explain absorption bands of various functional groups.

12. What is Chemical Shift? How it is calculated?

13. Define Van't Hoff factor. Explain Van't Hoff theory of dilute solutions.

14. Define specific conductance and equivalent conductance. And Explain variation of equivalent conductance with dilution.

15. Explain about Reversible and irreversible cells.

16. What is congruent and incongruent melting point-Give one example each?

Semester-IV

SPECTROSCOPY & PHYSICAL CHEMISTRY

Question bank

SPECTRO PHOTOMETRY & ELECTRONIC SPECTRO SCOPY

1.What is Spectrophotometry and Spectrophotometer?
Explain various types of spectrophotometers?

2. Explain Lambert's law and Lambert's – Beers law.

3. Explain a) Transmittance b) Absorbance c) Molar Absorptivity

4. Explain application of Lambert-Beer's law for quantitative analysis of Chromium in $K_2Cr_2O_7$ and Manganese in $MnSO_4$

5. Explain interaction of electromagnetic radiation with molecules.

6. Explain various types of molecular spectra.

7. Explain Energy levels of molecular orbitals

8. Explain the selection rules for electronic spectra.

9.What are Electronic Transitions ? Explain various types of Electronic transitions.

10.Explain a) Chromophore b) Auxochrome.

INFRA RED SPECTROSCOPY & PROTON MAGNETIC RESONANCE SPECTROSCOPY

1. Explain important spectral regions in infrared spectrum.

2. Explain about modes of vibrations in polyatomic molecules.

3. Characteristic absorption bands of various functional groups.

4. Explain interpretation of IR Spectra with example.

5. Explain the principle of NMR spectroscopy.

6. What are equivalent protons and Non-equivalent protons.

7. Explain about position of signals.

8. What is splitting of signals (or) Explain spin-spin Coupling.

9. What is Chemical shift? How it is calculated ?

10. Explain applications of NMR with examples.

11. What is coupling constant?

Dilute Solutions

1. State &derive Roult's law for the relative lowering of vapour pressure?

2.How will you determine the RLVP of a liquid by Ostwald- walker's process?
3.What is meant by Osmosis and Osmotic pressure. Describe any one method of determining the osmotic pressure of a dilute solution.

4.Define Elevation of Boiling point. Derive the relation between molecularweight of solute and Elevation of boiling point.

5.Define Depression in freezing point. Derive the relation between molecular weight of solute and Depression in freezing point.

6.Write the experimental determination methods for Elevation of Boiling point and Depression in freezing point.

7.Define Van't Hoff theory of dilute solutions.

8.Derive the relation between molecular weight of solute and osmotic pressure.

Electro chemistry-1

1.Define specific conductance and equivalent conductance. Explain variation of equivalent conductance with dilution.

2.Define transport number. Explain Hittorf's method for the determination of Transport numbers.

3.State and explain Kohlrausch's law of independent migration of ions.

4.Explain the Debye-Huckel-Onsager equation fro strong electrolytes.

5.Explain about Conductometric titrations.

6.Explain about Migration of ions.

7.Explain Ostwald's dilution law.

8.Write Arrhenius theory of electrolytes and it's importance.

Electro Chemistry – II

1.State and explain Nernest equation.

2.Explain about Hydrogen electrode and Calomel electrode.

3.Write the principles and applications of potetiometric titrations.

4.What is meant by Single electrode potential? How it is determined.

5.Explain about sign conventions?

6.Explain about reversible and irreversible cells.

7.Write the applications of e.m.f measurements?

Phase Rule

1.State Phase rule and explain the terms in it.

2.Explain the phase diagram of water system,

3.Explain the phase diagram of Pb-Ag system

4.Explain the phase diagram of NaCl-Water system.

5.Write notes on freezing mixtures.

6.Define phase ,component, degrees of free dom.

7.Derive gibbs phase rule.