PITHAPUR RAJAH'S GOVERNMENT COLLEGE

An Outcome Based Autonomous Institution Accredited with NAAC Grade "A" (3.17 CGPA)

Affiliated to Adikavi Nannaya University Rajamahendravaram

KAKINADA - 533 001, AP.

BOARD OF STUDIES OF CHEMISTRY

B.Sc. Hons. ANALYTICAL CHEMISTRY MAJORS

UNDER CBCS

Meeting Minutes/ Resolutions

***Convened on 30 April 2024*AY 2024- 25**

DEPARTMENT OF CHEMISTRY

PITHAPUR RAJAH'S GOVERNMENTCOLLEGE (AUTONOMOUS)

Opp. Mc. Laurin High School, Raja Ram Mohan Roy Road, Kakinada

www.prgc.edu.in; e-mail: chemistry@prgc.edu.in

PROCEEDINGS OF THE PRINCIPAL,

P.R. GOVERNMENT COLLEGE (A)KAKINADA- A.P

Present: Dr. B. V. Tirupanyam, M. Sc;

Ph.D.R.C.No.2/A.C./BOS/2024-25,

Dated: 23.04.2024

SUB: P.R. Government College (A), Kakinada-UG Board of Studies (BOS)- B.Sc-Analytical Chemistry-Nomination of Members-Orders issued.

REF: 1. UGC Guidelines for Autonomous Colleges-2018.

ORDERS:

The Principal, P.R. Government College (A), Kakinada is pleased to constitute UG Boards of Studies in CHEMISTRY for framing the syllabi in respective Subject for all Semesters duly following the norms of the UGC Autonomous guidelines.

S. No	Name of the Person	Designation
1	V. Sanjeeva Kumar	Chairman & Lecturer In charge
2	Dr. K. Jhansi Lakshmi ASD Govt. Degree College for Women (Autonomous)Kakinada	University Nominee
3	Dr. D. Chenna Rao Lecturer in Chemistry, Govt. Degree College, Yeleswaram	Subject Expert -I
4	U. Sai Krishna Lecturer in Chemistry, Govt. College, (Autonomous)Rajamahendravaram	Subject Expert - II
5	Dr. N. Ratnakar, AARKISH PHARMACEUTICALS INS NJ,NEW JERSEY	Subject Expert - III
6	Dr. P. KARUNA RAMAN MD, IDEAL ORGANICSHYDERABAD.	Representative from Industry
7	T. V. V. Satyanarayana	Member
8	P. Vijay Kumar	Member
9	V. Ram babu	Member
10	G. Pavani	Member
11	Dr. N. Bujji Babu	Member
12	Dr. Ch. Praveen	Member
13	V. Venkateswara Rao	Member
14	U.S.N. Prasad	Member
15	K.N.S. Swami	Member
16	S. Vijaya Lakshmi	Member
17	D.Bhavyasri	Member
18	K.Umamaheswari	Student Alumni Member
19	Deepthi Anusha II FBC	Student Member
20	BVNagendra Kumar, II MCCS	Student Member
21	J.Veera Durga I CHEMISTRY MAJORS	Student Member

The above members are requested to attend the BoS meeting on 30-04-2024 and share their valuablereviews, and suggestions on the following functionaries.

- Prepare syllabi for the subject keeping in view the objectives of the college, the interest of the stakeholders and National requirements for consideration and approval of the IQAC and Academic Council.
- Suggest the panel of Paper Setters & Examiners to the academic council for appointment of Paper Setters& Examiners.
- Suggested methodologies for innovative teaching and evaluation techniques.
- Coordinate research, teaching, extension and other activities in the Department of the college.

PRINCIPAL
P. R. Government College(A),
Kakinada

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A)
DEPARTMENT OF CHEMISTRY

Meeting of Board of Studies in Analytical Chemistry is convened on 30 April 2024 through offline/ onlineat P.R. Govt. College (A), Kakinada, at 10.00 AM.

Venue: JKC AC HALLS, Dt: 30-04-2024, Tuesday – 10.00 A.M.

The Principal Dr. B.V. Tirupanyam; Chairman V. Sanjeeva Kumar; University Nominee Dr. K. JhansiLakshmi, Lecturer in Chemistry, ASD Govt. Degree College for Women (Autonomous), Kakinada; Dr. P. KARUNA RAMAN MD, IDEAL ORGANICS HYDERABAD. Industrialist: Subject Experts Dr. D. Chenna Rao, Lecturer in Chemistry, Govt. Degree College, Yeleswaram and U. Sai Krishna Lecturer in Chemistry, Govt. College, (Autonomous), Rajamahendravaram all the faculty members of the Chemistry Department and student alumni attended the meeting.

Agenda:

1. To discuss the I,II,III, IV semesters of a Single major system as B.Sc. Chemistry (Hons), B.Sc. Organic Chemistry (Hons), B.Sc. Analytical Chemistry (Hons) from the academic year 2024-25. &V ,VI semesters of CBCS System
2. To discuss the Semester System and revised Choice Based Credit System (CBCS)being implemented for the past 04 years, i.e., i.e. 2020-21.
3. To discuss and approve the Continuation/Modifications of the syllabus for the Odd& Even Semesters of I, II Years for 2024-25.
4. Grant of Extra credits for Online SWAYAM MOOCs, edX, Coursera etc.
5. Syllabus, Model Question Papers and Model Blue Prints, Cos, POs, & PSOs mapping for I, II, III and IV Semesters.
6. Teaching-learning methodology by 50:50 (External: Internal) ratio I& II Year Students commenced w.e.f. 2021-22.
7. Minimum attendance of 75% for both I mid-term examination, and II mid- term examinationunder CIA component shall be the benchmark for attendance and it shall be approved in theBOS.
8. Minimum of 50% integration of ICT into a transaction of curriculum.
9. Remedial coaching and assignments for slow learners, project works, research, Conferences, Industrial /academic tours & PG Entrance Coaching etc., for advanced learners.
10. Panel of paper setters and examiners.
11. Implementation of compulsory Community Service Project (CSP)/ Internships/ Apprenticeship and Extension activities for the benefit of the society.
12. Department action plan for 2024-25.
13. To discuss and resolve the minor modifications/refinement if any, in the I, II, III and IV, Semester.
14. Any Other Proposal with the permission of the Chairman.
15. Proposal to start new UG honors course i.e., BSc., Pharmaceutical Chemistry for the AY 2024-25.

Resolutions:

1. It is resolved to Approve the syllabus after certain additions and deletions were made during the

BOS meeting in the existing syllabus for I,II,III, IV semesters of a Single major system as B.Sc. Chemistry (Hons), B.Sc. Organic Chemistry (Hons), B.Sc. Analytical Chemistry (Hons) from the academic year 2024-25. &V ,VI semesters of CBCS System.

2. It is resolved to approve the syllabus as per the recommendations of the BOS for the Semester System and revised Choice Based Credit System (CBCS)beingimplemented for the past 04 years, i.e., i.e. 2020-21.
3. It is resolved to approve the Continuation/Modifications of the syllabus for the Odd& Even Semesters of I, II Years for 2024-25. As per the recommendations of the BOS.
4. IIt is resolved to approve the Extra credits for Online SWAYAM MOOCs, edX, Coursera etc. which is as per the guidelines of Autonomous examination Cell.
5. It is resolved to approve Syllabus, Model Question Papers and Model Blue Prints, Cos, POs, & PSOs mapping for I, II,III and IV Semesters. With respect to the discussions held in the BOS.
6. It is resolved to approve the teaching learning methodology by 50:50 (External: Internal) ratio I, II & Year Students commenced w.e.f. 2021-22.
7. It is resolved to implement the Minimum attendance of 75% for both I mid-term examination and II mid- term examination under CIA component shall be the benchmark for attendance.
8. It is resolved to approve Minimum of 50% integration of ICT in transaction of curriculum.
9. It is resolved to implement Remedial coaching and assignments for slow learners, project works, research works, Conferences, Industrial /academic tours & PG Entrance Coaching etc., for advancedlearners.
10. It is resolved to propose Panel of paper setters and examiners for the academic year 2024-25.
11. It is resolved that the mandatory Community Service Project (CSP)/ Internships/ Apprenticeship and Extension activities are mandatory for overall growth of the student and benefit to the society.
12. It is resolved to approve Department action plan for the AY 2024-25.
13. It is resolved to approve the minor modifications/refinement if any, in the I, II, III and IV Semester.
14. It is resolved to send proposal to start new UG honors course i.e., B.Sc., Pharmaceutical Chemistry for the AY 2024-25.
15. It is resolved to send proposal to start diploma course in as per the NEP-2020 norms for the academic year 2024-25.

DEPARTMENT OF CHEMISTRY

ACTION PLAN

ACADEMIC YEAR 2024-2025

S.No	Month	Activity planned
1	July 2024	Enrollment of 3 months MOOCS/SWAYAM/NPTL/Edex etc by staff
2	July 2024	Placement Drive through JKC
3	August 2024	Invited talk
4	August 2024	Study tour
5	August 2024	Certificate/ Diploma course
6	September 2024	National seminar/ online/offline
7	September 2024	Sep 16 Ozone Day
8	October 2024	Certificate course/Diploma course
9	November 2024	Invited talk
10	December 2024	Enrollment of 3 months MOOCS/SWAYAM/NPTL/Edex etc by students
11	December 2024	International webinar
12	December 2024	10 December National Chemistry Day
13	January 2025	Invited talk
14	January 2025	Career Guidance
15	February 2025	Community outreach program (In connection with the National Science Day)
16	March 2025	Review of Research Publications for 24-25

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A)

KAKINADA

IMPORTNANT DAYS OF OBSERVATION FOR AY 2024-25

MONTH	DATE	NAME OF DAY	DEPARTMENT/STUDENT SUPPORTING WING
JANUARY	26th	Republic Day	All Departments and student supporting wings
FEBRUARY	28th	National Science Day	All Science departments
MARCH	22nd	World Water Day	Chemistry
JUNE	5th	World Environment Day	All Science departments
JULY	11th	World Population Day	All Arts depts.
	28th	World Nature Conservation Day	Life sciences
AUGUST	15th	Independence Day	All Departments and student supporting wings
SEPTEMBER	16th	World Ozone Day	Chemistry
	21st	International Day of Peace	History
	23rd	Mole Day	Chemistry
NOVEMBER	11th	National Education Day	

Signature of the members who attended the board of studies in B.sc Honors Chemistry and B.sc Three major system chemistry on 30th April 2024 at 10 a.m. Mode of conduct of meeting offline / online

SL.NO	NAME	SIGNATURE	CONTACT NO.
1	V. Sanjeeva Kumar	V. S.	9849324988
2	Dr. K. Jhansi Lakshmi	K. Jhansi Lakshmi	9441256409
3	Dr. P. KARUNA RAMAN MD, IDEAL ORGANICS, HYDERABAD.	Dr.P.Karuna Raman	9398249493
4	Dr. D. Chenna Rao		9560740108
5	U. Sai Krishna	U. Sai Krishna	9347334707
6	T. V. V. Satyanarayana	T. V. V. Satya	9490876913
7	P. Vijay Kumar	Pvijay	9652023082
8	V. Ram babu		9948485537
9	G. Pavani		9912526493
10	Dr. N. Bujji Babu		9441394792
11	Dr. Ch. Praveen	praveen	9491185518
12	V. Venkateswara Rao	V. Venkateswara Rao	9885165588
13	U.S.N. Prasad	USNP	6300882584
14	K.N.S. Swamy	KNSSwamy	9908900962
15	S. Vijaya Lakshmi	S. Vijaya Lakshmi	9133941966
16	D.Bhavyasri	D. Bhavyasri	
17	Ch. Veni	Ch Veni	
18	Deepthi Anusha II FBC	P. Deepthi Anusha	7382468859
19	Syamala, II MCCS	A. Syamala	6300192780
20			

B. SC ANALYTICAL CHEMISTRY MAJOR COURSE STRUCTURE

SEMESTER-III ACADEMIC YEAR 2024-25

YEAR	SEMESTER	PAPER	TITLE	MARKS	CREDITS
II	**III**	**V**	Quantitative Methods of Analysis	**50**	**3**
			Practical-V	**50**	**1**
		VI	Separation Methods – I	**50**	**3**
			Practical-VI	**50**	**1**
		VII	Physical Chemistry-I	**50**	**3**
			Practical-VII	**50**	**1**
		VIII	General Chemistry and Inorganic Chemistry	**50**	**3**
			Practical-VIII	**50**	**1**

SEMESTER-II
ANALYTICAL CHEMISTRY
MAJOR

	Pithapur Rajah's Government College(A), Kakinada	Program & Semester I B.Sc. ANALYTICAL CHEMISTRY (SEMESTER – II)			
Course Code CHE-3	TITLE OF THE COURSE Course -3: **BASIC PRINCIPLES IN ANALYTICAL CHEMISTRY**				
Teaching	Hours Allocated: 45 (**Theory**) (3 hrs. / Wk.)	L	T	P	C
Pre-requisites:	Basic knowledge about material and energy balances	3	-	2	3

Course Objectives:

1. To provide basic knowledge about Chemical concentrations and standard solutions
2. To provide basic awareness on Chemical analysis
3. To understand and proper handling of common laboratory glass apparatus
4. To provide knowledge and applications of errors in chemical analysis

Course Outcomes:

On Completion of the course, the students will be able to-		Cognitive Domain
CO1	Understand chemical concentrations and get skill to prepare different standard solutions	Skill
CO2	Understand about chemical analysis and identify suitable chemical methods to analyze different samples.	Application
CO3	Handle different types of common laboratory glass apparatus used in chemical analysis	Understand
CO4	Get awareness on errors in chemical analysis and get capability to calculate them	Application

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT-I: **9 Hrs.**

A. SI Units:

1. Definitions of the Seven Base Units: Mass, Length, Time, Temperature, Amount Of substance, Electrical current and luminous intensity
2. Derived units and Conversion between units.

B. CHEMICAL CONCENTRATIONS:

1. Mole, molar mass; Calculations in grams and moles;
2. Solutions and their concentrations:
   i. Molar concentrations;
   ii. Analytical Molarity;
   iii. Equilibrium molarity of a particular species;
   iv. Percent concentration;
   v. Parts per million/ billion (ppm, ppb);
   vi. Volume ratios for dilution procedures;
   vii. p-functions;

C. Preparation of standard Solutions and Experimental procedure:

Standard solutions, Primary standard solutions and Secondary Standard solutions

UNIT-II: **9 Hrs.**

INTRODUCTION TO ANALYTICAL CHEMISTRY AND ANALYTICALMETHODS – I:

1. Introduction to Chemical analysis
2. General steps involved in chemical analysis
3. Quantitative Chemical analysis
4. Types of Quantitative Chemical Analysis: Classical methods of analysis and Instrumental methods of analysis with examples
5. Methods of detecting analytes based on,
   a. Physical properties,
   b. Electromagnetic radiations
   c. Electric charge

UNIT-III: **9 Hrs.**

INTRODUCTION TO ANALYTICAL CHEMISTRY ANDANALYTICAL METHODS – II:

1. Description, use and calibration of common laboratory apparatus: Volumetric flask, Burettes and Pipettes
2. Description and use of common laboratory apparatus Conical Flask, Weighing bottles, Funnels, Desiccators, Drying ovens
3. pH meter - components, use, maintenance, applications
4. Single pan analytical balance - operation and construction, Errors in weighing and care of an analytical balance.

UNIT-IV: **9 Hrs.**

ERRORS IN CHEMICAL ANALYSIS:

1. Errors and Types of Errors
2. Accuracy and Precision
3. Propagation of uncertainty: Gaussian distribution
4. Mean and Standard deviation;
5. Statistical tests of data: F-test, t-test, Q-test for bad data
6. Calibration curve;
7. Significant figures and their computation rules
8. Laboratory note book
9. Safety with chemicals and Wastes.

UNIT – V:

VOLUMETRICANALYSIS: **9Hours**

1. Titrimetric analysis: Volumetric titrimetry introduction
2. Different terms involved in titrimetric analysis: Titrant, Titrand, The equivalence point, the end point and Indicator.
3. Classification and principles of volumetric methods with examples:
    i. Acid-Base titrations,
    ii. Redox Titrations
    iii. Complexometric Titrations
    iv. Precipitation Titrations.
4. Indicator; Definition, theories of indicators, different types of indicators
5. Buffer Solutions

Text Books:

1. Douglas A. Skoog and Donald M.West: Fundamentals of Analytical Chemistry.
2. Quantitative chemical analysis by Vogel's 6^{th} and 7^{th} editions

List of Reference Books:

1. Seamus P.J. Higson: Analytical Chemistry.
2. Douglas A. Skoog and Donald M.West: Fundamentals of Analytical Chemistry.
3. Adion A. Gordus: Schaum's Outline of Analytical Chemistry, Tata McGraw-Hill.
4. GaryD.Christian: Analytical Chemistry.
5. Freifelder and Kealy: Analytical Chemistry.
6. Daniel C Harris: Exploring Chemical Analysis.
7. Daniel C Harris: Quantitative Chemical Analysis.
8. Quantitative chemical analysis by Vogel's 6^{th} and 7^{th} editions

CO-PO Mapping:

(1: Slight[Low]; 2: Moderate[Medium]; 3: Substantial[High], '-': No Correlation)

	PO 1	PO 2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	2	2	3	3	2	2	3	3	3
CO2	2	3	3	3	3	2	1	2	2	3	2	2	3
CO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO4	2	1	2	1	3	2	3	1	2	3	2	3	2
Avg.	2.5	2.25	2.75	2.0	2.5	1.75	2.0	2.0	2.25	2.25	2.25	2.75	2.75

Weightage to Content

Course-3

S. No	Course Content	Long Answer	Short Answer	Total Marks	As per Blooms Taxonomy
1	Unit-I	1	2	25	Understanding, Application
2	Unit-II	1	1	20	Remembering, Understanding
3	Unit-III	1	1	15	Analysing, Creation
4	Unit-IV	1	2	20	Evaluation, Understanding
5	Unit-V	2	1	25	Understanding, Application
	Total	**5**	**7**	**85**	

P.R. GOVERNMENT COLLEGE (A), KAKINADA

I YEAR B. Sc (Examination at the end of II semester)

(COURSE – 3 BASIC PRINCIPLES INANALYTICAL CHEMISTRY)

MODEL PAPER

Duration: 2hr **Max.Marks:50M**

Section – I

Answer any three of the following questions.

Must attempt atleast one question from each part. Each question carries 10 Marks.

3 X 10M = 30M

Part –A

1. Question From Unit-I
2. Question From Unit-I
3. Question From Unit-III

Part –B

4. Question From Unit-IV
5. Question From Unit-V
6. Question From Unit-V

Section – II

Answer any four of the following questions. Each carries 5 marks. **4 X 5M= 20M**

7. Question From Unit-I
8. Question From Unit-I
9. Question From Unit-II
10. Question From Unit-III
11. Question From Unit-IV
12. Question From Unit-IV
13. Question From Unit-V

QUESTION BANK

UNIT-1

ESSAY QUESTIONS

1. Write about Primary and Secondary standard solutions?
2. Write about volume ratios for dilutions and p-functions?

SHORT QUESTIONS

1. Define molar mass and mole?
2. Write about analytical molarity and equilibrium molarity?

UNIT-2

ESSAY QUESTIONS

1. Discuss about Types of quantitative analysis?
2. Write about methods of detecting analytes based on physical properties and electro magnetic radiations?

SHORT QUESTIONS

1. Write about general steps involved in chemical analysis?
2. write about qualitative and quantitative chemical analysis?

UNIT-3

ESSAY QUESTIONS

1. Write about components, use, maintenance, applications of PH Meter?
2. Write about operation and construction, errors in weighing and care of single pan analytical balance?

SHORT QUESTIONS

1. Explain description, use and calibration of Burette?
1. Explain description, use and calibration of Conical Flask?
2. Explain description, use and calibration of Funnel?
3. Explain description, use and calibration of Volumetric Flask?

UNIT-4

ESSAY QUESTIONS

1. Discuss about Errors and Types of Errors?
2. Write about Accuracy and Precision?

SHORT QUESTIONS

1. Discuss about F-Test and t-Test?
2. Write about Significant figures?
3. Define Mean and Standard Deviation?
4. Write about Laboratory note book ?
5. Discuss about safety with Chemicals and Wastes?

1.

UNIT-5

ESSAY QUESTIONS

1. Write about Acid-Base titrations?
2. Write about Redox titrations?
3. Write about Complexometric titrations?

SHORT QUESTIONS

1. Write about Titrant, Titrand, Equivalence Point and End Point?
2. Discuss about different types of Indicators?
3. Write about Buffer Solutions?
4. Write about Volumetric Analysis?

	Pithapur Rajah's Government College(A), Kakinada	Program & Semester			
Course Code CHE-3	TITLE OF THE COURSE **Course -3: VOLUMETRIC ANALYSIS**	I B.Sc. ANALYTICAL CHEMISTRY (II Semester)			
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	Preparation of standard solutions and handling of laboratory apparatus	-	-	2	1

Course Objectives:

1. To provide basic knowledge about the handling of laboratory apparatus
2. To provide knowledge about the preparation of standard solutions
3. To provide hands on training for the determination of different components

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Handle and calibrate the common laboratory glass apparatus
CO2	Get practical skill to the preparation of different standard solutions used for quantitative analysis
CO3	Determine different unknown components present in the given solutions
CO4	Acquire knowledge on buffer solutions

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	-

Practical Syllabus: **50 M**

1. Use and calibration of common volumetric apparatus : Burette, Pipette and Volumetric flask
2. Preparation of standard solutions: Primary and secondary standard solutions
3. Determination of Sodium carbonate by using standard HCl solution
4. Determination of zinc by using EDTA solution
5. Preparation of Buffer solutions

CO-PO Mapping:

1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 4: (No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	2	2	3	2	2	3	3
CO2	3	3	3	2	3	2	2	3	2	3	3	3	3
CO3	3	2	3	2	3	1	2	2	2	2	2	3	2
CO4	3	3	2	1	3	2	2	1	2	3	3	3	3
Avg.	3	2.75	2.75	2	3	2	2	2	2.25	2.5	2.5	3	2.75

Course outcome & Program outcome mapping

On Completion of the course, the students will be able to	
CO1	Understand the structures of Diborane ,interhalogen compounds and Daily life applications of silicones.
CO2	Identify the Charecteristics of d – block elements particularly variable oxidation states,Magnetic properties and catalytic Properties.
CO3	Understand how to separate the Lanthanoid complexes.
CO4	Define n/p ratio and Binding energy and predict the types of Radioactive series.

CO-PO Mapping: 1: Low =1 ;2: Moderate = 2 ; 3: High = 3 ; 4: No Correlation = 0

CO	PO1	PO 2	PO3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO 3		
CO1	3	2	2	2	1	2	1	3	2	2		
CO2	3	1	2	2	1	1	1	3	1	2		
CO3	3	2	2	3	2	2	2	3	2	2		
CO4	3	1	1	1	1	1	1	2	1	1		

PROGRAMME OUTCOMES

At the completion of the B.Sc. Chemistry program, the students of our Department will be able to:

(PO1) Knowledge: Attain in depth knowledge about the fundamental principles, essential facts, conclusions and applications of chemical and scientific theories in various domains of chemistry.

(PO2) Critical Thinking: Carry out experiments in the area of organic analysis, estimation, derivative process, inorganic semi micro analysis, preparation, Kinetic, conductometric and potentiometric experiments and spectral analysis applying the domain of critical thinking.

(PO3) Problem Solving: Define the background of reaction mechanisms, complex chemical structures, instrumental method of chemical analysis, and separation techniques and apply appropriate techniques for analyzing specific problems both qualitatively and quantitatively in laboratories and in industries.

(PO4): Usage of modern tools: Create data using modem chemical tools and ICT for modeling and analyze the data obtained from sophisticated instruments (like UV-Vis, FTIR, NMR, GCMS, Fluorescence, SEM, TEM and XRD) for chemical analysis

	PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A) KAKINADA DEPARTMENT OF CHEMISTY	Program & Semester Ana Chemistry Hons I B.Sc. (II Semester)			
Course Code CHE-4	TITLEOFTHECOURSE **COURSE 4: INORGANIC CHEMISTRY**				
Teaching	HoursAllocated:45 (**Theory**)	L	T	P	C
Pre-requisites	Fundamentals of classification of Elements.	45	10	30	3+1

CourseOutcomes:

On Completion of the course, the students will be able to	
CO1	Understand the structures of Diborane ,interhalogen compounds and Daily life applications of silicones.
CO2	Identify the Charecteristics of d – block elements particularly variable oxidation states,Magnetic properties and catalytic Properties.
CO3	Understand how to separate the Lanthanoid complexes.
CO4	Define n/p ratio and Binding energy and predict the types of Radioactive series.

Course with focus on Skill Development/Employability/Entrepreneurship modules

SkillDevelopment		Employability		Entrepreneurship	

Syllabus:

UNIT –I Chemistry of p-block elements – I 9 h

Group 13: Preparation & structure of Diborane, Borazine and $(BN)_x$ Group14: Preparation, classification and uses of silicones and Silanes. Group 15: Preparation & structure of Phosphonitrilic Chloride $P_3N_3Cl_6$

Unit II Chemistry of p-block elements – II 9 h

Group 16: Classification of Oxides, structures of oxides and Oxoacids of Sulphur

Group 17: Preparation and Structures of Interhalogen compounds. Pseudohalogens,

UNIT-III Chemistry of d-block elements: 9 h

Characteristics of d-block elements with special reference to electronic configuration,variable valence, colour, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states of 3d series-Latimer diagrams.

UNIT-IV Chemistry of f-block elements: 9 h

Chemistry of lanthanides - electronic configuration, oxidation states, lanthanide contraction, consequences of lanthanide contraction, colour, magnetic properties.

Separation of lanthanides by ion exchange method.

Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

Unit – V Radioactivity 9 h

Definition, Isotopes, n/p ratio, binding energy, types of radioactivity, Soddy-Fajan's displacement law,Law of Radioactivity, Radioactive decay series, Nuclear Reactions- fission and fusion, Applications of radioactivity.

Textbooks:

S.NO	AUTHOR	TITLE	PUBLISHER
1	J D Lee	Concise Inorganic Chemistry	
2	Puri and Sharma	Inorganic chemistry	

Reference books

S.NO	AUTHOR	TITLE	PUBLISHER
1	Cotton and Wilkinson	Basic Inorganic Chemistry	
2	Satya Prakash	Advance Inorganic chemistry vol-I	
3	Maheshwar Sharon	Nuclear Chemistry	

WebLinks:

1. https://www.slideshare.net/terencepereira58/diborane
2. https://www.youtube.com/watch?v=xKzaHJAEPeA
3. https://www.idc-online.com/technical_references/pdfs/chemical_engineering/Oxides.pdf
4. https://www.youtube.com/watch?v=4aoUwJ5COpg
5. https://byjus.com/jee/lanthanides/
6. https://www.youtube.com/watch?v=PNQVovRfIoA
7. https://web.pdx.edu/~pmoeck/lectures/modern/TRM-13.ppt
8. https://www.toppr.com/ask/en-np/question/state-soddyfajans-displacement-laws-for-radioactive-transformations/

Course outcome & Program outcome mapping

On Completion of the course, the students will be able to	
CO1	Understand the structures of Diborane ,interhalogen compounds and Daily life applications of silicones.
CO2	Identify the Charecteristics of d – block elements particularly variable oxidation states,Magnetic properties and catalytic Properties.
CO3	Understand how to separate the Lanthanoid complexes.
CO4	Define n/p ratio and Binding energy and predict the types of Radioactive series.

CO-PO Mapping: 1: Low =1 ;2: Moderate = 2 ; 3: High = 3 ; 4: No Correlation = 0

CO	PO1	PO 2	PO3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO 3		
CO1	3	2	2	2	1	2	1	3	2	2		
CO2	3	1	2	2	1	1	1	3	1	2		
CO3	3	2	2	3	2	2	2	3	2	2		
CO4	3	1	1	1	1	1	1	2	1	1		

PROGRAMME OUTCOMES

At the completion of the B.Sc. Chemistry program, the students of our Department will be able to:

(PO1) Knowledge: Attain in depth knowledge about the fundamental principles, essential facts, conclusions and applications of chemical and scientific theories in various domains of chemistry.

(PO2) Critical Thinking: Carry out experiments in the area of organic analysis, estimation, derivative process, inorganic semi micro analysis, preparation, Kinetic, conductometric and potentiometric experiments and spectral analysis applying the domain of critical thinking.

(PO3) Problem Solving: Define the background of reaction mechanisms, complex chemical structures, instrumental method of chemical analysis, and separation techniques and apply appropriate techniques for analyzing specific problems both qualitatively and quantitatively in laboratories and in industries.

(PO4): Usage of modern tools: Create data using modem chemical tools and ICT for modeling and analyze the data obtained from sophisticated instruments (like UV-Vis, FTIR, NMR, GCMS, Fluorescence, SEM, TEM and XRD) for chemical analysis

(PO5): Communication: Develop Skills to evaluate, analyze and interpret the chemical information and data and to communicate effectively within the chemical community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

(PO6): Life-long Learning: Demonstrate scholarly attitude to pursue a career in the field of chemical education and research and have the zeal and vision to engage in independent and life-long learning in the broadest context of technological and social change.

(PO7) Ethical Practices and Social Responsibility: Generate ideas and solutions for green and sustainable chemistry and approach towards planning and execution of research in frontier areas of chemical sciences.

PROGRAM SPECIFIC OUTCOMES (PSO's)

At the time of graduation, our under graduates would be able to:
PSO 1- Evaluate, analyze, interpret and effectively apply the basic laws, principles, phenomena,
processes and mechanisms involved in the domain of organic, inorganic, physical and analytical Chemistry
PSO2 - Demonstrate the knowledge of Chemistry in the domain of research, education and perspective entrepreneurship.

PSO3 - Evaluate distinct problems in the field of chemical data analysis, scientific interpretation
and reaction mechanisms with an understanding on basic tools to be employed.

Weightage to contentSemester -II
Course - 4

S.No	CourseContent	Long Answer	ShortAnswer	Total marks	As per Blooms Taxonomy
1	Chemistry of p – block elements.	1	2	20	Understanding, Application
2	Chemistry of p – block elements.	2	1	25	Remembering, Understanding
3	Chemistry of d- block elements.	1	1	15	Analysizing & Creation
4	Chemistry of f-block elements.	1	1	15	Evaluation, Understanding
5.	Radioactivity	1	2	20	Understanding, Application
	TOTAL	**6**	**7**	**95**	

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A) : KAKINADA

BOARD OF STUDIES 2023-24

DEPARTMENT OF CHEMISTRY

I B.Sc, CHEMISTRY(Hons)

SEMESTER– II

COURSE-4 – Inorganic Chemistry

Question Bank

Unit-I

Essay questions:

1. Explain the synthesis and structure of diborane?
2. What are silicones write their classification & applications?

Short Answer questions:

3. What is inorganic benzene explain its structure?
4. Elaborate the structure of Boran nitride.
5. Write the preparation and structure of $P_3N_3Cl_6$.

Unit- II

Essay questions

1. What are oxides explain their classification based on oxygen content and chemical nature?
2. Discuss the classification and structure of interhalogen compounds?

Short answer questions

3. Explain the structure of oxides of sulfur.
4. Write a short note on pseudo halogens.
5. Write a short on the oxy acids of sulfur?

Unit-III

Essay questions:

1. Explain the characteristics of d- block elements with reference to following.
   a) Electronic configuration
   b) Variable oxidation states
2. Write a short note on the following properties of d- block elements.
   a) Magnetic properties
   b) catalytic properties

Short answer questions

3. Explain the complex formation of transition elements with an example?

4. Discuss the stability of various oxidation states of 3d-series elements.
5. Write a short note on Latimer diagrams.

Unit-IV

Essay questions:

1. How to separate the lanthanides by using ion exchange method?
2. Compare lanthanides and actinides?

Short answer questions

3. Explain the electronic configuration of lanthanide elements.
4. What is lanthanide contraction write its consequences?
5. Calculate the spin only and effective magnetic moment of Pr^{+3}
6. Write the electronic configuration of actinides?

Unit-V

Essay questions

1. Explain Soddy- Fajan's displacement law and law of Radioactivity.
2. Elaborate nuclear fission and nuclear fusion reactions with suitable examples?

Short answer questions

3. Define binding energy and n/p ratio.
4. What are isotopes and give three examples?
5. Write a short note on applications of Radioactivity?
6. Discuss radioactive decay series?

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A) :: KAKINADA

I YEAR B.Sc CHEMISTRY Hons (Examination at the end of II semester)

(COURSE – 4 Inrganic Chemistry)

MODEL PAPER

Duration: 2hr **Max.Marks:50M**

Section – 1

Answer any three of the following questions. Must attempt atleast one question from each part. Each question carries 10 Marks. **3 X 10M = 30M**

Part –A

1. Explain any two preparation methods of diborane and deduce its structure. [BT1, CO1]
2. what are oxides and explain their classification based on oxygen content and nature [BT2, CO1]
3. Define interhalogen compounds and draw the structure of ClF3 and BrF5. [BT2, CO1]

Part – B

4. Elaborate the characteristics of d- block elements with reference to Magnetic properties and Variable oxidation states [BT3 CO2]
5. How to separate the lanthanides by using ion exchange method. [BT4 CO3]
6. Explain the following. [BT1, CO4]

a) Soddy- Fajan's displacement law.

b) law of Radioactivity

Section – II

Answer any four of the following questions. Each carries 5 marks. 4 X 5M= 20M

7. Why Borazine is called inorganic Benzene. Support your answer with proof? [BT3, CO1]
8. Write the Daily life applications of silicones? [BT2, CO1]
9. Explain the structure and hybridization of SO_3. [BT1, CO1]
10. Why Particularly d- block elements act as catalysts. Explain with suitable examples? [BT4, CO2]
11. Brief Lanthanide contraction and write its consequences? [BT3, CO3]
12. Define Isotopes, n/p ratio and Binding energy? [BT1, CO4]
13. Write a short note on applications of Radioactivity? [BT2, CO4]