P. R. GOVERNMENT COLLEGE
(AUTONOMOUS)
KAKINADA

(Affiliated to Adikavi Nannaya University, Rajamahendravaram)

DEPARTMENT OF CHEMISTRY

B.Sc. Analytical Chemistry
(Syllabus under CBCS)

Board of Studies
(2021-22)

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

Recommended Composition and Functions of the Board of Studies of Analytical Chemistry: 2021-22

I Composition

i. Head of the Department concerned (Chairman):

Sri. Rambabu Vasamsetti, M.Sc., B.Ed., SET.

ii. The entire faculty of each specialization.

1. Dr. D. Rama Rao, M.Sc., B. Ed., M.Phil. Ph.D.
2. Dr. D. Chenna Rao, M.Sc., Ph.D.
3. Sri V. Sanjeeva Kumar MSc., NET
4. Sri T V V. Satya Narayana, M.Sc., B.Ed., SET.
5. Sri P. Vijaya Kumar, M.Sc., NET.
6. Smt. G. Pavani, M.Sc., B.Ed., SET
7. Dr. T. Uma Maheswara Rao, M.Sc., Ph.D.
8. Dr. N. Bujji Babu, M.Sc., Ph.D.
9. Dr. Ch. Praveen, M.Sc., Ph.D.
10. Kum. A. Lakshmi Bhavani. M.Sc.

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

Dr. Dr. K. Jhansi Lakshmi, Principal, ASD WOMEN'S COLLEGE, KAKINADA

iv. One expert in the subject from outside the college to be nominated by the Academic Council

Sri U. Sai Krishna, Lecturer in Chemistry, Govt. College(A), Rajamahendravaram

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

Dr. B. Ramesh Babu, Founder & M. D., BogaR Laboratories, Peddapuram

vi. 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.

Dr. K. Raghava Chari, 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 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.

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

Department of Analytical Chemistry

Minutes of board of studies (BOS) meeting 2021-22 on 02. 12. 2021 at 10.00 am

Meeting of Board of Studies in Chemistry is convened on 02 December 2021 through offline at P.R. Govt. College (A), Kakinada, at 10.00 AM.

Venue: Conference Hall, Dt: 02-12-2021, Thursday – 10.00 AM.

The Principal Dr. B.V. Tirupanyam, Chairman, Sri V. Rambabu, University Nominee, Dr.K. Jhansi Lakshmi, Lecturer in Chemistry, ASD Govt. Degree College for Women (Autonomous), Kakinada, Industrialist Dr. B. Ramesh Babu, Founder & M.D., BogaR laboratories, Peddapuram, Subject Expert Sri. U. Sai Krishna, Lecturer in Chemistry, Government College (A) Rajamahendravarm, all the faculty members of Chemistry Department and student alumni attended the meeting.

Agenda:

- To discuss the Semester System and Choice Based Credit System (CBCS) being implemented for the past 03 years, i.e., w.e.f. 2018-19.
- To discuss and approve the Continuation/Modifications of the syllabus for the Odd & Even Semesters of I, II & III Years for 2021-22.
- Grant of Extra credits for Online SWAYAM MOOCs etc.
- Syllabus, Model Question Papers and Model Blue Prints for I, II, III, IV, V and VI Semesters.
- Teaching learning methodology by 60:40(External: Internal) ratio for the present II- and III-Year Students and 50:50 (External: Internal) ratio I Year Students w.e.f. 2021-22.
- Panel of paper setters and examiners.
- Proposals for Community Service Projects/Extension activities for the benefit of the society.
- Department action plan for 2021-22.
- To discuss and resolve the minor modifications/refinement if any, in the Chemistry cluster electives CI, CII &CIII as majority of the students opting this cluster as their choice.
- Any Other Proposal with the Permission of the Chairman.

Resolutions:

The following agenda items are discussed and resolutions are made.

1. It is resolved to continue choice based credit system in the chemistry combination programmes as per the directions of the CCE, Vijayawada to the first year and second year and final year student's w.e.f. 2018-19.
2. It is resolved to approve the Continuation/Modifications of the syllabus for the Odd & Even Semesters of I, II & III Years for 2021-22.
3. It is resolved to encourage students to active participation in various activities and give extra credits for students after successful completion of a particular activity such as SWAYAM, MOOCS etc., (Annexure –II)
4. It is Resolved to follow 60%-40% external and internal w.e.f. 2017-2018 admitted batches and it continued in present second and third year students.
5. It is resolved to follow 50%-50% external and internal for first year w.e.f 2021-22 admitted batch.
6. It is resolved to allot 50 marks project work for final year students in chemistry preferably in cluster paper C - 3 practical's, w.e.f 2019-20 in accordance with APSCHE.
7. It is resolved to conduct departmental activities such as OZONE DAY, CHEM FEST, CHEMISTRY DAY and SCIENCE DAY. (Annexure-I)
8. It is resolved to implement the recommended andragogy for the first semester 2021-22
9. It is resolved to conduct practical examinations semester wise.
10. It is resolved to organize guest lectures by eminent professors.
11. It is resolved to implement pass minimum for internal assessment for CBSE pattern students as the pattern is learner oriented.
12. It is resolved to maintain status quo for same question paper pattern in II, III years.
13. It is resolved that there is no change in the syllabus in the first year (Sem –I & Sem –II) as prescribed by APSCHE, Vijayawada in the last academic year, the same syllabus will be adopted as such.
14. The following paper setters are recommended.

    1. Sri. U. Sai Krishna, Govt. College(A), Rajamahendravaram
    2. Dr. V. Narayana Rao, GDC, Perumallpuram.
    3. Dr. M. Trinadh, Govt. College(A), Rajamahendravaram.
    4. Sri. M. Sudhakar, Govt. College(A), Rajamahendravaram.
    5. Sri. K. Anand, GDC, Pithapuram.
    6. Dr. CH. Vijay Vardhan, GDC, Perumallpuram.
    7. Sri B. Surendra, GDC, Tadepalligudem.

Signatures of the members who attended the

Board of studies in Analytical Chemistry on 02. 12 .2021 at 10.00 AM

S. No.	Name of the member	Designation	Signature
1	Sri. Rambabu Vasamsetti	Chairman, Board of Studies, Lecturer in charge	
2	Dr. K. Jhansi Lakshmi	University Nominee Asst. Professor, Department of Chemistry, ASD Women's College, Kakinada.	2/12/21
3	Sri. U. Sai Krishna	Subject Expert Lecturer in Chemistry, Govt.College(A), Rajamahendravaram	02/12/21
4	Dr. B. Ramesh Babu	Industry expert/ Founder & M. D., BogaR Laboratories, Peddapuram.	
5	Dr. K. Raghava Chari	Alumnus, Retd .Principal,	
6	Dr. D. Rama Rao	Member Lecturer I/c - Dept. of Chemistry	
7	Dr. D. Chenna Rao	Member Lecturer in Chemistry	
8	Sri V. Sanjeeva Kumar	Member Lecturer in Chemistry	
9	Sri T V V. Satyanarayana	Member Lecturer in Chemistry	
10	Sri P. Vijaya Kumar	Member Lecturer in Chemistry	
11	Smt. G. Pavani	Member Lecturer in Chemistry	2/12/21
12	Dr. T. Uma Maheswara Rao	Member Lecturer in Chemistry	
13	Dr. N. Bujji Babu	Member Lecturer in Chemistry	
14	Dr.Ch. Praveen	Member Lecturer in Chemistry	2/12/2021
15	Kum. A. Lakshmi Bhavani	Member Guest Faculty in Analytical Chemistry	2/12/2021

ACTION PLAN BOS MEETING – ANALYTICAL CHEMISTRY HELD ON 02 -12 - 2021.

Department activities for AY 2021-22.

Annexure - I

S.No.	Month	Activity Proposed	Faculty Member of In charge
1.	**Nov -21**	Departmental staff meeting to review admissions and faculty recruitment	All Faculty members
2.	**Nov – 21**	Preparation of curricular plans, time- tables etc.,	All Faculty members
3.	**Dec–21**	Bridge classes	All Faculty members
4.	**Dec–21**	Student awareness programs on ragging& eve teasing - consequences, self-discipline.	All Faculty members
5.	**Dec–21**	National Chemistry Day	All Faculty members
6.	**Jan – 22**	Career guidance, higher education opportunities etc.,	All Faculty members
7.	**Feb – 22**	Study tour / Field trips	All Faculty members
8.	**Feb -22**	NATIONAL SCIENCE DAY	All Faculty members
9.	**Mar– 22**	Study tour / Field trips	All Faculty members
10	**Mar- 22**	Guest Lecture	All Faculty members

1. Organizing National/ State level seminars/Workshops/ Conferences/ Training programs etc. With topics and other details.

i). Staff development programs
ii) Awareness on OZONE protection
iii) National Chemistry day
iv) National Science day 2022
v) Guest lectures / Invited Talks
vi) Training on Soil analysis
vii) Training on water analysis

2.Change of modules in the syllabus content.

3. 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/ Field tours to Final year students: **Rs. 20,000**

1. National Institute of Hydrology, Kakinada.
2. SAR Chandra Environ Solutions, Kakinada.
3. ONGC mini refinery, Tatipaka.
4. Soil analysis laboratory, Samalkot.
5. Venky parenteral, Yanam
6. Any other relevant field visits

II. Lab equipment's: **Rs. 5, 00,000**

Lab equipment's required to conduct Practical's and to give hands on training to the students in order to build skill and confidence in the area of Analytical chemistry

III. Reference books & other necessary teaching – learning material: **Rs. 10,000**

IV. Guest Lectures / Invited talks: **Rs. 10,000**

3. Plan for organizing subject oriented community outreach programs & allocation of necessary funds. (Mandatory for each Department)

i) Awareness programs on various social / Health issue **Rs. 10,000**

4. Introduction of new programs - Certificate courses. **Rs. 10,000**

6. Any other program that enhances the learning capacity of students and their employable &knowledge skills

7. Examination reforms if any,
8. Suggest panel of examiners/paper setters & other experts/nominees for BOS deliberations.
   1. Dr. M. Trinadh, Govt. College(A), Rajamahendravaram
   2. Sri. U. Sai Krishna, Govt. College(A),Rajamahendravaram.
   3. Dr. V. Narayana Rao, GDC, Perumallpuram.
   4. Sri. M. Sudhakar, Govt. College(A), Rajamahendravaram.
   5. Sri. K. Anand, GDC, Pithapuram.
   6. Dr. CH. Vijay Vardhan, GDC, Perumallpuram.
   7. Sri B. Surendra, GDC, Tadepalligudem.

Semester wise/ Paper wise Marks / Credits allotted.

YEAR	SEMESTER	PAPER	TITLE	MARKS	CREDITS
I	I	I	Basic Principles & Laboratory Operations	100	04
			Practical – I	50	01
	II	II	Quantitative Methods Of Analysis	100	04
			Practical – II	50	01
II	III	III	Separation Methods – I	100	04
			Practical – III	50	01
	IV	IV	Separation Methods – II	100	04
			Practical – IV	50	01
		V	Analytical Biochemistry and Environmental Chemistry	100	04
			Practical – V	50	01
III	V	V	Analytical Biochemistry and Environmental Chemistry	100	03
			Practical – V	50	02
		VI	Instrumental Methods of Analysis	100	03
			Practical – VI	50	02
	* Any one cluster from VIII, A, B OR C	VII	Analysis of Applied Industrial Products (ELECTIVE)	100	03
			Practical – VII	50	02
	* Any one cluster from VIII, A, B OR C	VIII (C)	VIII-C-1	100	03
			VIII-C-2	100	03
			VIII-C-3	100	03
			Practical –VIII	50	02
			Practical –IX	50	02
			Practical –X: Project Work	50	02

GUIDELINES FOR ALLOTMENT OF EXTRA CREDITS

Annexure -II

S.No.	Activity	Details of achievement	Credits
1	MOOC Course	SWAYAM /NPTEL /CEC etc., (Course Completion certificate with credits should be produced for the claim of extra credits)	Total credits achieved will be considered
2	NCC	B CERTIFICATE	2
		Participation in National Camp after 'B' certificate	3
		C certificate	4
		Adventure camp/RD parade along with 'B'	5
		Failed in B certificate Examination	1
3	Sports	Intercollegiate selection	2
		South zone selection	3
		All India participation	4
		Winning medals in all India competitions	5
4	NSS	40% attendance in regular NSS activities	1
		50% attendance with Community Service	2
		Conduct of survey/Youth exchange/RD	3
5	JKC	Enrollment and training	1
		Campus recruitment local level	2
		MNCs/reputed companies	3
6	Community service	Participation in community service by departments (outreach programmes)	2
7	Cultural activity	Winning medals at state level-2, District level-1	2 1
8	COP/Add on Course	Pass in Certificate Exam-1, Diploma-2	1 2
9	Support services	Lead India, Health club, RRC and Eco Club etc., participation in various programmes	1

Course Structure:

All theory papers will have 4 hours per week and practical's will have 2 hours per week up to Semester IV (Second year). In final year all theory papers will have 3 hours per week and practical's will have 2 hours per week in Semester V and V I (Final year).

Each Theory Paper shall be of 100 marks and Practical Paper shall be of 50 marks.

Total Number of Papers: 24

Mathematics : 7Papers
Chemistry : 7Papers
Analytical Chemistry: 7 Papers + 1 Cluster elective (3Papers) = 10 Papers

Objectives and outcome of the course Analytical Chemistry

Analytical Chemistry is an applied, experimental field of science and is based not only on chemistry, but also on physics, biology, information theory and many fields of technology. It is of fundamental importance not only to all branches of chemistry but also to all biological sciences, engineering sciences, health, medicine, pharmaceuticals, environment, industrial processes, quality control and implementation of legislation.

The objective of B.Sc. Analytical chemistry course is to provide students exposure to chemistry, physics, biological sciences, environmental science, computer application, instrumentation and analytical techniques.

In this three-year course spread over six semesters, there are 10 papers of Analytical chemistry 7 papers of chemistry and 7 papers of Mathematics.

After graduating in Analytical Chemistry the students can pursue academics in Chemistry, bioinformatics, forensic science, biochemistry and other disciplines of inter- disciplinary sciences. They can also use it as a stepping stone to pharmaceutical industry and for Research and Development in industry.

Program Outcomes B.Sc. (Chemistry):

Undergraduate students upon graduation with a B.Sc. degree in chemistry:

PO : 1	Have firm foundations in the fundamentals and application of current chemical and scientific theories.
PO : 2	An understanding of major concepts, theoretical principles and experimental findings in chemistry.
PO : 3	Are able to design, carry out, record and analyze the results of chemical experiments
PO : 4	Are able to use modern instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment.
PO : 5	Are skilled in problems solving, critical thinking and analytical reasoning.
PO : 6	Are able to identify and solve chemical problems and explore new areas of research.
PO : 7	Are able to use modern library searching and retrieval methods to obtain information about a topic, chemical, chemical technique, or an issue relating to chemistry.
PO : 8	Knows the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using chemicals
PO : 9	Are able to communicate the results of their work to chemists and non-chemists.
PO : 10	Understand the ethical, historic, philosophical, and environmental dimensions of problems and issues facing chemists.
PO : 11	Find gainful employment in industry or government, be accepted at graduate or professional schools (law, medicine, etc.), or find employment in school systems as instructors or administrators.
PO : 12	Are able to pursue Higher education in Chemistry and other disciplines of inter disciplinary

Course outcomes

Analytical Chemistry

CO: 1	Analytical Chemistry is an applied, experimental field of science and is based not only on chemistry, but also on physics, biology, information theory and many fields of technology.
CO: 2	It gives fundamental knowledge on chemistry and also on all biological sciences, engineering sciences, health, medicine, pharmaceuticals, environment, industrial processes, quality control and implementation of legislation.
CO: 3	To provide students exposure to chemistry, physics, biological sciences, environmental science, computer application, instrumentation and analytical techniques
CO: 4	After graduating in Analytical Chemistry the students can pursue academics in Chemistry, bioinformatics, forensic science, biochemistry and other disciplines of Inter- disciplinary sciences
CO: 5	Students can also use Analytical Chemistry as a stepping stone to pharmaceutical industry and for Research and Development in industry.
CO: 6	Are able to use modern instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment.

Specific Program Out comes

Analytical Chemistry

SEMESTER –I	**SPO : 1**	Gains knowledge on basic concepts of analytical methods
	SPO : 2	Understands the types of errors in chemical analysis
	SPO : 3	Gains knowledge on principles and applications of Thermo gravimetric methods
	SPO : 4	Gains knowledge on use and handling of Common laboratory apparatus.
SEMESTER –II	**SPO : 1**	Gains knowledge on basic concepts of Gravimetric methods and their importance
	SPO : 2	Gains knowledge on volumetric methods and their importance in Chemical analysis.
	SPO : 3	Gains knowledge on Centrifugation methods
	SPO : 4	Gains knowledge on Environmental and water pollutants and their analysis.
SEMESTER –III	**SPO : 1**	Gains basic knowledge on Separation techniques and their classification.
	SPO : 2	Gains knowledge on Different chromatographic techniques and their applications.
SEMESTER - IV	**SPO : 1**	Gains knowledge on Gas chromatographic technique and their applications.
	SPO : 2	Gains knowledge on Electrophoresis concept and its applications
	SPO : 3	Gains basic knowledge on Filtration techniques.
SEMESTER - V	**SPO : 1**	Gains basic knowledge about Carbohydrates, Proteins & Lipids and their analysis
	SPO : 2	Gains some basic knowledge about Clinical chemistry and Microbiological assay.
	SPO : 3	Gains some basic knowledge and importance of Spectroscopic methods
	SPO : 4	Gains some basic knowledge and importance of Electro analytical methods
SEMESTER - VI	**SPO : 1**	Gains knowledge and awareness about some applied industrial products.
	SPO : 2	Gains knowledge about analysis of cement, Glasses and Gases
	SPO : 3	Gains some knowledge about Industrial standards and Control
	SPO : 4	Gains knowledge on practical Analytical chemistry and its applications in various fields

P. R. GOVERNMENT COLLEGE (A), KAKINADA

B. Sc. (Analytical Chemistry)

SEMESTER –V

Paper–V (ANALYTICAL CHEMISTRY-5) 45hrs (3h/w)

ANALYTICAL BIOCHEMISTRY AND ENVIRONMENTAL CHEMISTRY

UNIT–I **9 hrs.**

BASIC UNDERSTANDING OF THE STRUCTURES, PROPERTIES AND FUNCTIONS OF CARBOHYDRATES, LIPIDS, AND PROTEINS

- Isolation and characterization of poly saccharides.
- Classification of lipids, properties, functions and Biochemical functions
- of steroid hormones.
- Proteins- structure, classification, isolation, characterization and functions.
- Biochemistry of peptide hormones.
- Enzymes- nomenclature, classification, effect of pH, temperature on enzyme activity, enzyme inhibition.
- Lipoproteins.

UNIT–II **9 hrs.**

BIOCHEMISTRY OF DISEASE: A DIAGNOSTIC APPROACH

Clinical chemistry: a diagnostic approach by blood/urine analysis.

- Blood: Composition and functions of blood, blood coagulation.
- Blood collection and preservation of samples.
- Anemia
- Regulation, estimation and interpretation of data for blood sugar,
- urea, creatinine, cholesterol and bilirubin.
- Urine: Collection and preservation of samples.
- Formation of urine.
- Composition and estimation of constituents of normal and pathological urine.

Unit-III: **9hrs**

Microbiological Tests and Assays:

Microbiological Assay of antibiotics, (std. preparations and units of activity, test organisms and inoculum, apparatus, methods: cylinder or cup plate method and two level factorial assay (ampicillin), microbial limit test (preliminary testing, medium soya bean casein digest agar medium only) and total microbial count only), test of sterility-membrane filtration method, determination of thiomersal.

Unit-IV: **9hrs**

Standardization and Quality Control of different Dosage Forms:

Brief introduction to different dosage forms with the IP requirements,
Analytical methods for the following:
Tablets (aspirin), additives used in tablet manufacture, capsules (Rifampicin),
Powders (Sodium benzoate), solutions (saline, NaCl) suspensions
(Barium sulphate–limit test for impurity), mouthwashes (Ointments - salicylic acid) and creams dimethazone by IR), injections (Mannitol), ophthalmic preparations (sulphacteamine), aerosols (salbutamol), blood products and reporting protocols.

UNIT-V **9 hrs.**

Concept and scope of environmental chemistry –nomenclature –environmental segments – The natural cycles of the environment -the hydrological cycle –the oxygen cycle –the nitrogen cycle.

Classification of water pollutants –Characterization –Dissolved Oxygen –BOD-COD- Waste water treatment (General). Disposal of radioactive wastes. Pollution due to some typical industries like Textile, Pulp and Paper, Electroplating, Dairy, Cane sugar

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SEMESTER –V

Laboratory Course - V

Practical-V Analysis of Bio Products **30 hrs. (2 h / w)**

Identification and estimation of the following:

i. Carbohydrates – qualitative and quantitative.
ii. Lipids –qualitative.
iii. Determination of the iodine number of oil.
iv. Determination of the saponification number of oil.
v. Determination of cholesterol using Liebermann-Burchardreaction.
vi. Proteins –qualitative.
vii. Isolation of protein.
viii. Determination of protein by the Biuret reaction.
ix. Determination of nucleic acids

Suggested Readings:

i. T. G. Cooper: Tool of Biochemistry.
ii. Keith Wilson and John Walker: Practical Biochemistry.
iii. Alan H Gowenlock: Varley's Practical Clinical Biochemistry.
iv. Thomas M. Devlin: Textbook of Biochemistry.
v. Jeremy M. Berg, John L Tymoczko, Lubert Stryer: Biochemistry.
vi. G. P. Talwar and M Srivastava: Textbook of Biochemistry and Human Biology.
vii. A.L. Lehninger: Biochemistry.
viii. O. Mikes, R.A. Chalmers: Laboratory Handbook of Chromatographic Methods.
ix. Environmental chemistry by A.K. De
x. A text book of Engineering chemistry by S.S. Dara
xi. A text book of Industrial chemistry by B.K. Sharma

SCHEME OF VALUATION

Max. Marks: 50

1. Quantitative Analysis .... 15 Marks
2. Qualitative Analysis ..... 15 Marks
3. Viva – Voice ..... 10 Marks
4. Record ..... 10 Marks

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL QUESTION PAPER
SEMESTER – V
Paper - V (ANALYTICAL CHEMISTRY-5)
ANALYTICAL BIOCHEMISTRY AND ENVIRONMENTAL CHEMISTRY

Duration: 2hrs. 30Min. **Max. Marks: 60**

SECTION – A

Answer any **FOUR** questions. Each question carries **10** marks. 4 X 10 = 40M

1. Question from Unit –I
2. Question from Unit –II
3. Question from Unit –III
4. Question from Unit - IV
5. Question from Unit – V
6. Question from Unit – I
7. Question from Unit – II
8. Question from Unit - V

SECTION – B

Answer any **four** questions. Each question carries **5** marks. 4 x 5 = 20M

9. Question from Unit - I
10. Question from Unit – II
11. Question from Unit – III
12. Question from Unit – IV
13. Question from Unit – V
14. Question from Unit – I
15. Question from Unit – II
16. Question from Unit - V

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – V
Paper - V (ANALYTICAL CHEMISTRY-5)
ANALYTICAL BIOCHEMISTRY AND ENVIRONMENTAL CHEMISTRY
Duration: 2hrs. 30Min. **Max. Marks: 60**

Blue Print:

S. No.	Course Content	Essay Questions (10M)	Short Answer Questions (5M)	Total No. Of Questions from each Unit
1	Unit -I	2	2	4
2	Unit –II	2	2	4
3	Unit –III	1	1	2
4	Unit –IV	1	1	2
5	Unit -V	2	2	4
	TOTAL	8	8	16

Note: Questions should be given from Question bank.

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – V
Paper - V (ANALYTICAL CHEMISTRY-5)
ANALYTICAL BIOCHEMISTRY AND ENVIRONMENTAL CHEMISTRY
Duration: 2hrs. 30Min. Max. Marks: 60

Question Bank

Essay Questions:10 M

19. Write about the isolation and characterization of polysaccharides
20. Write about the classification and functions of lipids
21. Explain about the classification and isolation of proteins
22. Write about the classification of enzymes and explain the effect of pH & temperature on enzymes
23. Write about composition of blood and explain about coagulation of blood
24. Explain about the collection and preservation of urine samples
25. Explain about the estimation of constituents in pathological urine.
26. Write about the collection and preservation of blood samples
27. Explain about the estimation and interpretation of blood sugar and cholesterol
28. Write about the microbiological assay of antibiotics
29. Explain about the determination of thiomersal.
30. Explain about the analytical methods of Aspirin tablet
31. Write about the analytical methods of Rifampicin capsule
32. Explain about the Oxygen cycle
33. Write about the nitrogen cycle
34. Explain about waste water treatment
35. Explain the methods of determination of DO and COD
36. Write about the water pollutants released from various industries

Question Bank:

Short answer Questions: 05 M

1. Write the biochemical functions of steroid hormones
2. Explain about the structure of proteins
3. Write about peptide hormones
4. Explain about enzyme inhibition
5. Write about the functions of blood
6. Explain about anemia.
7. Write about the estimation of bilirubin
8. Explain about the estimation of creatinine
9. Write about the formation of urine
10. Explain about the total microbial count
11. Explain about the microbial limit test
12. Write about the preparation of saline solution
13. Explain about mouth washes.
14. Write briefly about environmental segments
15. Explain about the classification of water pollutants
16. Define DO and COD and write their significances.
17. Explain about the disposal of radiochemical wastes
18. Explain about hydrogen cycle

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SEMESTER –V

Paper–VI: ANALYTICALCHEMISTRY-645hrs (3h/w)

INSTRUMENTAL METHODS OF ANALYSIS

AN INTRODUCTION TO SPECTROSCOPIC METHODS OF ANALYSIS:

UNIT–I **9 hrs.**

A. UV - VISIBLE SPECTROPHOTOMETRY:

Principle, Lambert-Beer's law and its deviations, UV– Visible spectrophotometer Instrumentation – sources, detectors, Single and double beam spectrophotometers and its applications

B. IR SPECTROSCOPY:

Principle, Instrumentation – Sources, detectors and applications

UNIT–II **9 hrs**

ATOMIC EMISSION SPECTROSCOPY (Flame photometry):

Principle – Instrumentation – Interferences – Analytical techniques for Flame photometry – Calibration plots (Working curves). Applications - Determination of Alkali and Alkaline earth metals in natural water

UNIT-III:

9hrs

ATOMIC ABSORPTION SPECTROSCOPY: AAS

Principle – Instrumentation – Radiation sources (line sources) – Hollow cathode lamps and Discharge lamps. Interferences – Analytical techniques for AAS – Calibration plots. Applications – Determinations of Calcium and Magnesium in tap water.

UNIT-IV:

9hrs

POLOROGRAPHY AND COULOMETRY:

A. Polarography:
Basic Principles of Polarography, residual current, migration current, diffusion current, half wave potential, Ilkovic equation.
Instrumentation, Dropping mercury electrode (DME), advantages and disadvantages of DME, Qualitative and quantitative analysis of inorganic ions.

B. Coulometry: Types of coulometric methods: Potentiostatic and amperostatic; principles, instrumentation and applications.

UNIT-V:

9hrs

BASIC ELECTRO-ANALYTICAL CHEMISTRY:

A. Electrochemical cells, Electrode potentials, cell potentials, Nernst equation, Determination of EMF of cell, Applications of EMF measurements – Potentiometric titrations.

B. Ion selective electrodes: Reference electrodes – Hydrogen electrode, Calomel electrode, silver chloride electrode. Indicator electrodes –Hydrogen and glass electrodes, Metal –metal ion electrode, inert electrode, Applications of ion selective electrodes.

P. R. GOVERNMENT COLLEGE (A), KAKINADA

B. Sc. (Analytical Chemistry)

SEMESTER –V

Practical - VI Instrumental methods of analysis 30 hrs. (2 h /w)

1. Determination of Fe (II) with Cr (VI) by using Potentiometric titration method.
2. Determination of Fe (II) with Mn (VII) by using Potentiometric titration method.
3. Determination of metals in given samples by AAS technique.
4. Preparation of standard calibration graphs of Pb, Cd, Zn and Fe by AAS
5. Determination of Fe(III) by Spectrophotometric method.

Suggested Readings:

1. P.W. Atkins: Physical Chemistry.
2. G.W. Castellan: Physical Chemistry.
3. C.N. Banwell: Fundamentals of Molecular Spectroscopy.
4. Brian Smith: Infra-red Spectral Interpretations: A Systematic Approach.
5. W.J. Moore: Physical Chemistry.

SCHEME OF VALUATION

Max. Marks: 50

I.	Procedure to be written in the first 15 minutes	....	10 Marks
II.	Recording of data and reporting the value upto 2% error.....		20 Marks
III.	Error up to 5%	.....	10 Marks
	Error greater than 5%	.....	5 Marks
IV.	Viva – Voice	.....	10 Marks
V.	Record	.....	10 Marks

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL QUESTION PAPER
SEMESTER – V
Paper - VI (ANALYTICAL CHEMISTRY-6)
INSTRUMENTAL METHODS OF ANALYSIS

Duration: 2hrs. 30Min. **Max. Marks: 60**

SECTION – A

Answer any **FOUR** questions. Each question carries **10** marks. 4 X 10 = 40M

1. Question from Unit –I
2. Question from Unit –II
3. Question from Unit –III
4. Question from Unit - IV
5. Question from Unit – V
6. Question from Unit – I
7. Question from Unit – IV
8. Question from Unit - V

SECTION – B

Answer any **four** questions. Each question carries **5** marks. 4 x 5 = 20M

9. Question from Unit - I
10. Question from Unit – II
11. Question from Unit – III
12. Question from Unit – IV
13. Question from Unit – V
14. Question from Unit – I
15. Question from Unit – IV
16. Question from Unit - V

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – V
Paper - VI (ANALYTICAL CHEMISTRY-6)
INSTRUMENTAL METHODS OF ANALYSIS

Duration: 2hrs. 30Min. **Max. Marks: 60**

Blue Print:

S. No.	Course Content	Essay Questions (10M)	Short Answer Questions (5M)	Total No. Of Questions from each Unit
1	Unit -I	2	2	4
2	Unit –II	1	1	2
3	Unit –III	1	1	2
4	Unit –IV	2	2	4
5	Unit -V	2	2	4
	TOTAL	8	8	16

Note: Questions should be given from Question bank

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – V
Paper - VI (ANALYTICAL CHEMISTRY-6)
INSTRUMENTAL METHODS OF ANALYSIS

Duration: 2hrs. 30Min. **Max. Marks: 60**

Question Bank:

Essay Questions: 10 M

1. State and Explain Beers –Lamberts law and explain the principle of UV – Visible spectroscopy.
2. Explain about the instrumentation and applications of UV –Visible spectrophotometer.
3. Write about the principle and instrumentation of IR Spectroscopy.
4. Explain about Single beam and double beam spectrophotometers.
5. Explain about the Principle and instrumentation of Flame photometry
6. Explain about the following,
   i. Determination of alkali and alkaline earth metals in natural waters by flame photometry
   ii. Calibration plots in Flame photometry
7. Explain about the principle and instrumentation of Atomic absorption spectroscopy (AAS)
8. Explain about the following,
   i. Determination of Calcium and Magnesium in tap water by AAS
   ii. Calibration plots in AASS
9. Explain about the principle and instrumentation of Polarography technique.
10. Explain about the following,
    i. Ilkovic equation
    ii. Dropping mercury electrode (DME)
11. Explain about the potentiostatic coulometry technique
12. Explain about the amperiostatic coulometry technique.
13. Explain about the Nernst equation and its applications
14. Write about potentiometric titrations
15. Explain about the following,
    i. Reference electrodes
    ii. Indicator electrodes
16. Explain about the ion selective electrodes and write its applications.

Question Bank:

Short Answer Questions: 05 M

1. State Beers – Lamberts law and write its deviations
2. Explain about the photo multiplier tube detector used in Spectrophotometer
3. Write the advantages and dis advantages of double beam spectrophometer over single beam spectrophotometer
4. Write the applications of IR spectroscopy
5. Explain about the interferences and its eliminations in Flame photometry
6. Explain about the calibration plots in Flame photometry
7. Write about the applications of Flame photometry
8. Explain about the radiation sources used in AAS
9. Write about Hollow cathode lamp
10. Write about the applications off AAS
11. Write about qualitative and quantitative applications of Polarography
12. State and explain about Ilkovic equation
13. Explain about Diffusion current and half wave potentials.
14. Explain about residual current and migration current.
15. Write about DME
16. Explain the principles of coulometry
17. Write about the applications of coulometry
18. Write about electrochemical cells
19. Explain about electrode potentials
20. What is emf? write about cell potentials
21. Explain about Glass electrode
22. Explain about calomel electrode
23. Explain about Metal – metal ion electrode