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

DEPARTMENT OF CHEMISTRY

B. Sc Chemistry Syllabus under CBCS

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Board of Studies
2018-19

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

Recommended Composition of the Board of Studies of Chemistry

And it' s Functions of an Autonomous College

April-2018-19

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

   1. Dr. V .Sambasivarao, Lecturer in Chemistry, Arts College, Rajahmundry
   2. 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. Prof. 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. Sri. Nemani Ramam, M.Sc., M.Phil

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.

<u>Signatures of the members who attended the</u>

<u>Board of studies in Analytical Chemistry on 07.04.2018 at 2.00pm</u>

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. V. Sambasivarao, — Subject expert
   Lecturer in Chemistry,
   Govt. Arts College,
   Rajamahendravaram

5. Dr. K. Jhansi Lakshmi — Subject expert
   Lecturer in Chemistry,

Ideal Degree College, Kakinada

6. Sri. N. Ramam — Alumnus, Principal, Retd.
7. Sri D. Rama Rao — Member
8. Sri V. Mallikarjuna Sarma — Member

ACTION PLAN BOS MEETING -CHEMISTRY HELD ON 07 -04-2018.

1. Department activities for 2018-2019 academic year. Annexure I

Month	Activity proposed	Faculty member in charge
June-18	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-18	Student awareness programmes on ragging& eve teasing - consequences , self-discipline, career guidance, higher education opportunities etc.,	T.Vara prasad
August-18	Conference on prospects in pharmaceutical industries	T. Vara Prasad

	Study tour / Field trips	
Sept-18	Ozone day	
Oct-18	MOLE Day	D.Ramarao
	Faculty development programme	V.Mallikarjuna sarma
Nov-18	11th National Education Day – Out reach Programme to nearby school	
Dec-18	World AIDS Day	
	Chemistry day & Chem fest	V.Mallikarjuna sarma
Jan-19	10 days coaching for PG entrance examinations in chemistry Study tour / Field trips	V.Mallikarjuna sarma
Feb-19	NATIONAL SCIENCE DAY	V.Mallikarjuna sarma
March-19	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
xi)

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. **Institution 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	Technical assistants, Quality

		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.	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 propose to give 33.3% weitage for competitive exam questions pertaining to the syllabus prescribed.

10. **Suggest 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

Department of Chemistry BOS Meeting Dt.07 -04-2018

Resolutions:

Meeting of Board of studies in chemistry is convened on 07-04-18 in the guest room of the College. The Principal Dr. Chappidi Krishna, Dr.K.Deepthi , University Nominee , Ch. V. N. S. Vara Prasad, Managing partner, DAS Pharma Ltd, Kakinada, Dr.V.Sambasiva Rao , Subject Expert, Govt. Degree College, Tuni, Dr. . Jhansi Lakshmi, Lecturer in Chemistry, Ideal College, Kakinada. , all members of the faculty of Chemistry and student representatives attended the meeting. 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, Hyderabad to the first year and second year and final year students w.e.f. 2018-19
2. Enhance the internal assessment component from 30% to 40% in theory to first year (admitted batch) extended to second year also.
3. It is resolved to allot project works for final year students who opt for project work in chemistry preferably industry based.
4. It is resolved to conduct departmental activities such as Ozone day, Chem fest, Chemistry day and Science day etc.
5. It is resolved to offer subject electives and skill based electives in the V and VI semesters respectively.
6. It is resolved to implement the recommended Pedagogy for the first semester 2018-19.
7. Resolved to conduct practical examinations semester wise.

   The following paper setters are recommended.

   i. Dr. V.Sambasiva Rao, Govt.Arts College, Rajahmundry.
   ii. K.A.R.S.S.Prasad, VS Krishna College, Visakhapatnam.
   iii. Sri S.V.Ramana , Arts College, Rajahmundry
   iv. Sri Machi Raju, Arts College, Rajahmundry.
   v. U. Satyanarayana, GDC, Tuni
   vi. R. Brahmaji, GDC, Ramachandrapuram
   vii. N. V. Sudhakar, GDC, Tuni
8. It is resolved to organize Guest lectures by eminent professors.
9. Resolved to implement pass minimum for internal assessment for CBSE pattern students as the pattern is learner oriented.
10. NEW COURSES:

    It is resolved to explore the possibility of introducing a new course in B.Sc Pharmaceuticals/Industrial Chemistry as Restructed course.

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

12. Resolve 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.
13. 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.
14. It is proposed to give 33.3% weitage for competitive exam questions pertaining to the syllabus prescribed.

New Courses

15. 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.
16. 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.
17. 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.
18. .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.
19. it is proposed to give 33.3% weitage competitive exam questions pertaining to the syllabus prescribed

Special Features of Chemistry Department

20. In the cluster system 74 students opted chemistry projrcts andthey were submitted projects to our college under the guideance of eminemt lecturers.
21. NAAC team visited our college chemistry department on 08-09-2017 and chairman was commented **" chemistry department is very good"** in always.
22. CCB academic team visited our chemistry department on 21-03-2018 and team head was commented as **" chemistry department is excellent"** in always.

Modern Lecture Methods & New Techniques

23. Power Point Presentation / LCD Teaching.
24. Virtual Class Teaching Methods.
25. Feedback on Teaching Performance.

14. ExplainDiels-Alder reaction.

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15. Write about the acidic nature of Acetelene. How 2-Butyne is prepared from Acetelene

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16. Write Huckle’ s rule. Apply it to the non-benzenoid compounds.

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P. R. GOVERNMENT COLLEGE, KAKINADA
SYLLABUS FOR SEMESTER – II (CHEMISTRY)
Paper II (Physical & General Chemistry) 60 hrs. (4h/w)

OBJECTIVES: .1. COMPARES THE VB THEORY AND MOLECULAR ORBITAL THEORY
2. UNDERSTANDS THE PRINCIPLES INVOLVED IN TITRIMETRIC AND GRAVIMETRIC ANALYSIS
3. ABLE TO APPRECIATE THE APPLICATIONS OF COLLOIDS AND ADSORPTION

PHYSICAL CHEMISTRY **30 hrs (2h / w)**

UNIT-I

Solid state **l0h**

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravis lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Defects in crystals. Stoichiometric and non-stoichiometric defects.

UNIT-II

1. Gaseous state **6 h**

Compression factors, deviation of real gases from ideal behavior. Vander Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. The vander Waal's equation and the critical state. Law of corresponding states.Relationship between critical constants and vander Waal's constants. Joule Thomson effect.

2.Liquid state **4 h**

Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state. Classification of liquid crystals into Smectic and Nematic. Differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices.

UNIT-III

Solutions **l0h**

Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non ideal solutions. Vapour pressure - composition and vapour pressure- temperature curves. Azeotropes-HCl-H_2O, ethanol-water systems and fractional distillation. Partially miscible liquids-phenol-water, trimethylamine-water, nicotine-water systems. Effect of impurity on consulate temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

GENERAL CHEMISTRY **30 hrs (2h / w)**

UNIT-IV

l. Surface chemistry **8 h**

Definition of colloids. Solids in liquids(sols), preparation, purification, properties - kinetic, optical, electrical. Stability of colloids, Hardy-Schulze law, protective colloid. Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels) preparation, uses.

Adsorption: Physical adsorption, chemisorption. Freundlisch, Langmuir adsorption isotherms. Applications of adsorption

2. Chemical Bonding **7h**

Valence bond theory, hybridization, VB theory as applied toClF_3, $Ni(CO)_4$,
Molecular orbital theory - LCAO method, construction of M.O. diagrams for homonuclear and hetero-nuclear diatomic molecules (N_2, O_2, CO and NO).

UNIT-V

Stereochemistry of carbon compounds **15 h**

Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.
Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical

rotation and specific rotation.
Chiral molecules- definition and criteria(Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.
D,L and R,S configuration methods and E,Z- configuration with examples.

List of Reference Books

1. Principles of physical chemistry by Prutton and Marron
2. Solid State Chemistry and its applications by Anthony R. West
3. Text book of physical chemistry by K L Kapoor
4. Text book of physical chemistry by S Glasstone
5. Stereochemistry of Organic compounds by E L Eliel
6. Advanced Organic Chemistry by F A Carey and R J Sundberg
7. Stereochemistry by P.S.Kalsi
8. Stereochemistry of Organic compounds by D. Nasipuri
9. Advanced physical chemistry by Bahl and Tuli
10. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan

P. R. GOVERNMENT COLLEGE, KAKINADA
SYLLABUS FOR SEMESTER – II (CHEMISTRY)
Paper II (Physical & General Chemistry)
Weightage to content

S. No.	Course Content	Essay Questions (10M)	Short Answer Questions (5M)	Total No. Of Questions from each Unit	Total No. of Marks allotted to each Unit
	Physical Chemistry				
1	Unit - I	1	1	2	15
2	Unit - II	1	2	3	20
3	Unit - III	2	1	3	25
	General Chemistry				
4	Unit - IV	2	3	5	35
5	Unit - V	2	1	3	25
	TOTAL	**8**	**8**	**16**	**120**

LABORATORY COURSE -II **30** hrs (2 h / w)

Practical-II Analysis of Mixture Salt (At the end of Semester-II)

Qualitative inorganic analysis

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

Anions: Carbonate, sulphate, chloride, bromide, acetate, nitrate, borate, phosphate.

Cations: Lead, copper, iron, aluminum, zinc, manganese, calcium, strontium, barium, potassium and ammonium.