# PVKN GOVT. COLLEGE (AUTONOMOUS), CHITTOOR

# BOARD OF STUDIES
# MINUTES OF THE MEETING

## DEPARTMENT OF CHEMISTRY

# PVKN Govt. College (A), Chittoor

## BOARD OF STUDIES COMMITTE
## Department of Chemistry

| Category | Name of the Member | Signature |
|---|---|---|
| **BOS Chairman** | 1. **Dr. T. Hari Babu**<br>Lecturer in-Charge<br>Mobile: 9550026857<br>Mail ID: harihcu04@gmail.com | |
| **Faculty members** | 2. **Dr. Y. Vyshnavi**<br>Mobile: 9490385968<br>Mail ID:<br>vyshnavi.yelchuri@gmail.com<br>3. **Sri. A. Ramesh**<br>Mobile: 8297936159<br>Mail ID:<br>rameshallu349@gmail.com | |
| **External members** | | |
| Two subject experts from outside parent university nominated by Academic Council | 4. **Dr. K. Nagamuni Reddy**<br>Lecturer in Chemistry,<br>SKR & SKR Govt. College<br>for Women(A), Kadapa – 516004<br>Mobile: 9441150029<br>Mail ID: drknreddy65@gmail.com | |
| | 5. **Dr. V. Saleem Basha**<br>Lecturer in Chemistry,<br>Govt. College (A)<br>Anantapuramu<br>Mobile: 9491355579<br>Mail ID:<br>saleemchem08@gmail.com | |
| University nominee | 6. **Prof. D. Srinivasulu**<br>Department of Chemistry,<br>S V University,<br>Tirupati<br>Mobile: 9493816701<br>Mail ID 1:<br>dsrinivasulu@svuniversity.edu.in<br>Mail ID 2: doddaga_s@yahoo.com | |
| Representative from | 7. **Sri. G. Jayaprakash Reddy**<br>Managing Partner, Ranga Fruit | |

| | | |
|---|---|---|
| Industry/Corporate sector/Allied area | Products, Madras cross road, Pallur (Po)-517132, Gudipala(M), Chittoor(DT), Phone: 08572-226689, Fax- 08572-22707 | |
| One post graduate meritorious Alumnus nominated by Principal (or) Experts from outside the college whenever special courses of studies are formulated (or) One member of staff of the same faculty | 8. **Dr. K. Dayananda Reddy**<br>Reader in Chemistry(Rtd.),<br>PVKN Govt. College, Chittoor<br>Mobile: 9440359792<br>Mail ID: dayakollu@gmail.com | |

**Signature of the Members**

**Signature of the BOS Chairman**

7/2/19

# PVKN Govt. College (A), Chittoor

## BOARD OF STUDIES MEETING – 07-02-2019

### Department of Chemistry

The 1st meeting of BOS in Chemistry was held on 07-02-2019 at Chemistry Department.

**Agenda:**

1. Approval for UG Course structure of Chemistry subject.
2. Ratification for changes in the UG (BSc) I Semester paper entitled INORGANIC & ORGANIC CHEMISTRY Syllabus, model question paper and blue print.
3. Approval for changes in the UG (BSc) II Semester paper entitled PHYSICAL & GENERAL CHEMISTRY Syllabus, model question paper and blue print.
4. Panel of question paper setters and examiners.
5. Pedagogy of Teaching - Learning as per UGC guidelines.
6. Additional inputs to the curriculum.
7. Internal assessment component and additional credits for extra-curricular activities.
8. Evaluation and assessment pattern.
9. Introduction of new certificate and diploma courses.
10. Other academic and extra-curricular activities of the department.
11. Any other proposal with the permission of the chair.

**Signature of the Members**

**Signature of the BOS Chairman**

7/2/19

Haribabu 7.2.19

# PVKN Govt. College (A), Chittoor

## BOARD OF STUDIES MEETING – 07-02-2019

## Department of Chemistry

### Resolutions

1. The college was conferred with autonomy by the UGC in the month of July, 2018. Subsequently, the college submitted letters to the parent university, UGC and to the Govt. of AP for constitution of Statutory Bodies and release of notification by the affiliating university. The Registrar, S.V. University issued notification and directed to implement autonomy from the academic year 2018-19. The college prepared its own academic schedule after the conferment of autonomy. Accordingly, the college has been implementing autonomy for I year degree I semester students from the date of issuance of notification on adhoc basis following the academic regulations of the parent university and covered the prescribed syllabus in the first semester by making certain changes. The examinations for I semester were also conducted by the college as per the regulations of the UGC. The syllabus, course structure, model question papers and blue print are placed before the committee for ratification.

It is resolved to ratify the decisions taken at college level till the date of BOS meeting.

2. As per the academic schedule for II semester of I year students was started on 22-11-2018 and the academic instruction has been given to the students as per the syllabus designed by the internal BOS members. It is placed before the committee for constructive suggestions for further improvement keeping in view the local needs / market demand / industry-needs / employment generation as per the UGC Regulations 2018. The syllabus covered from 22-11-2018 is placed before the committee for ratification. From the date of BOS meeting, the remaining syllabus for I year II semester is approved.

3. Resolved to ratify the panel of question paper setters nominated for UG I year semester I examinations.

5. Resolved to use additional inputs to enrich the curriculum and enlighten the students on academic performance.

6. To include internal assessment components and additional credits for extra curricular activities of the students.

7. To follow the evaluation and assessment pattern strictly adhering the UGC norms and guidelines.

8. To introduce new certificate course on WATER ANALYSIS related to subject and other courses deemed to be useful for the students.

9. To take the valuable suggestions of the BOS on academic and extra-curricular activities to be taken up at department level for strengthening the academic instruction to the students.

10. If any discussion related to academic matters including extra curricular activities may be included as the last resolution.

**Signature of the Members**

**Signature of the BOS Chairman**

# PVKN Govt. College (A), Chittoor

## Department of Chemistry
## COURSE STRUCTURE

| SNO | COURSE<br>B. Sc (Chemistry) | TOTAL MARKS | MID SEM EXAM (CIA) | SEM END EXAM (SEE) | TEACHING HOURS | CRE DITS |
|---|---|---|---|---|---|---|
| 1 | I B. Sc- Semester I- Paper-I | 100 | 25 | 75 | 4 | 3 |
| | Paper - I Lab (practicals) | 50 | - | 50 | 3 | 2 |
| 2 | I B. Sc –Semester II- Paper-II | 100 | 25 | 75 | 4 | 3 |
| | Paper - II Lab ( Practical) | 50 | - | 50 | 3 | 2 |
| 3 | II B. Sc- Semester III- Paper-III | 100 | 25 | 75 | 4 | 3 |
| | Paper - III Lab( Practical) | 50 | - | 50 | 3 | 2 |
| 4 | II B. Sc-Semester IV- Paper-IV | 100 | 25 | 75 | 4 | 3 |
| | Paper - IV Lab( Practical) | 50 | - | 50 | 3 | 2 |
| 5 | III B.Sc-Semester V- Paper-V | 100 | 25 | 75 | 3 | 3 |
| | Paper - V Lab (Practical) | 50 | - | 50 | 3 | 2 |
| 6 | III B.Sc-Semester V- Paper-VI | 100 | 25 | 75 | 3 | 3 |
| | Paper -VI Lab( Practical) | 50 | - | 50 | 3 | 2 |
| 7 | III B.Sc- Semester VI<br>Core Elective Paper-VII | 100 | 25 | 75 | 3 | 3 |
| | Core Elective Paper-VII<br>Lab( Practical) | 50 | - | 50 | 3 | 2 |
| 8 | III B.Sc-Semester-VI Cluster<br>Elective Paper-VIII-1 | 100 | 25 | 75 | 3 | 3 |
| | Cluster Elective<br>Paper – VIII-1 Lab( Practical) | 50 | - | 50 | 3 | 2 |
| 9 | III B.Sc-Semester VI Cluster<br>Elective Paper-VIII-2 | 100 | 25 | 75 | 3 | 3 |
| 18 | Cluster Elective<br>Paper – VIII-2 Lab( Practical) | 50 | - | 50 | 3 | 2 |
| 19 | III B.Sc-Semester VI Cluster<br>Elective Paper-VIII-3 | 100 | 25 | 75 | 3 | 3 |
| 20 | Cluster Elective<br>Paper – VIII-3 Lab ( Practical) | 50 | - | 50 | 3 | 2 |
| | TOTAL | | | | | |

**Signature of the Members**

Y. Vijaya Lakshmi

7/2/19

Haribabu 7.2.19

**Signature of the BOS Chairman**

## PVKN Govt. College (A), Chittoor

### Department of Chemistry
### Paper titles

| SEM | PAPER | PAPER CODE | MAJOR/ELECTIVE THEORY/PRACTICAL | TITLE |
|---|---|---|---|---|
| I | I | 18-CHE-101 | Core Theory | Inorganic & Organic Chemistry |
| | I P | 18-CHE-101 P | Core Practical | Simple Salt Analysis |
| II | II | 18-CHE-201 | Core Theory | Physical & General Chemistry |
| | II P | 18-CHE-201 P | Core Practical | Analysis of Mixture Salt |

Signature of the Members

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NEW

# PVKN Govt. College (A), Chittoor

I B.Sc., SEMESTER –I: CHEMISTRY PAPER – I
(INORGANIC & ORGANIC CHEMISTRY)

Subject Code: 18-CHE-101 Credits: 03 Teaching Hrs/Week : 4

## SYLLABUS

### INORGANIC & ORGANIC CHEMISTRY-I 60 hrs (4h/w)

**UNIT –I**

**p-block elements –I** **10h**

*General characteristics of elements of groups 13, 14, 15, with special reference to metallic, acidic nature, oxidation states, I.P, E.A., E.N.* *(added syllabus)*

Group - 13: Synthesis and structure of diborane ($B_2H_6$), tetraborane ($B_4H_{10}$) and borazine ($B_3N_3H_6$)

Group - 14: Preparation and applications of silanes and silicones.

Group - 15: Preparation and reactions of hydrazine, hydroxylamine

**UNIT-II**

**p-block elements –II** **4h**

*General characteristics of elements of groups 16, 17, with special reference to metallic, acidic nature, oxidation states, I.P, E.A., E.N* *(added syllabus)*

Group - 16: Classifications of oxides based on (i) Chemical behaviour and (ii) Oxygen content

Group- 17: Inter halogen compounds and pseudo halogens

**2. Organometallic Chemistry** **6h**

Definition - classification of Organometallic compounds – nomenclature, preparation and synthetic applications of alkyls of Li and Mg

**UNIT-III**

**Structural theory in Organic Chemistry** **15h**

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like $H_2O$, $NH_3$ & $AlCl_3$).

Reactive intermediates : Generation and structure of Carbonium ion & Carbanion. Classification and structure of Carbene & Nitrene.

Bond polarization: Inductive effect and its application to (i) Basicity of amines (ii) Acidity of carboxylic acids and (iii) Stability of carbonium ions.

Resonance or Mesomeric effect and its application to (i) acidity of phenol and (ii) acidity of carboxylic acids.Hyper conjugation and its application to (i) stability of carbonium ions, (ii) Free radicals and (iii) alkenes.

Types of organic reactions: (i) Addition reactions (ii) Substitution reactions (iii)Elimination Reactions (iv) Rearrangement reactions (v) Polymerisation reactions.

**UNIT-IV**

**I. Acyclic Hydrocarbons** **9h**

(A) Alkenes - Preparation of alkenes by (i) dehydrohalogenation of alkyl halides, (ii) dehalogenation of vicinal dihalides and (iii) dehydration of alcohols.
Chemical properties: Addition of hydrogen, halogen (with mechanism). Addition of HX (Markonikov's addition). Addition of $H_2O$, HOX, $H_2SO_4$ (with mechanism). Addition of HBr in the presence of peroxide (anti - Markonikov's addition).

(B) Dienes - Types of dienes, reactions of 1, 3-butadiene: 1, 2 and 1,4 addition of HBr to 1,3 – butadiene, Diel's - Alder reaction of 1,3-butadiene.

(C) Alkynes - Preparation by (i) dehydrohalogenation of dihalides and (ii) dehalogenation of tetrahalides. Acidity of acetylenic hydrogens. Chemical properties: electrophilic addition of $X_2$, HX, $H_2O$ (Tautomerism). Oxidation with $KMnO_4$ and $OsO_4$. *Reduction of alkynes by Lindlar's catalyst, $Na/NH_3$ (Birch reduction), and metallic reduction ($H_2$/ Ni, Pd, Pt) (added syllabus).*

**2. Alicyclic hydrocarbons (Cycloalkanes)** **6h**

Nomenclature, Preparation by Freunds method, Wislicenus method. Reactivity comparision of cyclopropane and cyclobutane with alkanes. Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions. Conformational structures of cyclohexane.

**UNIT-V**

**Benzene and its reactivity** **10h**

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)

Reactions - General mechanism of electrophilic substitution, mechanism of Nitration, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like $NO_2$ and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) nitro, carbonyl and sulphonic acid groups (iii) Halogens.

**Additional inputs**

1. Hydrazoic acid, Polyhalides and their structures, Gilman reagent ($R_2CuLi$) (unit II)
2. $SN^1$, $SN^2$ mechanisms (unit III)
3. Polymerization reactions of acetylene, Ozonolysis, Polymerisation, polymers in daily life, Conformers of cyclopentane (unit IV)

**Suggested readings (Reference Books)**


1. Inorganic Chemistry by J.E.Huheey
2. Basic Inorganic Chemistry by Cotton and Wilkinson
3. A textbook of qualitative inorganic analysis by A.I. Vogel
4. Organic Chemistry by Morrisson and Boyd
5. A Text Book of Organic Chemistry by I. L. Finar Vol I
6. Concise Inorganic Chemistry by J. D. Lee


**Signature of the Members**

7/2/19

Y. Uyshnavi

**Signature of the BOS Chairman**

Haribabu 7.2.19

OLD

# PVKN Govt. College(A), Chittoor

I B.Sc., SEMESTER –I: CHEMISTRY PAPER – I
(INORGANIC & ORGANIC CHEMISTRY)

Subject Code: Credits : 03 Teaching Hrs/Week : 4

## SYLLABUS

**UNIT –I** **15h**

**p-block elements –I**

Group-13: Synthesis and structure of diborane and higher boranes ($B_4H_{10}$ and ***$B_5H_9$ (removed)***), boron-nitrogen compounds ($B_3N_3H_6$ and ***BN (removed)***)

Group - 14: Preparation and applications of silanes and silicones.

Group - 15: Preparation and reactions of hydrazine, hydroxylamine.

**UNIT-II** **8h**

**1. p-block elements -II**

Group - 16: Classifications of oxides based on (i) Chemical behaviour and (ii) Oxygen content.

Group-17: Inter halogen compounds and pseudo halogens.

**7h**

**2. Organometallic Chemistry**

Definition - classification of Organometallic compounds - nomenclature, preparation, properties and applications of alkyls of Li and Mg.

**UNIT-III** **10 h**

**Structural theory in Organic Chemistry**

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like $H_2O$, $NH_3$ & $AlCl_3$).

Bond polarization : Factors influencing the polarization of covalent bonds, electro negativity - inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes, carbanions, carbenes and nitrenes.

Types of Organic reactions : Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination- Examples.

**UNIT-IV**

**6 h**

**1. Acyclic Hydrocarbons**

**Alkenes** - Preparation of alkenes. Properties: Addition of hydrogen - heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of $H_2O$, HOX, $H_2SO_4$ with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition). Dienes - ***Types of dienes (removed)***, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction.

**Alkynes** - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acetylides). Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of $X_2$, HX, $H_2O$ (Tautomerism), Oxidation with $KMnO_4$, $OsO_4$, reduction and ***Polymerisation reaction of acetylene (removed)***.

**4 h**

2. **Alicyclic hydrocarbons (Cycloalkanes)**

Nomenclature, Preparation by Freunds method, Wislicenus method. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and ***Pitzer's strain theory (removed)***. Conformational structures of ***cyclobutane, cyclopentane (removed)***, cyclohexane.

**UNIT-V**

**10h**

**Benzene and its reactivity**

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like $NO_2$ and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens

(Explanation by taking minimum of one example from each type)

**Suggested readings**

**Reference Books**


1. Inorganic Chemistry by J.E.Huheey
2. Basic Inorganic Chemistry by Cotton and Wilkinson
3. A textbook of qualitative inorganic analysis by A.I. Vogel
4. Organic Chemistry by Morrisson and Boyd
5. A Text Book of Organic chemistry by I L Finar Vol I
6. Concise Inorganic Chemistry by J.D.Lee


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7/2/19

# PVKN Govt. College(A), Chittoor

I B.Sc., SEMESTER –I: CHEMISTRY PAPER – I
(INORGANIC & ORGANIC CHEMISTRY)

## BLUE PRINT FOR THE MODEL PAPER

| S. No. | Type of Question | To be given in the Question Paper | | | To be answered | | |
|---|---|---|---|---|---|---|---|
| | | No. of Questions | Marks allotted to each question | Total Marks | No. of Questions | Marks allotted to each question | Total Marks |
| 1 | Section - A (Short Questions) | 10 | 5 | 50 | 5 | 5 | 25 |
| 2 | Section - B (Essay Questions) | 10 | 10 | 100 | 5 | 10 | 50 |
| Total Marks | | | | 150 | Total Marks | | 75 |

## BLUE PRINT FOR THE QUESTION PAPER SETTING

| Chapter Name | Essay Question 10 Marks | Short Questions 5 Marks | Marks allotted to the Chapter |
|---|---|---|---|
| UNIT - I | 2 | 2 | 30 |
| UNIT - II | 2 | 2 | 30 |
| UNIT - III | 2 | 2 | 30 |
| UNIT - IV | 2 | 2 | 30 |
| UNIT - V | 2 | 2 | 30 |
| Total No. of Questions | 10 | 10 | 150 |

Approved:

Signature of the Members

Y. Upendra

Haribabu 7.2.19
Signature of the BOS Chairman
7/2/19

NEW

# PVKN Govt. College(A), Chittoor

I B.Sc., SEMESTER –I: CHEMISTRY PAPER – I
(INORGANIC & ORGANIC CHEMISTRY)

Subject Code: 18-CHE-101 Time : 3 hrs Max Marks : 75

## MODEL QUESTION PAPER

## SECTION – A

**Answer any Five of the following short questions** **5X5 =25 Marks**

1. How is borazole prepared ? Discuss about its properties and structure.
2. How hydroxylamine can be prepared ? Give an account of its properties.
3. Write note on Preparation of Silicones.
4. Write a short note on pseudo halogens.
5. what are Grignard reagents ? How are they prepared?
6. Define the Carbonium ion and explain the stability with no bond resonance.
7. Define the Markonikov's rule and explain the addition of 1- Propene with HBr.
8. Explain the acidity of the Acetylinic hydrogen with example.
9. Draw the conformational structures of Cyclohexane.
10. Define aromaticity and apply the Huckel's rule to benzene and naphthalene.

## SECTION – B

**Answer ALL the following Questions** **5X10 =50 Marks**

11 How is diborane prepared ? Discuss its structure ?

(OR)

12 What are silicones ? How can they be prepared ? Discuss about their uses.

13 Explain classification of oxides on the basis of chemical behavior and oxygen content.

(OR)

14 Define Inter halogen compounds ? Discuss the Preparation and structure of Interhalogen compounds ?

15. Describe different types of Organic Reactions with one example to each.

(OR)

16. Write notes on the following
    1) Mesomeric effect 2) Hyper conjugation 3) Inductive effect
17. Explain the addition of these reagents to alkenes with mechanism.
    1) $H_2O$ 2) HOX 3) $H_2SO_4$

(OR)

18. Explain Baeyer's bond angle strain theory.
19. Describe the Molecular Orbital structure of Benzene.

(OR)

20. Explain the orientation in benzene with respect to alkyl and nitro groups.

**Signature of the Members**

**Signature of the BOS Chairman**

7/2/19

Y. Haribabu 7.2.19

OLD

# PVKN Govt. College(A), Chittoor

I B.Sc., SEMESTER –I: CHEMISTRY PAPER – I
(INORGANIC & ORGANIC CHEMISTRY)

Subject Code: Time : 3 hrs Max Marks : 75

## MODEL QUESTION PAPER

### SECTION – A

**Answer any Five of the following Questions** **5X5 =25 Marks**

1. Define the electron deficient molecules and draw the structure of Borazole and Diborane.
2. Classify the Oxides based on the oxygen content with one example to each.
3. How the following are synthesized from Organo Lithium Compounds.
   a) Acetic acid b) Ethyl alcohol
4. Define the Carbonium ion and explain the stability with no bond resonance.
5. Define the Markonikov's rule and explain the addition of 1- Propene with HBr.
6. Explain the acidity of the Acetylinic hydrogen with example.
7. Draw the conformational structures of Cyclohexane.
8. Define aromaticity and apply the Huckel's rule to benzene and naphthalene.

### SECTION – B

**Answer ALL the following Questions** **5X10 =50 Marks**

9. (a) Write note on Preparation, Structure and Properties of Silicones.

**(OR)**

(b) Explain the Preparation and Oxidation- Reduction reactions of Hydroxylamine.

10.(a) Give an account on different types of interhalogen compounds.

**(OR)**

(b) How the following are prepared from the Methyl Magnesium bromide and methyl lithium
i) Formaldehyde ii) Acetaldehyde iii) Acetone iv) t- butyl alcohol

11. (a) Describe different types of Organic Reactions with one example to each.

**(OR)**

(b) Write notes on the following
i) Mesomeric effect ii) Hyper conjugation iii) Inductive effect

12.(a) Explain the addition of these reagents to alkenes with mechanism.
i) $H_2O$ ii) HOX iii) $H_2SO_4$

**(OR)**

(b)Explain Baeyer's bond angle strain theory.

13. (a) Describe the Molecular Orbital structure of Benzene.

**(OR)**

(b) Explain the orientation in benzene with respect to alkyl and nitro groups.

**Signature of the Members**

**Signature of the BOS Chairman**

7/2/19

T. Haribabu 7.2.19

Y. Vyshnavi

NEW

# PVKN Govt. College (A), Chittoor

I B.Sc., SEMESTER –I: CHEMISTRY PAPER – I P
(SIMPLE SALT ANALYSIS)

Subject Code: 18-CHE-101P | Credits: 02 | Teaching Hrs/Week : 3

## PRACTICAL SYLLABUS

Qualitative Inorganic Analysis — 30 hrs (3h/w)

Analysis of simple salt containing one anion and cation from the following

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

**Cations:** Lead, copper, iron, aluminium, zinc, manganese, calcium, barium, and ammonium.

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7/2/19

OLD

# PVKN Govt. College (A), Chittoor

I B.Sc., SEMESTER –I: CHEMISTRY PAPER – I P
(SIMPLE SALT ANALYSIS)

Subject Code: Credits : 02 Teaching Hrs/Week : 3

## PRACTICAL SYLLABUS

Qualitative inorganic analysis 30 hrs (2 h / w)

Analysis of simple salt containing one anion and one cation from the following

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

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

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7/2/19

NEW

# PVKN Govt. College (A), Chittoor

I B.Sc., SEMESTER –I: CHEMISTRY PAPER – I P
(SIMPLE SALT ANALYSIS)

Subject Code: 18-CHE-101P | Time: 3 hrs | Max. Marks : 50

Q. Analyse the given inorganic simple salt using systematic qualitative analysis procedure. Report the name of anion and cation with one confirmatory test.

For Record - 10 Marks

For Practical - 40 Marks

**Signature of the Members**

**Signature of the BOS Chairman**

7/2/19

7.2.19

NEW

# PVKN Govt. College(A), Chittoor

I B.Sc., SEMESTER –II: CHEMISTRY PAPER – II
(PHYSICAL & GENERAL CHEMISTRY)

Subject Code: 18-CHE-201 Credits: 03 Teaching Hrs/Week : 4

## SYLLABUS

**PHYSICAL & GENERAL CHEMISTRY** 60 hrs (4h/w)

**UNIT-I**

**Solid state** **8h**

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, Bragg's equation – derivation and determination of crystal structure by Bragg's method. Crystal structure.
Defects in crystals: stoichiometric defects - Schottky and Frenkel defects.

**UNIT-II**

**1. Gaseous state** **8 h**

Compression factors, deviation of real gases from ideal behavior. Vander Waal's equation of state. P-V Isotherms of $CO_2$. 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. Liquifaction of gases: i) Linde's method and ii ) Claude's method.

**2.Liquid state** **4 h**

Structural differences between solids, liquids and gases. Liquid crystals, 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** **10h**

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.

**UNIT-IV**

**I. Surface chemistry** **8 h**

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

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

**2. Chemical Bonding** **6h**

Molecular orbital theory - LCAO method, construction of M.O. diagrams for homo-nuclear ($N_2$, $O_2$,) and hetero-nuclear diatomic molecules (CO and NO).

**UNIT-V**

**Stereochemistry of carbon compounds** **16 h**

Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.

Chiral molecules- definition and criteria (Symmetry elements).

Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation. Explanation of optical isomerism with examples Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

Definition of enantiomers and diastereomers. D,L and R,S configuration methods and E,Z-configuration with examples.

**Additional inputs**

Non stochiometric defects (Unit I)
Gas Laws (Boyle's Law, Charle's Law, Gay-Lussac's Law, Avogadro's law) (Unit II)
Types of Solutions (Unit III)
Factors effecting Adsorption, MO diagram of HCl (Unit IV)
Separation technique of d(+) and l(-) compounds (Unit V)

**Suggested readings (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


Haribabu 7.2.19

**Signature of the Members**

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7/2/19

OLD

# PVKN Govt. College (A), Chittoor

I B.Sc., SEMESTER –II: CHEMISTRY PAPER – II
(PHYSICAL & GENERAL CHEMISTRY)

Subject Code: Credits: 03 Teaching Hrs/Week : 4

## SYLLABUS

**UNIT-I**

**Solidstate** **10h**

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 (removed)*.

**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 (removed)*. 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** **10h**

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.

**UNIT-IV**

**I. 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 (removed)*. Liquids in liquids (emulsions) preparation, *properties (removed)*, 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 to $ClF_3$, $Ni(CO)_4$, Molecular orbital theory - LCAO method, construction of M.O. diagrams for homo-nuclear 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.

**Suggested readings**

**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
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7/2/19

# PVKN Govt. College (A), Chittoor

I B.Sc., SEMESTER –II: CHEMISTRY PAPER – II
(PHYSICAL & GENERAL CHEMISTRY)

## BLUE PRINT FOR THE MODEL PAPER

| S. No. | Type of Question | To be given in the Question Paper | | | To be answered | | |
|---|---|---|---|---|---|---|---|
| | | No. of Questions | Marks allotted to each question | Total Marks | No. of Questions | Marks allotted to each question | Total Marks |
| 1 | Section - A (Short Questions) | 10 | 5 | 50 | 5 | 5 | 25 |
| 2 | Section - B (Essay Questions) | 10 | 10 | 100 | 5 | 10 | 50 |
| Total Marks | | | | 150 | Total Marks | | 75 |

## BLUE PRINT FOR THE QUESTION PAPER SETTING

| Chapter Name | Essay Question 10 Marks | Short Questions 5 Marks | Marks allotted to the Chapter |
|---|---|---|---|
| UNIT - I | 2 | 2 | 30 |
| UNIT - II | 2 | 2 | 30 |
| UNIT - III | 2 | 2 | 30 |
| UNIT - IV | 2 | 2 | 30 |
| UNIT - V | 2 | 2 | 30 |
| Total No. of Questions | 10 | 10 | 150 |

Approved:

Signature of the Members

Y. Uyshnavi

Haribabu 7.2.19
7/2/19

Signature of the BOS Chairman

NEW

# PVKN Govt. College(A), Chittoor

I B.Sc., SEMESTER –II: CHEMISTRY PAPER – II
(PHYSICAL & GENERAL CHEMISTRY)

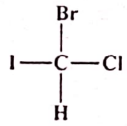
Subject Code: 18-CHE-201 Time : 3 hrs Max Marks : 75

## MODEL QUESTION PAPER

## SECTION – A

**Answer any Five of the following short questions** **5X5 =25 Marks**

1Explain Joule-Thomson effect.
2 Explain space lattice and unit cell.
3 Explain law of rationality of indices.
4 Explain classification of Liquid crystals
5 Write a note on fractional distillation
6 Write and explain Henry's law.
7 Explain differences between physical adsorption and chemisorption
8 Explain Hardy-Schulze law.
9 Assign R, S- configuration for the following compounds.



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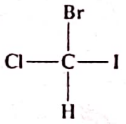

II

10 Explain E, Z configuration with examples

## SECTION – B

**Answer ALL the following Questions** **5X10 =50 Marks**

Unit –I

11 What are crystal defects? Explain the Frenkel and schottky's defects.

Or

12 What is symmetry? Explain the symmetry operations in crystals with examples.

Unit- II

13 Define critical constants. Derive relationship between critical constants and Vander Wall's constants.

**Or**

14 Write the differences between liquid and solid crystals. Write the applications of liquid crystals.

Unit –III

15 Explain critical solution temperature. Explain variation of solubility with temperature in phenol-water system.

Or

16 Explain Raoult's law and Nernst's distribution law.

Unit- IV

17 Derive Langmuir adsorption isotherm equation

Or

18 Construct molecular orbital diagram for $O_2$ and CO . Explain bond order and magnetic properties.

Unit –V

19 What are enantiomers and diastereomers? Write their differences.

Or

20 a) Explain D, L-configuration with examples.

b) Explain the terms chirality, optical activity.

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# PVKN Govt. College(A), Chittoor

I B.Sc., SEMESTER –II: CHEMISTRY PAPER – II

(PHYSICAL & GENERAL CHEMISTRY)

Subject Code: Time: 3 hrs Max Marks : 75

## MODEL QUESTION PAPER

### SECTION – A

**Answer any Five of the following Questions** **5X5 =25 Marks**

1 Explain Joule-Thomson effect.

2 Explain law of rationality of indices.

3 Explain classification of Liquid crystals

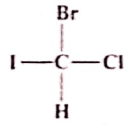
4 Write a note on fractional distillation

5 Write and explain Henry's law.

6 Explain Tyndall effect.

7 Explain the structure of $ClF_3$ and $NiCO)_4$ according to VBT.

8 Assign R, S- configuration for the following compounds.

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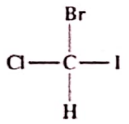


II

### SECTION – B

**Answer ALL the following Questions** **5X10 =50 Marks**

Unit –I

9 a) What is symmetry? Explain the symmetry operations in crystals with examples

(OR)

b) What are crystal defects? Explain the Frenkel and schottky's crystal defects.

Unit- II

10 a) Write the differences between liquid and solid crystals. Write the applications of liquid crystals.

(OR)

b) Define critical constants. Derive relationship between critical constants and Vander Wall's constants.

Unit –III

11 a) Explain Raoult's law and Nernst's distribution law.

(OR)

b) Explain critical solution temperature. Explain variation of solubility with temperature in phenol-water system.

Unit- IV

12 a) Construct molecular orbital diagram for $O_2$. Explain bond order and magnetic properties.

(OR)

b) Derive Langmuir adsorption isotherm equation

Unit –V

13 a) i) Explain D, L-configuration with examples.
ii) Explain the terms chirality, optical activity.

(OR)

b) What are enantiomers and diastereomers? Write their differences.

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NEW

# PVKN Govt. College (A), Chittoor

I B.Sc., SEMESTER –II: CHEMISTRY PAPER – II P
(ANALYSIS OF MIXTURE SALT)

Subject Code: 18-CHE-201 P | Credits: 02 | Teaching Hrs/Week : 3

## PRACTICAL SYLLABUS

Qualitative inorganic analysis — 30 hrs (2 h / w)

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.

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OLD

# PVKN Govt. College(A), Chittoor

I B.Sc., SEMESTER –II: CHEMISTRY PAPER – II P
(ANALYSIS OF MIXTURE SALT)

Subject Code: Credits: 02 Teaching Hrs/Week : 3

## PRACTICAL SYLLABUS

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

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NEW

# PVKN Govt. College (A), Chittoor

I B.Sc., SEMESTER –II: CHEMISTRY PAPER – II P
(ANALYSIS OF MIXTURE SALT)

Subject Code: 18-CHE-201 P | Time: 3 hrs | Max. Marks : 50

## MODEL QUESTION PAPER

Q. Analyse the given inorganic salt mixture using systematic qualitative analysis procedure. Report the names of two anions and two cations with one confirmatory reaction.
For Record - 10 Marks
For Practical - 40 Marks

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OLD

# PVKN Govt. College (A), Chittoor

I B.Sc., SEMESTER –II: CHEMISTRY PAPER – II P
(ANALYSIS OF MIXTURE SALT)

Subject Code: Time: 3 hrs Max. Marks : 50

## MODEL QUESTION PAPER

Q. Analyse the given inorganic salt mixture using systematic qualitative analysis procedure. Report the names of two anions and two cations with one confirmatory reaction.
For Record - 10 Marks
For Practical - 40 Marks

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**Signature of the BOS Chairman**

# PVKN Govt. College (A), Chittoor

## Department of Chemistry

## ADDITIONAL CREDITS FOR Certificate/Diploma/Advanced Diploma/Online courses

It is resolved to award extra credits to the students for completing Certificate/Diploma/Advanced Diploma/Online courses offered by the college.

| S. No. | Certificate/Diploma/Advanced Diploma/Online courses | Course duration | Credits |
|---|---|---|---|
| 1 | Certificate/Diploma/Advanced Diploma/Online courses | 30 | 1 |
| | | 60 | 2 |
| | | 120 | 3 |
| | | 150 | 4 |

## ADDITIONAL CREDITS FOR EXTRA CURRICULAR ACTIVITIES

It is resolved to award extra credits to the students for the fulfillment of the following activities duly certified by concerned Convener and recommended by the In-charge of the department as per the UGC and APSCHE regulations at the end of the each semester.

It also resolved that every student must have to enroll in any one of the below mentioned extracurricular activities in the beginning of the semester. Convener has to submit the list of students along with documentary evidences for the activities in a book form

| S. No. | Extracurricular activity | Working hrs per Semester | Credits |
|---|---|---|---|
| 1 | NCC/NSS/WEC/YRC/YOGA/Cultural/Sports/ Community Out Reach Programmes | 30 | 1 |
| | | 60 | 2 |
| | | 90 | 3 |

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**PVKN Govt. College (A), Chittoor**
**Department of Chemistry**

## EVALUATION / ASSESSMENT PATTERN

(a) A continuous internal assessment (CIA) (for 25 marks) by the concerned Course teacher as well as by an end of semester examination (for 75 marks) and will consolidated at the end of the course for 100 marks. The components for continuous internal assessment are :

(b) Passing minimum for end of semester exam will be 40% out of 75 marks (i.e., 30 marks). Passing minimum for Internal Examination will be 40% out of 25 marks (i.e., 10 marks).

(c) Internal Assessment shall be conducted for 75marks and marks are proportionately reduced for 25 marks.

(d) Extra credits will be awarded for students on completing Certificate/Diploma/Advanced Diploma/Online courses offered by the college.

(e) Extra credits will be awarded for students on various extracurricular activities like NCC/NSS/WEC/YRC/YOGA/Cultural/Sports/ Community Out Reach Programmes as per the UGC and APSCHE regulations.

**Signature of the Members**

**Signature of the BOS Chairman**

7/2/19

# PVKN Govt. College (A), Chittoor

## Department of Chemistry

## Panel of question paper setters and examiners

| S. No. | Name of the question paper setters | Experience |
|---|---|---|
| 1. | Dr. K. Raveendra Babu<br>Lecturer in Chemistry<br>Department of Chemistry<br>Govt. College (A)<br>Rajamahendravaram-533103<br>Mobile: 9492916941<br>Email: kraveendrababu@gmail.com | |
| 2. | Dr. B. Anusha,<br>Lecturer in Chemistry,<br>Department of Chemistry,<br>KVR Govt. College for Women (A),<br>Kurnool-518004.<br>Mobile: 9441499042<br>Email: anushabheemreddy@gmail.com | |
| 3. | Dr. B. Mahesh<br>Lecturer in Chemistry<br>Department of Chemistry<br>Govt. College for men (A)<br>Kadapa-516004.<br>Mobile: 9966524276<br>Email: | |
| 4. | D. Pulsingh<br>Lecturer in Chemistry<br>Department of Chemistry<br>Govt. College (A),<br>Anantapur-515001<br>Mobile: 8897339419<br>Email: pulsinghdhanavath@gmail.com | |
| 5. | M. Venkateswara Reddy,<br>Lecturer in Chemistry,<br>Department of Chemistry,<br>Govt. Degree College,<br>Rajampeta-516115,<br>Kadapa.<br>Mobile: 9182097620<br>Email: reddy2u22@gmail.com | |
| 6. | | |

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Signature of the BOS Chairman

Signature of the Members

# P.V.K.N.GOVERNMENT COLLEGE (A), CHITTOOR.
## DEPARTMENT OF CHEMISTRY
## CERTIFICATE COURSE –ACTION PLAN
## 2018-19

1. **Course Code**: CHE/001
2. **Mode**: Blended Mode
3. **Title: WATER ANALYSIS**
4. **Type of Course**: Certificate course.
5. **Cohort for which it is compulsory**: The course is optional.
6. **No of Credits**: 4
7. **Semester and Year Offered**: Winter 2018.
8. **Course Coordinator and Team:**

Dr. T. Hari Babu, Email ID :harihcu04@gmail.com
Dr Y. Vyshnavi, Email ID: vyshnavi.yelchuri@gmail.com
Sri. A, Ramesh, Email ID: rameshallu349@gmail.com
Sri. K. Ram Babu, Email ID: rambabuk1974@gmail.com
Sri. O. Hariprasad, Email ID: deviprasad957@gmail.com

**Pre-requisites**: Knowledge about water pollutants, standard reagents and solutions and volumetric analysis

**Aim**:

This certificate course is designed to familiarize students with the methods of water analysis and the analytical instruments used to measure the quality of drinking water.

I. Level:
   a. Introductory
   b. Length: 5 weeks
   c. Estimated Effort: 8 hours/week
   d. Subject: Chemistry
   e. Institution: GDC
   f. Languages: English/Telugu
   g. Video Transcripts: English and Telugu
   h. Price(Fees):Rs 1670/-

9. **Brief description of modules/ Main modules**:

I. Types of Water Pollutants.
II. Water quality standards I
III. Preparation of standard reagents and solutions
IV. Different methods of expressing the concentration
V. Principles of volumetric analysis

10. **Learning Outcomes of the Course**

a. Apply (gained) knowledge and experience regarding water quality and treatment methods in design, operation & maintenance and rehabilitation of conventional water treatment processes and plants;

b. Analyse water quality data and to select the most attractive raw water resource.

c. Design and engineer a water treatment plant (conventional and advanced) for both groundwater and surface water treatment.

11. **Course Evaluation**

a. Theory examination(descriptive) – 60M

b. Practical examination – 40M

12. **Suggested Readings (Reference books):**


1. James E. Girard, "Principles of Environmental Chemistry", 3rd Edition by Jones &Bartleth hearing, United States of America.
2. Ravi S. Singh, ' Environmental concerns – The third world perspectives', YS Books International, New Delhi, 2014.
3. Divya Agarwal and Manoj K. Agarwal – 'Text book of Environmental Sciences', Daya Publishing House, New Delhi, 2014.
4. Analysis of Basic Water Quality Parameters in drinking water by Sateesh.


## BUDGET ESTIMATION TO RUN THE CERTIFICATE COURSE:

Number of students: 30
Theory :- 15 hours
Practicals:- 25 hours ( 2 batches )

| | | |
|---|---|---|
| Theory (remuneration) | = | 15* 250= Rs 3,750/- |
| Practicals (remuneration)= | | 25*125=Rs 3,125/- |
| Lab equipment | = | Rs 13,000/- |
| Stationary | = | Rs 5,000/- |
| Refreshments | = | Rs 5,000/- |
| Conduction of examinations= | | Rs 5,000/- |
| Certificates printing= | | Rs 2000/- |
| **Total** | | **= Rs 36,875/-** |

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Haribabu 7.2.19

7/2/19

# P.V.K.N.GOVERNMENT COLLEGE (A), CHITTOOR.
## DEPARTMENT OF CHEMISTRY
## CERTIFICATE COURSE ON"WATER ANALYSIS"

## SYLLABUS

**Theory: 15 h**

**Unit- I** **3h**

Importance and unique properties of water

Types of water pollutants:

- Organic pollutants: Oxygen demanding wastes, disease causing agents.
- Inorganic pollutants: Inorganic salts, mineral acids, finely divided metals and trace elements, metal complexes

**Unit II** **3h**

Water quality standards: Quality of ground water, water quality criteria given by CPCB for drinking water, test characteristics of drinking water (colour, odour, taste, pH, total dissolved salts, alkalinity, total hardness)

Significance of testing: Different tests (temperature, pH, total dissolved salts, salinity, hardness), Reasons for testing.

**Unit III** **3h**

Theory on preparation of reagents and standard solutions for water analysis: Standard $H_2SO_4$, Standard KCl Solution, EDTA solution, Standard $MgSO_4$ solution, NaOH solution, Buffer Solution, Eriochrome Black-T indicator solution, Standard NaCl Solution, Standard $AgNO_3$ Solution, Potassium chromate indicator solution, Standard $Na_2SO_4$ solutions.

Objectives of testing.

**Unit IV** **3h**

Different methods of expressing concentration: Weight percentage, volume percentage, molarity, normality, mole fraction, molality and ppm.

**Unit V** **3h**

Principle of volumetric analysis: Acid-base titrations, Complexometric titrations, Redox titrations, Precipitation titrations and Principle of gravimetric analysis.

Principle of Spectrophotometer: working of single beam and double beam Spectrophotometer.

**Practical: 25 h**

1. Sample collection, preparation of laboratory reagents and solutions for water analysis Standard $H_2SO_4$, Standard KCl Solution, EDTA solution, Standard $MgSO_4$ solution, NaOH solution, Buffer Solution, Erichrome Black-T indicator solution, Standard NaCl Solution, Standard $AgNO_3$ Solution, Potassium chromate indicator solution, Standard $Na_2SO_4$ solutions.- **6h**

| | |
|---|---|
| 2. Determination of physical parameters of water: Color, Odor, pH, Conductivity. | –3h |
| 3. Estimation of Total Dissolved Salts (TDS)- | 3h |
| 4. Determination of Alkalinity of water sample- | 3h |
| 5. Estimation of carbonate and bicarbonate in water- | 3h |
| 6. Determination of Total hardness of water by EDTA method – | 3h |
| 7. Field visits - | 4h |
| **Total** | **25h** |

**Reference books for practical:-**


1. APHA (American Public Health Association) Handbook,1998
2. Soil, Plant and Water Analysis - P. C. Jaiswal
3. Chemical and Biological Analysis of Water - Dr. R. K. Trivedy and P. K. Goel.
4. Practical Biochemistry - J. Jayraman


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**Signature of the Members**

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