

**DEPARTMENT OF CHEMISTRY**

**GDC BELLAMPALLY**



**WELCOME TO**

**NAAC PEER TEAM**

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# I. CURRICULAR ASPECTS

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## ABOUT THE DEPARTMENT

### SUCCESSION LIST OF INCHARGES OF THE DEPARTMENT

The following contribution to development of this Department and rendered their services for the uplift men of the department particular and college in general.

Head of the Department:

Sri. M.Gopal

Name of the Lecturer :

Sri. K.Kumaraswamy

Sri. P.Chandraprakash Rao

Sri. P.Swamy

The present existence of the Govt. Degree College, Bellampally passed through the following stages.

1. This college was started in 11-12-1987.
2. College started with B.A., B.Com courses
3. In 2006 college was shifted to the present building.
4. In 2008-09 inauguration of Science group.  
G.O.RT No.846,& 58,RCNO.439/admn 1-L-1/2008
5. In 2017-18 was started CBCS Chemistry.

The Department of Chemistry was established in the year 2008-09 and successfully run up to 2014, due to lack of admissions courses were reorganised

and restored in the year 2019-20. Sri. M. Gopal was the first head of the department, started B.Sc. course with the combination of Mathematics, Physics, Botany, Zoology, Chemistry and Computer science/ Computer applications. This Institute was affiliated to Kakatiya University, Warangal .

## Courses Offered

At Present the Following combinations are offered in this college as CHEMISTRY one of the Elective subject.

| Programme                   | Course/Group                             | Medium  | Combinations Offered               |
|-----------------------------|--|---------|------------------------------------|
| BSc. Physical Science(CBCS) | B.Sc (MPC)                               | ENGLISH | Maths, Physics, Chemistry          |
|                             | B.Sc (MCCS)                              | ENGLISH | Maths, Chemistry, Computer Science |
| BSc. Life Science(CBCS)     | B.Sc (BZC)<br>B.Sc (BZCS)<br>B.Sc (BCCS) | TELUGU  | Botany, Zoology, Chemistry         |
| BSc. Life Science(CBCS)     | B.Sc (BZC)<br>B.Sc (BZCS)<br>B.Sc (BCCS) | ENGLISH | Botany, Zoology, Computer Science  |

**FACULTY DETAILS**

No. of Teaching Staff: 02

| S.NO. | Name of the faculty | Qualifications      | Length of service |
|-------|---------------------|---------------------|-------------------|
| 1.    | Sri. M. Gopal       | M.Sc. M.Ed.         | 26 Years          |
| 2.    | P. Swamy            | M.Sc. M.Phil. B.Ed. | 15 years          |

**Non-Teaching staff:**

No. of posts sanctioned: 01

No of posts filled: 01

| S.NO. | Name of the faculty | Qualifications | Length of service |
|-------|---------------------|----------------|-------------------|
| 1.    | J. Rajeshwari       | Intermediate   | 10 years          |

Faculty was competent to teach Chemistry and related subjects to under graduate courses. They were well experienced with adequate efficiency, maintain accurate academic plans and impart teaching to students as per the academic plan and curriculum. Apart from the subject teaching skills they can able to teach for competitive examinations for their bright future. And perform as a subject expert at various levels.

## Students Strength Particulars

For the Year 2018-2019

## B.Sc. I Year

| Group              | Medium  | 2018-2019 |       |       |
|--------------------|---------|-----------|-------|-------|
|                    |         | Men       | Women | Total |
| B.Sc. (MPC)        | ENGLISH | 0         | 0     | 0     |
| B.SC. Life Science | TELUGU  | 0         | 0     | 0     |
| B.SC Life Science  | ENGLISH | 0         | 0     | 0     |
| Total :            |         | 0         | 0     | 0     |

## B.Sc. II Year

| Group       | Medium | 2018-2019 |       |       |
|-------------|--------|-----------|-------|-------|
|             |        | Men       | Women | Total |
| B.Sc. (BZC) | TELUGU | 00        | 01    | 01    |

## B.Sc. III Year

| Group       | Medium | 2018-2019 |       |       |
|-------------|--------|-----------|-------|-------|
|             |        | Men       | Women | Total |
| B .Sc (BZC) | TELUGU | 00        | 01    | 01    |

## Students Strength Particulars

For the Year 2019-2020

## B.Sc. I Year

| Group              | Medium  | 2019-2020 |       |       |
|--------------------|---------|-----------|-------|-------|
|                    |         | Men       | Women | Total |
| B.Sc. (MPC)        | ENGLISH | 13        | 13    | 26    |
| B.SC. Life Science | TELUGU  | 10        | 29    | 39    |
| B.SC Life Science  | ENGLISH | 10        | 18    | 28    |
| Total :            |         | 33        | 60    | 93    |

## B.Sc. II Year

| Group     | Medium  | 2019-2020 |       |       |
|-----------|---------|-----------|-------|-------|
|           |         | Men       | Women | Total |
| B.Sc(MPC) | ENGLISH | 00        | 00    | 00    |
| B.Sc(BZC) | TELUGU  | 00        | 00    | 00    |

## B.Sc. III Year

| Group       | Medium  | 2019-2020 |       |       |
|-------------|---------|-----------|-------|-------|
|             |         | Men       | Women | Total |
| B.Sc(MPC)   | ENGLISH | 00        | 00    | 00    |
| B .Sc (BZC) | TELUGU  | 00        | 01    | 01    |



## Students Strength Particulars

For the Year 2020-2021

## B.Sc. I Year

| Group                         | Medium  | 2020-2021 |       |       |
|-------------------------------|---------|-----------|-------|-------|
|                               |         | Men       | Women | Total |
| B.Sc. Physical science (CBCS) | ENGLISH | 13        | 04    | 17    |
| B.Sc. Life Science (CBCS)     | TELUGU  | 14        | 31    | 45    |
| B.Sc Life Science(CBCS)       | ENGLISH | 12        | 39    | 51    |
| Total :                       |         | 39        | 74    | 113   |

## B.Sc. II Year

| Group                         | Medium  | 2020-2021 |       |       |
|-------------------------------|---------|-----------|-------|-------|
|                               |         | Men       | Women | Total |
| B.Sc. Physical science (CBCS) | ENGLISH | 16        | 04    | 20    |
| B.Sc. Life Science (CBCS)     | TELUGU  | 04        | 23    | 26    |
| B.Sc. Life Science(CBCS)      | ENGLISH | 01        | 14    | 19    |

**B.Sc.III Year**

| Group                         | Medium  | 2020-2021 |       |       |
|-------------------------------|---------|-----------|-------|-------|
|                               |         | Men       | Women | Total |
| B.Sc. Physical science (CBCS) | ENGLISH | 0         | 0     | 0     |
| B.Sc. Life Science (CBCS)     | TELUGU  | 0         | 0     | 0     |
| B.Sc. Life Science(CBCS)      | ENGLISH | 0         | 0     | 0     |

## Student's Strength Particulars

For the Year 2021-2022

## B.Sc. I Year

| Group                            | Medium  | 2021-2022 |       |       |
|----------------------------------|---------|-----------|-------|-------|
|                                  |         | Men       | Women | Total |
| B.Sc. PHYSICAL SCINCE (CBCS)     | ENGLISH | 10        | 13    | 23    |
| B.Sc. Life Science (CBCS) (CBCS) | TELUGU  | 16        | 27    | 43    |
| B.Sc Life Science(CBCS)          | ENGLISH | 06        | 34    | 40    |
| Total :                          |         | 32        | 74    | 106   |

## B.Sc. II Year

| Group                        | Medium  | 2021-2022 |       |       |
|------------------------------|---------|-----------|-------|-------|
|                              |         | Men       | Women | Total |
| B.Sc. PHYSICAL SCINCE (CBCS) | ENGLISH | 20        | 14    | 34    |
| B.Sc. Life Science (CBCS)    | TELUGU  | 12        | 25    | 37    |
| B.Sc Life Science(CBCS)      | ENGLISH | 08        | 30    | 38    |
| Total                        |         | 30        | 69    | 109   |

**B.Sc. III Year**

| Group                            | Medium  | 2021-2022 |           |           |
|----------------------------------|---------|-----------|-----------|-----------|
|                                  |         | Men       | Women     | Total     |
| B.Sc. PHYSICAL SCINCE (CBCS)     | ENGLISH | 14        | 13        | 27        |
| B.Sc. Life Science (CBCS) (CBCS) | TELUGU  | 04        | 20        | 24        |
| B.Sc Life Science(CBCS)          | ENGLISH | 05        | 10        | 15        |
| <b>Total</b>                     |         | <b>23</b> | <b>43</b> | <b>66</b> |

**Socio-Economic of Status Students:**

For the Year 2019-20

**FIRST YEAR**

| Sl.No. | course                             | SC        |           |           | ST        |           |           | BC        |           |           | OC        |           |           | GRAND TOTAL |           |           |
|--------|------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|
|        |                                    | Boys      | Girls     | Total     | B         | G         | T         | B         | G         | T         | B         | G         | T         | B           | G         | T         |
| 1      | B.Sc. (Life Science) I YEAR T.M.   | 01        | 05        | 06        | 03        | 05        | 08        | 06        | 13        | 19        | 0         | 6         | 06        | 10          | 29        | 39        |
| 2      | B.Sc. (Life Science) I YEAR E.M.   | 05        | 10        | 15        | 01        | 02        | 03        | 04        | 06        | 10        | 0         | 0         | 0         | 10          | 18        | 28        |
| 3      | B.Sc. ( Phy . Science) I YEAR E.M. | 01        | 02        | 03        | 09        | 05        | 14        | 02        | 04        | 06        | 01        | 02        | 03        | 13          | 13        | 26        |
|        | <b>TOTAL</b>                       | <b>07</b> | <b>17</b> | <b>24</b> | <b>13</b> | <b>12</b> | <b>25</b> | <b>12</b> | <b>23</b> | <b>35</b> | <b>01</b> | <b>08</b> | <b>09</b> | <b>33</b>   | <b>60</b> | <b>93</b> |

**SECOND YEAR**

| Sl.No. | course                            | SC       |          |          | ST       |          |          | BC       |          |          | OC       |          |          | GRAND TOTAL |          |          |
|--------|-----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-------------|----------|----------|
|        |                                   | Boys     | Girls    | Total    | B        | G        | T        | B        | G        | T        | B        | G        | T        | B           | G        | T        |
| 1      | B.Sc. (Life Science) II YEAR T.M. | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0           | 0        | 0        |
| 2      | B.Sc. (Life Science) II YEAR E.M. | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0           | 0        | 0        |
| 3      | B.Sc. (Phy. Science) II YEAR E.M. | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0           | 0        | 0        |
|        | <b>TOTAL</b>                      | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b>    | <b>0</b> | <b>0</b> |

**THIRD YEAR**

| Sl.No. | course                             | SC       |          |          | ST       |          |          | BC       |          |          | OC       |          |          | GRAND TOTAL |          |          |
|--------|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-------------|----------|----------|
|        |                                    | Boys     | Girls    | Total    | B        | G        | T        | B        | G        | T        | B        | G        | T        | B           | G        | T        |
| 1      | B.Sc. (Life Science) III YEAR T.M. | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 01       | 01       | 0        | 0        | 0        | 0           | 01       | 01       |
| 2      | B.Sc. (Life Science) I YEAR E.M.   | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0           | 0        | 0        |
| 3      | B.Sc. ( Phy . Science) I YEAR E.M. | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 01       | 01       | 0        | 0        | 0        | 0           | 01       | 01       |
|        | <b>TOTAL</b>                       | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b>    | <b>0</b> | <b>0</b> |

Socio-Economic Status of Students:

For the Year 2020-2021

**FIRST YEAR**

| Sl.No. | course                                | SC        |           |           | ST       |          |          | BC        |           |           | OC       |           |          | GRAND TOTAL |           |            |
|--------|---------------------------------------|-----------|-----------|-----------|----------|----------|----------|-----------|-----------|-----------|----------|-----------|----------|-------------|-----------|------------|
|        |                                       | Boys      | Girls     | Total     | B        | G        | T        | B         | G         | T         | B        | G         | T        | B           | G         | T          |
| 1      | B.Sc. (Life Science) I YEAR<br>T.M.   | 7         | 14        | 21        | 1        | 1        | 2        | 6         | 14        | 20        | 0        | 2         | 2        | 14          | 31        | 45         |
| 2      | B.Sc. (Life Science) I YEAR<br>E.M.   | 6         | 25        | 31        | 1        | 0        | 1        | 4         | 13        | 17        | 1        | 1         | 2        | 12          | 39        | 51         |
| 3      | B.Sc. ( Phy . Science) I YEAR<br>E.M. | 5         | 4         | 9         | 4        | 1        | 5        | 14        | 13        | 27        | 2        | 1         | 3        | 13          | 04        | 17         |
|        | <b>TOTAL</b>                          | <b>18</b> | <b>43</b> | <b>61</b> | <b>6</b> | <b>2</b> | <b>8</b> | <b>24</b> | <b>40</b> | <b>60</b> | <b>3</b> | <b>43</b> | <b>7</b> | <b>39</b>   | <b>74</b> | <b>113</b> |

**SECOND YEAR**

| Sl.No. | course                               | SC        |           |           | ST        |           |           | BC        |           |           | OC        |           |           | GRAND TOTAL |           |           |
|--------|--------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|
|        |                                      | Boys      | Girls     | Total     | B         | G         | T         | B         | G         | T         | B         | G         | T         | B           | G         | T         |
| 1      | B.Sc. (Life Science) II YEAR<br>T.M. | 1         | 7         | 8         | 1         | 5         | 6         | 2         | 11        | 13        | 0         | 0         | 0         | 4           | 24        | 28        |
| 2      | B.Sc. (Life Science) II YEAR<br>E.M. | 2         | 7         | 9         | 1         | 1         | 2         | 2         | 6         | 8         | 0         | 0         | 0         | 5           | 14        | 19        |
| 3      | B.Sc. (Phy. Science) II YEAR<br>E.M. | 4         | 3         | 7         | 0         | 2         | 2         | 9         | 7         | 16        | 1         | 2         | 3         | 14          | 14        | 28        |
|        | <b>TOTAL</b>                         | <b>07</b> | <b>17</b> | <b>24</b> | <b>02</b> | <b>08</b> | <b>10</b> | <b>13</b> | <b>24</b> | <b>37</b> | <b>01</b> | <b>02</b> | <b>03</b> | <b>23</b>   | <b>52</b> | <b>75</b> |

**THIRD YEAR**

| Sl.No. | course                                | SC       |          |          | ST       |          |          | BC       |           |           | OC       |          |          | GRAND TOTAL |           |           |
|--------|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|----------|----------|----------|-------------|-----------|-----------|
|        |                                       | Boys     | Girls    | Total    | B        | G        | T        | B        | G         | T         | B        | G        | T        | B           | G         | T         |
| 1      | B.Sc. (Life Science) I YEAR<br>T.M.   | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 01        | 01        | 0        | 0        | 0        | 0           | 01        | 01        |
| 2      | B.Sc. (Life Science) I YEAR<br>E.M.   | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0         | 0         | 0        | 0        | 0        | 0           | 0         | 0         |
| 3      | B.Sc. ( Phy . Science) I YEAR<br>E.M. | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0         | 0         | 0        | 0        | 0        | 0           | 0         | 0         |
|        | <b>TOTAL</b>                          | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>01</b> | <b>01</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b>    | <b>01</b> | <b>01</b> |

## Results

2018-19

| Sl. No. | Course & year           | Appeared | Passed | Percentage |
|---------|-------------------------|----------|--------|------------|
| 01      | B.Sc.(BZC) -III<br>YEAR | 01       | 0      | 0          |

2019-20

## SEMESTER-I

| Sl. No. | Course & year                             | Appeared | Passed | Percentage |
|---------|---|----------|--------|------------|
| 01      | B.Sc. (Physical<br>Science) I YEAR<br>E/M | 20       | 04     | 25%        |
| 02      | B.Sc. (Life Science)<br>I YEAR T.M.& E/M  | 75       | 08     | 11%        |

## SEMESTER-II

| Sl. No. | Course & year                               | Appeared | Passed | Percentage |
|---------|---|----------|--------|------------|
| 01      | B.Sc. ( Physical<br>Science) I YEAR<br>E.M. | 20       | 04     | 25%        |
| 02      | B.Sc. (Life Science)<br>I YEAR T.M.& E/M    | 40       | 40     | 100%       |

**SEMESTER III**

| Sl. No. | Course & year                             | Appeared | Passed | Percentage |
|---------|---|----------|--------|------------|
| 01      | B.Sc. ( Physical Science) II YEAR<br>E.M. | 19       | 19     | 100%       |
| 02      | B.Sc. (Life Science)<br>II YEAR T.M.& E/M | 38       | 38     | 100%       |



## DEPARTMENT OF CHEMISTRY

## TIME TABLE-2019-2020

| DAY | I                                   | II                                    | III                     | 1.00-1.30 LUNCH | IV  | V         | VI        |
|-----|-------------------------------------|---------------------------------------|-------------------------|-----------------|---|-----------|-----------|
|     | 10-00 -11.00                        | 11.00-12.00                           | 12.00-1.00              |                 | 01.30-2.30  | 2.30-3.30 | 3.30-4.30 |
| MON | Chem-1(MPC E/M)<br>Chem-1(BZC T/M)  | Chem-1(BZC E/M) &<br>Chem-1(BCCA E/M) | Chem-5 (BZC<br>T/M)     | 1.00-1.30 LUNCH | Chem-1 practical's (MPC- 1)                               |           |           |
| TUE | Chem-1(MPC E/M)<br>Chem-1(BZC T/M)  | Chem-1(BZC E/M) &<br>Chem-1(BCCA E/M) | Chem-5 (BZC<br>T/M)     |                 | Chem-1 practical's ( BZC-1)-T/M                           |           |           |
| WED | Chem-1(MPC E/M)<br>Chem-1(BZC T/M)  | Chem-1(BZC E/M) &<br>Chem-1(BCCA E/M) | Chem-5 (BZC<br>T/M)     |                 | Chem-1 practical's (BZC-2)-T/M                            |           |           |
| THU | Chem-1(MPC E/M)<br>Chem-1(BZC T/M)) | Chem-1(BZC E/M) &<br>Chem-1(BCCA E/M) | Chem-6 (E)<br>(BZC T/M) |                 | Chem-1 practical's (BZC-3 & BCCA-1)-E/M                   |           |           |
| FRI | *                                   | EST                                   | Chem-6 (E)<br>(BZC T/M) |                 | Chem-5 practical's (BZC) + Chem-1 practical's (MPC-<br>2) |           |           |
| SAT | *                                   | EST                                   | Chem-6 (E)<br>(BZC T/M) |                 | Chem-6 practical's (BZC)                                  |           |           |

## Work Load Details

| S.No  | Course & Year                 | Workload of Theory<br>Classes in Hrs per<br>week | Workload of Practical<br>Classes in Hrs per week | Internal Subject<br>EST |
|-------|-------------------------------|--|--|-------------------------|
| 1     | BSc (MPC) E/M I<br>Yr         | 04   | $03*02=06$                                       | *                       |
| 2     | BSC Life<br>Science T/M       | 04   | $03*02=06$                                       | *                       |
| 3     | BSC Life<br>Science E/M       | 04   | $03*02=06$                                       | *                       |
| 5     | III Yr BSC<br>(BZC)T/M III Yr | $03*02=06$                                       | $03*02=06$                                       | *                       |
| 6     | ALL BSC I Yr                  | *  | *  | 02                      |
| Total |                               | 18   | 24   | 42                      |

Total Workload/Week = 42

Sanctioned Posts = 02

Number of Lecturers Working = 02

## LIST OF THE TEACHING STAFF

### 2018-19

| SNO | NAME        | Designation | Qualification & Specialization |
|-----|-------------|-------------|--------------------------------|
| 1.  | Sri.M.Gopal | HOD         | M.Sc. M. Ed                    |

### 2019-20

| SNO | NAME                           | Designation           | Qualification & Specialization |
|-----|--------------------------------|-----------------------|--------------------------------|
| 1.  | Sri.M.Gopal                    | HOD                   | M.Sc. M. Ed                    |
| 2.  | Paidipelli Chandra Prakash Rao | Lecturer in Chemistry | M.Sc. M. Phil                  |

### 2020-21

| SNO | NAME                           | Designation           | Qualification & Specialization |
|-----|--------------------------------|-----------------------|--------------------------------|
| 1.  | Sri.M.Gopal                    | HOD                   | M.Sc. M. Ed                    |
| 2.  | Paidipelli Chandra Prakash Rao | Lecturer in Chemistry | M.Sc. M. Phil                  |

### 2021-22

| SNO | NAME | Designation | Qualification & Specialization |
|-----|------|-------------|--------------------------------|
|-----|------|-------------|--------------------------------|

|    |              |                       |                    |
|----|--------------|-----------------------|--------------------|
| 1. | Sri. M.Gopal | HOD                   | M.Sc. M. Ed        |
| 2. | P. Swamy     | Lecturer in Chemistry | M.Sc.M.phill. B.Ed |

## Curriculum of CBCS for the Academic Year 2019-2020

### SEMESTER I

#### Paper I

#### Chemistry-I

### Unit – I (Inorganic Chemistry)

#### 1. Chemical Bonding

Ionic Solids – lattice and salivation energy, solubility of ionic solids, Fajan’s rule, polarity and polarizability of ions. VSEPR Theory – Common hybridization – sp, sp<sup>2</sup>, sp<sup>3</sup>, sp<sup>3</sup>d, sp<sup>3</sup>d<sup>2</sup> and sp<sup>3</sup>d<sup>3</sup>, shapes of molecules. Molecular orbital theory: Shapes and sign convention of orbitals. Modes of bonds. Criteria for orbital overlap. LCAO concept.  $\pi$  and  $\sigma$  overlapping. Concept of Types of molecular orbitals- bonding, antibonding and non bonding. MOED of homonuclear diatomics – H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub> (unhybridized diagrams only) and heteronuclear diatomics CO, CN-, NO, NO<sup>+</sup> and HF. Bond order, stability and magnetic properties.

#### 2. P-Block Elements 1

Group-13: Structure of diborane and higher Boranes (B<sub>4</sub>H<sub>10</sub> and B<sub>5</sub>H<sub>9</sub>), Boron nitrogen compounds (B<sub>3</sub>N<sub>3</sub>H<sub>6</sub> and BN), Lewis acid nature of BX<sub>3</sub>.

Group – 14: Carbides- Classification – ionic, covalent, interstitial – Structures and reactivity, Industrial applications. Silicones – Classification – straight chain, cyclic and cross-linked.

Group – 15 : Nitrides – Classification- ionic, covalent, interstitial. Rectivity – hydrolysis. Reactions

of hydrazine, hydroxyl amine, phosphazenes.

## Unit – II (Organic Chemistry)

### 1. Structural Theory in Organic Chemistry

Bond polarization : factors influencing the polarization of covalent bonds, electro negativity – inductive effect. Applications of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance – Mesomeric effect, application to (a) acidity of phenol. (b) Acidity of carboxylic acids and Basicity of anilines. Stability of carbocations, carbanions and free radicals. Hyper conjugation and its application to stability of carbonium ions, free radicals and alkenes.

### 2. Acyclic Hydrocarbons

Alkanes- Methods of preparation : From Grignard reagent, Kolbe synthesis. Chemical reactivity – inert nature, free radical substitution, Halogenation example – reactivity, selectivity and orientation.

Alkenes – Preparation of alkenes(with mechanism) (a)by dehydration of alcohols (b)dehydrohalogenation of alkyl halides (c) by dehalogenation of 1,2 dihalides, Zaitsev's rule. Properties : Anti-addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H<sub>2</sub>O, HOX, H<sub>2</sub>SO<sub>4</sub> with mechanism and addition of HBr in the presence of peroxide (anti- Markonikov's addition). Oxidation (cis - additions)- hydroxylation by KMnO<sub>4</sub>, OsO<sub>4</sub>, anti addition – peracids (via epoxidation), hydroboration, ozonolysis – location of double bond.

Dienes – Types of dienes, reactions of conjugate dienes – 1,2 and 1,4 addition of HBr to 1,3 – butadiene and Diels – Alder reaction.

Alkynes – Preparation by dehydrohalogenation of vicinal dihalides, dehalogenation of tetrahalides. Physical Properties: Chemical reactivity – electrophilic addition of X<sub>2</sub>, HX, H<sub>2</sub>O (tautomerism), Oxidation (formation of enediol, 1,2 diones and carboxylic acids) and reduction (Metal – ammonia reduction, catalytic hydrogenation).

#### Aromatic Hydrocarbons

Introduction to aromaticity : Huckel's rule - Benzene, Naphthalene and Anthracene. Reactions – General mechanism of electrophilic substitution,

mechanism of nitration, sulphonation and halogenations, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution – Definition of ortho, para, and meta direction groups. Ring activating and deactivating groups with examples. Orientation – (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivating groups – nitro, nitrile, carbonyl, carboxylic acid, sulphonic acid and halo groups.

### Unit – III (Physical Chemistry)

#### 1. Atomic structure and elementary quantum mechanics

Black body radiation, heat capacities of solids, Rayleigh Jeans law, Planck's radiation law, photoelectric effect, Limitations of classical mechanics, Compton effect, de Broglie's hypothesis. Heisenberg's uncertainty principle.

#### 2. Gaseous State

Deviation of real gases from ideal behavior. Vander Waals equation of state. Critical phenomenon. PV isotherms of real gases, continuity of state. Andrew's isotherms of CO<sub>2</sub>. The vander Waals constants. The law of corresponding states, reduced equation of states. Joule Thomson effect and inversion temperature of a gas. Liquifaction of gases : i)Linde's method based on Joule Thomson effect ii) Claude's method based on adiabatic expansion of a gas.

#### 3. Liquid State and Solutions

Intermolecular forces, structure of liquids (qualitative description). Structural differences between solids, liquids and gases, Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).

##### Solution

Liquid – liquid mixtures, ideal liquid mixtures, Raoult's and Henry's laws. Non ideal systems. Azeotropes: HCl-H<sub>2</sub>O and C<sub>2</sub>H<sub>5</sub>OH – H<sub>2</sub>O systems. Fractional distillation. Partially miscible liquids : Phenol – Water, Trimethyl amine – Water and Nicotine – Water systems.

## Unit – IV (General Chemistry)

### 1. General Principles of Inorganic Qualitative Analysis

**Anion analysis:** Theory of sodium carbonate extract, classification and reactions of anions-  $\text{CO}_3^{2-}$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{PO}_4^{3-}$ ,  $\text{BO}_3^{3-}$ ,  $\text{CH}_3\text{COO}^-$ ,  $\text{NO}_3^-$ . Interfering ions. Cation Analysis: Principles involved – Solubility product, common ion effect, general discussion for the separation and identification of group I individual cations ( $\text{Hg}_2^{2+}$ ,  $\text{Ag}^+$ ,  $\text{Pb}^{2+}$ ) with flow chart and chemical equations. Principle involved in separation of group II & IV cations. General discussion for the separation and identification of group II ( $\text{Hg}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Bi}^{3+}$ ,  $\text{Cd}^{2+}$ ,  $\text{Sb}^{3+}$ ), III ( $\text{Al}^{3+}$ ,  $\text{Fe}^{3+}$ ), IV ( $\text{Mn}^{2+}$ ,  $\text{Zn}^{2+}$ ) individual cations with flow chart and chemical equations. General discussion for the separation and identification of group V individual cations ( $\text{Ba}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ca}^{2+}$ ) with flow chart and chemical equations. Theory of flame test. Identification of Group VI cations ( $\text{Mg}^{2+}$ ,  $\text{NH}_4^+$ ).

### 2. Isomerism

**Isomerism:** Definition of isomers. Classification of isomers: Constitutional and Stereoisomers- definition and examples. Constitutional isomers: chain, functional and positional isomers. Stereoisomers: Enantiomers and Diastereomers – Definition and Examples. Representation of Stereoisomers- Wedge, Fisher Projection, Sawhorse, Newmann formulae.

**Conformational Analysis:** Classification of Stereoisomers based on energy. Definition and Examples – Conformational and Configurational isomers. Conformational analysis of Ethane, n-butane, 1,2- Dichloro ethane, Dichloro ethanol. Cyclic compounds: Bayer's strain theory, conformational analysis of Cyclo Hexane.

Cis-trans isomerism: E-Z Nomenclature

### 3. Solid State Chemistry

**Laws of Crystallography:** (i) Law of constancy of interfacial angle (ii) Law of symmetry- symmetry elements in crystal (iii) Law of rationality of indices. Definition of space lattice, Unit cell. Bravais lattices and seven crystal systems

(A brief review). X-ray diffraction by crystals: Derivation of Bragg's equation. Determination of structure of NaCl, KCl and CsCl (Bragg's method & Powder method).

### Laboratory Course:

#### Qualitative Analysis - Semi micro analysis of mixtures

Analysis of two anions (one simple, one interfering) and two cations in the given mixture.

### SEMESTER II Paper II Chemistry - II

#### Unit-I ( Inorganic Chemistry)

##### 1. p-block Elements -II

**Oxides:** Types of oxides (a) Normal- acidic, basic amphoteric and neutral (b) Mixed (c) sub oxide (d) peroxide (e) superoxide. Structure of oxides of C, N, P, S and Cl - reactivity, thermal stability, hydrolysis.

**Oxy acids:** Structure and acidic nature of oxyacids of B, C, N, P, S and Cl. Redox properties of oxyacids of Nitrogen:  $\text{HNO}_2$  (reaction with  $\text{FeSO}_4$ ,  $\text{KMnO}_4$ ,  $\text{K}_2\text{Cr}_2\text{O}_7$ ),  $\text{HNO}_3$  (reaction with  $\text{H}_2\text{S}$ , Cu),  $\text{HNO}_4$  (reaction with KBr, Aniline),  $\text{H}_2\text{N}_2\text{O}_2$  (reaction with  $\text{KMnO}_4$ ). Redox properties of oxyacids of Potassium:  $\text{H}_3\text{PO}_2$  (reaction with  $\text{HgCl}_2$ ),  $\text{H}_3\text{PO}_3$  (reaction with  $\text{AgNO}_3$ ,  $\text{CuSO}_4$ ).

Redox properties of oxyacids of Sulphur:  $\text{H}_2\text{SO}_3$  (reaction with  $\text{KMnO}_4$ ,  $\text{K}_2\text{Cr}_2\text{O}_7$ ),  $\text{H}_2\text{SO}_4$  (reaction with Zn, Fe, Cu),  $\text{H}_2\text{S}_2\text{O}_3$  (reaction with Cu, Au),  $\text{H}_2\text{SO}_5$  (reaction with KI,  $\text{FeSO}_4$ ),  $\text{H}_2\text{S}_2\text{O}_8$  (reaction with  $\text{FeSO}_4$ , KI)

**Interhalogens-** classification- general preparation- structures of  $\text{AB}$ ,  $\text{AB}_3$ ,  $\text{AB}_5$  and  $\text{AB}_7$  type and reactivity. Poly halides- definition and structure of  $\text{ICl}_2^-$ ,  $\text{ICl}_4^-$  and  $\text{I}_3^-$ . Comparison of Pseudohalogens with halogens.

##### 2. Chemistry of Zero group elements

General preparation, structure, bonding and reactivity of Xenon compounds – Oxides, Halides



and Oxy-halides. Clathrate compounds and Anomalous behavior of He (II)

### 3. Chemistry of d-block elements

Characteristics of d-block elements with special reference to electronic configuration variable valence, ability to form complexes, magnetic properties & catalytic properties. Stability of various oxidation states and SRP Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu triads. Titanium triad – electronic configuration and reactivity of +3 and +4 states – oxides and halides. Chromium triad – reactivity of +3 and +6 states. Copper triad – reactivity of +1, +2 and +3 states.

## Unit - II(Organic chemistry)

### 1.Aromatic Hydrocarbons

Concept of aromaticity –definition, Huckel's rule – application to Benzenoids and Non – Benzenoids (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation).

Preparations: From acetylene, phenols, benzene carboxylic acids and sulphonic acids

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation, and halogenation, Friedel Craft's alkylation (polyalkylation) and acylation. Orientation of aromatic substitution - Definition of ortho, para, and meta directing groups. Ring activating and deactivating groups with examples. Orientation – (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivating groups - carboxy, nitro, nitrile, carbonyl and sulphonic acid & halo groups.

### 2.Arenes and Polynuclear Aromatic Hydrocarbons

Preparation of alkyl benzenes by Friedel Craft's alkylation, Friedel Craft's acylation followed by reduction, Wurtz-Fittig reaction. Chemical reactivity: Ring substitution reactions, side chain substitution reactions and oxidation.

Polynuclear hydrocarbons – Structure of naphthalene and anthracene (Molecular Orbital diagram and resonance energy) Reactivity towards electrophilic substitution. Nitration and sulphonation as examples.

### 3: Halogen compounds

Nomenclature and classification: alkyl (primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl. Chemical reactivity - reduction, formation of RMgX, Nucleophilic substitution reactions

- classification into  $S_N^1$  and  $S_N^2$ . Mechanism and energy profile diagrams of  $S_N^1$  and  $S_N^2$  reactions. Stereochemistry of  $S_N^2$  (Walden Inversion) 2-bromobutane,  $S_N^1$  (Racemisation) 1-bromo-1-phenylpropane explanation of both by taking the example of optically active alkyl halide. Structure and reactivity - Ease hydrolysis - comparison of alkyl, vinyl, allyl, aryl, and benzyl halides.

## Unit – III (Physical Chemistry)

### 1: Solutions

Liquid - liquid mixtures, ideal liquid mixtures, Raoult's and Henry's laws. Non ideal systems. Azeotropes HCl-H<sub>2</sub>O and C<sub>2</sub>H<sub>5</sub>OH - H<sub>2</sub>O systems. Fractional distillation, Partially miscible liquids- Phenol – Water, Trimethyl amine – Water and Nicotine – Water systems. Lower upper consolute temperatures. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law with solvent extraction.

### 2: Dilute Solutions & Colligative Properties

Dilute Solutions, Colligative Properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis - laws of osmotic pressure, its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, Van'thoff factor, degree of dissociation and association of solutes.

### 3: Solid state Chemistry

Laws of Crystallography – (i) Law of Constancy of interfacial angles (ii) Law of Symmetry, Symmetry elements in crystals (iii) Law of rationality of indices. Definition of space lattice, unit cell. Bravais Lattices and Seven Crystal systems (a brief review). X-ray diffraction by crystals; Derivation of Bragg's equation, Determination of structure of NaCl, KCl & CsCl (Bragg's method and Powder method).

## Unit – IV (General Chemistry)

### 1: Theory of Quantitative Analysis

**Volumetric Analysis:** Introduction, standard solutions, indicators, end point, titration curves, Types of titrations: i) neutralization titration- principle, theory of acid base indicators, titration curves and selection of indicators- strong acid - strong base, strong acid –weak base, weak acid- strong base and weak acid –weak base.

Gravimetric analysis- Introduction, nucleation, precipitation, growth of precipitate, filtration and washing, drying and incineration of precipitate, coprecipitation and post precipitation. Determination of  $\text{Ni}^{2+}$

### 2: Theories of bonding in metals:

Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors n-type and p-type, extrinsic & intrinsic semiconductors, and insulators.

### 3: Material Science

Classification of materials- classification as metals, ceramics, organic polymers, composites, biological materials etc. The property of super conductivity of materials.

Super conducting materials- elements, alloys and compounds. Properties of super conductors- zero resistivity, Meisener effect and thermal properties. Composites- meaning of composites, advanced composites, classification –particle reinforced fiber reinforced and structural composites general characters of composite materials-Particle- reinforced composites – large particle and dispersion-strengthened composite. Fiber reinforced composites (continuous and discontinuous fiber composites).

## Laboratory Course

### Qualitative Analysis - II

Analysis of two anions and two cations in the given mixture.

Anions:  $\text{CO}_3^{2-}$ ,  $\text{SO}_3^{2-}$ ,  $\text{S}^{2-}$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{CH}_3\text{COO}^-$ ,  $\text{NO}_3^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{BO}_3^{3-}$ ,  $\text{SO}_4^{2-}$

Cations:  $\text{Ag}^+$ ,  $\text{Pb}^{2+}$ ,  $\text{Hg}^+$ ,  $\text{Hg}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{NH}_4^+$

**KAKATIYA UNIVERSITY - WARANGAL - TELANGANA**

Under Graduate Courses (Under CBCS 2019–2022)

**B.Sc. CHEMISTRY II Year**

**SEMESTER – III**

Paper-III  
Chemistry - III

**Unit-I (Inorganic Chemistry)**

**15 h (1 hr/week)**

**S3-I-1: Chemistry of f-block elements:**

**5 h**

Chemistry of Lanthanides: Position in periodic table, Electronic structure, oxidation state, ionic and atomic radii- lanthanide contraction- cause and consequences, anomalous behavior of post lanthanides-complexation- type of donor ligands preferred. Magnetic properties- paramagnetism. Colour and spectra, f-f transitions –occurrence and separation– ion exchange method, solvent extraction.

Chemistry of actinides- general features – electronic configuration, oxidation state, actinide contraction, colour and complex formation. Comparison with lanthanides.

**S3-I-2: Coordination Compounds-I**

**6 h**

Simple inorganic molecules and coordination complexes. Nomenclature – IUPAC rules, 1. Coordination number, coordination geometries of metal ions, types of ligands. 2. Brief review of Werner's theory, Sidgwick's electronic interpretation and EAN rule and their limitations. (Valence bond theory (VBT) – postulates and application to (a) tetrahedral complexes  $[\text{Ni}(\text{NH}_3)_4]^{2+}$ ,  $[\text{NiCl}_4]^{2-}$  and  $[\text{Ni}(\text{CO})_4]$  (b) Square planar complexes  $[\text{Ni}(\text{CN})_4]^{2-}$ ,  $[\text{Cu}(\text{NH}_3)_4]^{2+}$ ,  $[\text{PtCl}_4]^{2-}$  (c) Octahedral complexes  $[\text{Fe}(\text{CN})_6]^{4-}$ ,  $[\text{Fe}(\text{CN})_6]^{3-}$ ,  $[\text{FeF}_6]^{4-}$ ,  $[\text{Co}(\text{NH}_3)_6]^{3+}$ ,  $[\text{CoF}_6]^{3-}$ . Limitations of VBT. 3. Isomerism in coordination compounds, stereo isomerism – (a) geometrical isomerism in (i) square planar metal complexes of the type  $[\text{MA}_2\text{B}_2]$ ,  $[\text{MA}_2\text{BC}]$ ,  $[\text{M}(\text{AB})_2]$ ,  $[\text{MABCD}]$ . (ii) Octahedral metal complexes of the type  $[\text{MA}_4\text{B}_2]$ ,  $[\text{M}(\text{AA})_2\text{B}_2]$ ,  $[\text{MA}_3\text{B}_3]$  using suitable examples, (b) Optical isomerism in (i). tetrahedral complexes  $[\text{MABCD}]$ , (ii). Octahedral complexes  $[\text{M}(\text{AA})_2\text{B}_2]$ ,  $[\text{M}(\text{AA})_3]$  using suitable examples. Structural isomerism: ionization, linkage, coordination ligand isomerism using suitable examples.

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**S3-I-3: Metal carbonyls and Organometallic Chemistry****4 h**

Metal carbonyls: Preparation and properties of  $\text{Ni}(\text{CO})_4$ . Structural features of  $\text{Ni}(\text{CO})_4$ ,  $\text{Fe}(\text{CO})_5$ ,  $\text{Fe}_2(\text{CO})_9$ ,  $\text{Fe}_3(\text{CO})_{12}$  and  $\text{Cr}(\text{CO})_6$  -18 valence electron rule.

Definition, nomenclature and classification of organometallic compounds. Methods of preparation, properties and applications of alkyl and aryl compounds of Li, Mg & Al.

**Unit - II (Organic Chemistry)****15h(1 hr/week)****S3-O-1: Carboxylic acids and derivatives****5 h**

Preparation: a) Hydrolysis of Nitriles, amides and esters. b) Carbonation of Grignard reagents. Special methods of preparation of Aromatic Acids - Oxidation of Arenes. Physical properties- hydrogen bonding, dimeric association,. Chemical properties – Reactions involving H, OH and COOH groups -salt formation, anhydride formation, Acid halide formation, Esterification (mechanism) & Amide formation. Reduction of acid to the corresponding primary alcohol - via ester or acid chloride. Degradation of carboxylic acids by Huns Diecker reaction, Schmidt reaction (Decarboxylation). Arndt – Eistert synthesis, Halogenation by Hell – Volhard - Zelensky reaction. Carboxylic acid Derivatives – Hydrolysis and Amonolysis of acid halides, Acid anhydrides and esters (mechanism of ester hydrolysis by base and acid). Hydrolysis and dehydration of amides.

**S3-O-2: Nitrohydrocarbons****3 h**

Preparation of Nitroalkanes. Reactivity - halogenation, reaction with  $\text{HNO}_2$  (Nitrous acid), Nef reaction, reduction. Aromatic Nitrohydrocarbons: Preparation of Nitrobenzene by Nitration. Physical properties, chemical reactivity –Reduction of Nitrobenzenes in different media.

**S3-O-3: Amines, Cyanides and Isocyanides****7 h**

Amines: classification into  $1^\circ$ ,  $2^\circ$ ,  $3^\circ$  Amines and Quarternary ammonium compounds. Preparative methods – Ammonolysis of alkyl halides, Gabriel synthesis, Hoffman's bromamide reaction (mechanism). Reduction of Amides and Schmidt reaction. Physical properties. Use of amine salts as phase transfer catalysts. Chemical Properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation. Reaction with Nitrous acid of  $1^\circ$ ,  $2^\circ$ ,  $3^\circ$  (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration, oxidation of aryl and  $3^\circ$  Amines, diazotisation. Diazonium salts: Preparation with mechanism. Synthetic importance – a) Replacement of diazonium group by – OH, X (Cl)- Sandmeyer and Gatterman reaction, by fluorine (Schiemann's reaction), by iodine, CN,  $\text{NO}_2$ , H and aryl groups. Coupling Reaction of diazonium salts. i) with phenols ii) with anilines. Reduction to phenyl hydrazines.

**Cyanides and isocyanides:** Structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii)

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reduction iv) oxidation.

### Unit III (Physical Chemistry)

15 h (1 hr/week)

#### S3-P-1: Thermodynamics -I

10 h

A brief review of - Energy, work and heat units, mechanical equivalent of heat, definition of system, surroundings. First law of thermodynamics statement- various forms mathematical expression. Thermodynamic quantities- extensive properties and intensive properties, state function and path functions. Energy as a state function and exact differential. Work of expansion and heat absorbed as path function.

Expression for work of expansion, sign convention problems on first law. Heat changes at constant pressure and heat changes at constant volume. Enthalpy. Heat capacities at constant pressure and constant volume. Derivation of  $C_p - C_v = R$ . Isothermal adiabatic processes. Reversible and irreversible processes. Reversible change and maximum work. Derivation of expression for maximum work for isothermal reversible process. Problems. Internal energy of an ideal gas. Joules experiment. Joule-Thompson coefficient. Adiabatic changes in ideal gas, derivation of equation,  $PV^\gamma = \text{constant}$ . P-V curves for isothermal and adiabatic processes. Heat of a reaction at constant volume and at constant pressure, relation between  $\Delta H$  and  $\Delta V$ .

Variation of heat of reaction with temperature. Kirchhoff's equation and problems. Limitations of first law and need for second law. Statement of second law of thermodynamics. Cyclic process. Heat engine, Carnot's theorem, Carnot's cycle. Derivation of efficiency of heat engine. Problems. Thermodynamic scale of temperature.

#### S3-P-2: Thermodynamics-II

5 h

Entropy: Definition from Carnot's cycle. Entropy as a state function. Entropy as a measure of disorder. Sign of entropy change for spontaneous and non-spontaneous processes & equilibrium processes. Entropy changes in i). Reversible isothermal process, ii). Reversible adiabatic process, iii). Phase change, iv). Reversible change of state of an ideal gas. Problems. Entropy of mixing of ideal gases. Free energy Gibb's function (G) and Helmholtz's function (A) as thermodynamic quantities. Concept of maximum work and network  $\Delta G$  as Criteria for spontaneity. Derivation of equation  $\Delta G = \Delta H - T\Delta S$ . Significance of the equation. Gibbs equations and Maxwell relations. Variation of G with P, V and T.

### Unit - IV (General Chemistry)

15 h (1 hr/week)

#### S3-G-1 Evaluation of analytical data

4 h

Significant figures, accuracy and precision. Errors-classification of errors- determinate and indeterminate errors, absolute and relative errors. Problems based on mean, median, range, standard deviation

#### S3-G-2: Carbanions-I

5 h

Introduction, acidic nature of  $\alpha$ -hydrogens and tautomerism in carbonyl compounds, nitro hydrocarbons, ethyl acetoacetate, diethyl malonate. Terminal alkynes. Stability of carbanions Reactions : Aldol reaction, Perkin reaction, Benzoin condensation, haloform reaction, conversion of smaller alkynes to higher alkynes.

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### S3-G-3: Phase Rule

6 h

Statement and meaning of the terms – Phase, Component and Degrees of freedom, Gibb's Phase rule, phase equilibria of one component system – water system. Phase equilibria of two-component system – Solid-Liquid equilibria, simple eutectic –Pb-Ag system, desilverisation of lead. Solid solutions – compound with congruent melting point – Mg-Zn system and incongruent melting point – NaCl-H<sub>2</sub>O system.

### References

**General reference:** B.Sc II Year Chemistry : Semester III, Telugu Academy publication, Hyd Unit- I

1. Analytical chemistry by G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasada Rao, K.L.N. Reddy and C. Sudhakar
2. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications(1996).
3. Concise Inorganic Chemistry by J.D. Lee 3<sup>rd</sup> edn Van Nostrand Reinhold Company(1977)
4. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3<sup>rd</sup> edn Wiley Publishers (2001).
5. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4<sup>th</sup> edn. (2006)
6. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
7. Inorganic Chemistry by Shriver and Atkins 3<sup>rd</sup> edn Oxford Press (1999).
8. Textbook of Inorganic Chemistry by R Gopalan(Universities Press(2012)
9. College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati Universities Press (India) Limited(2012)

### Unit- II

1. Text book of organic chemistry by Soni. Sultan Chand & Sons; Twenty Ninth edition (2012)
2. General Organic chemistry by Sachin Kumar Ghosh. New Age Publishers Pvt Ltd (2008).
3. Text book of organic chemistry by Morrison and Boyd. Person(2009)
4. Text book of organic chemistry by Graham Solomons. Wiley(2015)
5. Text book of organic chemistry by Bruce Yuranis Powla. (2012)
6. Text book of organic chemistry by C N pillai CRC Press (2012)
7. Organic Chemistry by L. G. Wade Jr.
8. Organic Chemistry by M. Jones, Jr
9. Organic Chemistry by John McMurry.

### Unit III

1. Principles of physical chemistry by Prutton and Marron. The MacmillanCompany; 4<sup>th</sup> Edn.(1970)
2. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand and Sons.(2011)
3. Text Book of Physical Chemistry by Puri and Sharma. S. Nagin chand and Co.(2017)
4. Text Book of Physical Chemistry by K. L. Kapoor. (2012)
5. Colloidal and surface chemistry ,M. Satake, Y. Hayashi, Y.Mido, S.A.Iqbal and
6. M.S.sethi, Discovery Publishing Pvt.Ltd (2014)
7. Material science by Kakani & Kakani, New Age International(2016)
8. Physical Chemistry by Ira Levine (Author) McGraw-Hill Education; 6 edition (May 9, 2008)

### Unit IV

1. Text book of organic chemistry by Morrison and Boyd, Person(2009)

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2. Text book of organic chemistry by Graham solomons, Wiley(2015)
3. Text book of organic chemistry by Sony, Sultan Chand & Sons; 29<sup>th</sup> edition (2012)
4. Text book of organic chemistry by Bruice yuranis Powla, (2012)
5. General Organic chemistry by Sachin kumar Ghosh, New Age Publishers Pvt Ltd (2008)

### Laboratory Course

#### Paper III (Organic Synthesis)

45 h (3h/week)

#### 1. Synthesis of Organic compounds:

Acetylation: Acetylation of salicylic acid, Benzoylation of Aniline.

Aromatic electrophilic substitution: Nitration: Preparation of nitro benzene and m-dinitro benzene.

Halogenation: Preparation of p-bromo acetanilide, Preparation of 2,4,6-tribromo phenol

Oxidation: Preparation of benzoic acid from benzyl chloride.

Esterification: Preparation of n-butyl acetate from acetic acid.

Methylation: Preparation of - naphthyl methyl ether.

Condensation: Preparation of benzilidene aniline and Benzaldehyde and aniline.

Diazotisation: Azocoupling of  $\beta$ -Naphthol.

#### 2. Microwave assisted synthesis of Asprin – DEMO (demonstration only)

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**B.Sc. II yr CHEMISTRY**  
**SEMESTER WISE SYLLABUS**  
**SEMESTER IV**  
**Paper-IV**  
**Chemistry - IV**

**Unit-I (Inorganic Chemistry) 15h (1 h/week)**  
**S4-I-1: Coordination Compounds –II 11 h**

Crystal field theory (CFT)- Postulates of CFT, splitting patterns of d-orbitals in octahedral, tetrahedral, square planar with suitable examples. Crystalfield stabilization energies and its calculations for various dn configurations in octahedral complexes. High Spin Low Spin complexes. Colour and Magnetic properties of transition metal complexes. Calculations of magnetic moments spin only formula. Detection of complex formation - basic principles of various methods- change in chemical properties, solubility, colour, pH, conductivity, magnetic susceptibility.

Hard and soft acids bases (HSAB) - Classification, Pearson's concept of hardness and softness, application of HSAB principles – Stability of compounds / complexes, predicting the feasibility of reaction. Thermodynamic and kinetic stability of transition of metal complexes. Stability of metal complexes –stepwise and overall stability constant and their relationship and chelate effect determination of composition of complex by Job's method and mole ratio method.

Applications of coordination compounds: Applications of coordination compounds a) in quantitative and qualitative analysis with suitable examples b) in medicine for removal of toxic metal ions and cancer therapy c) in industry as catalysts polymerization –Ziegler Natta catalyst d) water softening.

**S4-I-2: Bioinorganic Chemistry 4 h**

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride (Cl<sup>-</sup>). Toxic metal ions As, Hg & Pb Oxygen transport and storage – structure of hemoglobin, binding and transport of oxygen. Fixation of CO<sub>2</sub> in photosynthesis- overview of light and dark reactions in photosynthesis. Structure of chlorophyll and coordination of magnesium. Electron transport in light reactions from water to NADP<sup>+</sup> (Z – scheme).

**Semester-IV**

**Unit - II (Organic Chemistry) 15h(1 hr/week)**  
**S4-O-1: Carbohydrates 6 h**

Introduction: Classification and nomenclature. Monosaccharides: All discussion to be confined to (+) glucose as an example of aldo hexoses and (-) fructose as example of ketohexoses. Chemical properties and structural elucidation: Evidences for straight chain pentahydroxy aldehyde structure. Number of optically active, isomers possible for the structure, configuration

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of glucose based on D-glyceraldehyde as primary standard (No proof for configuration is required). Evidence for cyclic structure of glucose (Pyranose structure, anomeric Carbon and anomers). Proof for the ring size (methylation, hydrolysis and oxidation reactions). (Haworth formula and chair conformational formula). Structure of fructose: Evidence of 2 – keto hexose structure. Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure, Haworth formula).

Inter Conversion of Monosaccharides: : Arabinose to D-glucose, D- mannose (kiliani – Fischer method). Epimers, Epimerisation- Lobry de bruyn van Ekenstein rearrangement. D-glucose to D-arabinose by Ruff's degradation. Aldohexose(+) (glucose) to ketohexose (-) (fructose) and Ketohexose(Fructose) to aldohexose (Glucose).

#### S4-O-2: Amino acids and proteins

5 h

Classification. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples – Glycine, Alanine, Valine and Leucine) by following methods: a) From halogenated Carboxylic acid b) Malonic ester synthesis c) strecker's synthesis. Physical properties: Optical activity of naturally occurring amino acids. Zwitter ion structure – salt like character, definition of isoelectric point. Chemical properties: General reactions due to amino and carboxyl groups – Lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides. Primary structure of proteins, di peptide synthesis

#### S4-O-3: Heterocyclic Compounds

4 h

Introduction and definition: 5 membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole. Importance of ring systems – Numbering. Aromatic character

Resonance structures: Explanation of feebly acidic character of pyrrole, electrophilic substitution, Halogenation, Nitration and Sulphonation. Reactivity of furan as 1,3-diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene Paul-Knorr synthesis. Structure of pyridine, Basicity – Aromaticity – Comparison with pyrrole – preparation by Hantsch method and properties – Reactivity towards Nucleophilic substitution reaction – chichibabin reaction.

### Unit III (Physical Chemistry)

15h (1 hr/week)

#### S4-P-1: Chemical Kinetics

11 h

Introduction to chemical kinetics, rate of reaction, variation of concentration with time, rate laws and rate constant. Specific reaction rate. Factors influencing reaction rates: effect of concentration of reactants, effect of temperature, effect of pressure, effect of reaction medium, effect of radiation, effect of catalyst with simple examples. Order of a reaction.

First order reaction, derivation of equation for rate constant. Characteristics of first order reaction. Units for rate constant. Half- life period, graph of first order reaction, Examples- Decomposition of  $H_2O_2$  and decomposition of oxalic acid, Problems.

Pseudo first order reaction, Hydrolysis of methyl acetate, inversion of cane sugar, problems. Second order reaction, derivation of expression for second order rate constant, examples-

Saponification of ester,  $2O_3 \rightarrow 3O_2$ ,  $C_2H_4 + H_2 \rightarrow C_2H_6$ . Characteristics of second order reaction, units for rate constants, half-life period and second order plots. Problems

**S4-P-2: Photochemistry**

4 h

Introduction to photochemical reactions, Difference between thermal and photochemical reactions, Laws of photo chemistry- Grotthus Draper law, Stark-Einstein's Law of photochemical equivalence. Quantum yield. Examples of photo chemical reactions with different quantum yields. Photo chemical combinations of  $H_2-Cl_2$  and  $H_2-Br_2$  reactions, reasons for the high and low quantum yield. Problems based on quantum efficiency. Consequences of light absorption. Singlet and triplet states. Jablonski diagram. Explanation of internal conversion, inter-system crossing, phosphorescence, fluorescence.

**Unit III (General Chemistry)**

15h (1 hr/week)

**S4-G-1: Theories of bonding in metals**

4 h

Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors n-type and p-type, extrinsic & intrinsic semiconductors, and insulators.

**S4-G-2: Carbanions-II**

5 h

Mannich reaction, Michael addition and Knoevenagel condensation Synthetic applications of Aceto acetic ester. Acid hydrolysis and ketonic hydrolysis: Preparation of ketones, monocarboxylic acids and dicarboxylic acids Malonic ester- synthetic applications. Preparation of (i) substituted mono carboxylic acids and (ii) substituted dicarboxylic acids.

**S4-G-3: Colloids & Surface Chemistry**

6 h

Definition of colloids. Classification of colloids. Solids in liquids (sols): preparations and properties - Kinetic, Optical and Electrical stability of colloids. Protective action. Hardy-Schultz law, Gold number. Liquids in liquids (emulsions): Types of emulsions, preparation and emulsifier. Liquids in solids(gels): Classification, preparations and properties, General applications of colloids.

**Adsorption:** Types of adsorption. Factors influencing adsorption. Freundlich adsorption isotherm. Langmuir theory of unilayer adsorption isotherm. Applications.

**References**

**General reference:** B.Sc II Year Chemistry : Semester IV, Telugu Academy publication, Hyd Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications (1996).
2. Concise Inorganic Chemistry by J.D. Lee 3<sup>rd</sup> edn. Van Nostrand Reinhold Company (1977)
3. Basic Inorganic Chemistry by F.A. Cotton, G. Wilkinson and Paul.L. Gaus 3<sup>rd</sup> edn Wiley Publishers (2001).
4. Inorganic Chemistry Principles of structure and reactivity by James E. Huhey, E.A. Keiter and R.L. Keiter 4<sup>th</sup> edn. (2006)
5. Chemistry of the elements by N.N. Greenwood and A. Earnshaw Pergamon Press (1989).
6. Inorganic Chemistry by Shriver and Atkins 3<sup>rd</sup> edn Oxford Press (1999).
7. Textbook of Inorganic Chemistry by R Gopalan, Universities Press, (2012)

## Unit- II

1. Text book of organic chemistry by Soni. Sultan Chand & Sons; Twenty Ninth edition (2012)
2. General Organic chemistry by Sachin Kumar Ghosh. New Age Publishers Pvt Ltd (2008)
3. Text book of organic chemistry by Morrison and Boyd. Person(2009)
4. Text book of organic chemistry by Graham Solomons. Wiley(2015)
5. Text book of organic chemistry by Bruce Yuranis Powla. (2012)
6. Text book of organic chemistry by C N pillai CRC Press (2012)
8. Organic Chemistry by L. G. Wade Jr.
9. Organic Chemistry by M. Jones, Jr
10. Organic Chemistry by John McMurry.

## Unit III

1. Principles of physical chemistry by Prutton and Marron. The Macmillan Company; 4<sup>th</sup> edn. (1970)
2. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons.(2011)
3. Text Book of Physical Chemistry by Puri and Sharma. S. Nagin chand and Co.(2017)
4. Text Book of Physical Chemistry by K. L. Kapoor. (2012)
5. Physical Chemistry through problems by S.K. Dogra. (2015)
6. Text Book of Physical Chemistry by R.P. Verma.
7. Elements of Physical Chemistry by Lewis Glasstone. Macmillan (1966)
8. Industrial Electrochemistry, D. Pletcher, Chapman & Hall, London, 1990

## Unit IV

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications(1996).
2. Concise Inorganic Chemistry by J.D. Lee 3<sup>rd</sup> edn. Van Nostrand Reinhold Company (1977)
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3<sup>rd</sup> edn Wiley Publishers (2001).
4. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4<sup>th</sup> edn. (2006)
5. Text book of organic chemistry by Morrison and Boyd, Person (2009)
6. Text book of organic chemistry by Graham solomons, Wiley (2015)
7. Fundamentals of organic synthesis and retrosynthetic analysis by Ratna Kumar Kar, CBA,(2014)
8. Organic synthesis by Dr. Jagadamba Singh and Dr. L.D.S. Yadav, Pragati Prakashan, 2010
7. Stereochemistry of organic compounds by D. Nasipuri, New Academic Science Limited, 2012
8. Organic chemistry by Clayden, Greeves, Warren and Wothers, Oxford University Press, 2001
9. Fundamentals of Asymmetric Synthesis by G. L. David Krupadanam, Universities, Press 2014

## Laboratory Course

### Paper IV-

#### Qualitative Analysis of Organic Compounds:

45hrs (3 h/week)

Qualitative analysis: Identification of organic compounds through the functional group analysis - ignition test, determination of melting points/boiling points, solubility test, functional group tests and preparation of suitable derivatives of the following: Carboxylic acids, phenols, amines, urea, thiourea, carbohydrates, aldehydes, ketones, amides, nitro hydrocarbons, ester and naphthalene.

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**B.Sc., III YEAR CHEMISTRY**

**SEMESTER-V**

**DSE-A: Chemistry Paper-V**

***(Spectroscopy & Chromatography)***

**(04 credits)**

**60 Hrs (04 Hrs/week)**

**UNIT-I: Molecular Spectroscopy (15 Hrs)**

**S5-A-E-I:** Introduction to electromagnetic radiation, interaction of electromagnetic radiations with molecules, various types of molecular spectra.

**Rotational spectroscopy (Microwave spectroscopy)**

Rotational axis, moment of inertia, classification of molecules (based on moment of inertia), rotational energies, selection rules, determination of bond length of rigid diatomic molecules eg. HCl.

**Infra red spectroscopy**

Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant (Problems). Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum

**Electronic spectroscopy**

Bonding and anti-bonding molecular orbitals, electronic energy levels of molecules ( $\sigma$ ,  $\pi$ ,  $n$ ), types of electronic transitions:  $\sigma$ - $\sigma^*$ ,  $n$ - $\sigma^*$ ,  $n$ - $\pi^*$ ,  $\pi$ - $\pi^*$  with suitable examples. Selection rules, Terminology of chromophore, auxochrome, bathochromic and hypsochromic shifts. Absorption characteristics of chromophones: diene, enone and aromatic chromophores. Representation of UV-Visible spectra. General features of absorption-spectroscopy transmittance, absorbance, and molar absorptivity. Beer-Lambert's law and its limitations.

**UNIT-II: NMR & Mass Spectroscopy (15 Hrs)**

**S5-A-E-II: Proton Magnetic Resonance Spectroscopy**

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, factors affecting chemical shifts, NMR splitting of signals – spin-spin coupling, representation of proton NMR spectrum – Integrations.  $^1\text{H}$  NMR spectrum of – ethyl bromide, acetaldehyde, 1, 1, 2- tribromo ethane, ethyl acetate and acetophenone.

**Mass Spectrometry**

Electron Impact Mass: Basic principles, Nitrogen rule, types of ions: Molecular ion, fragment ion and isotopic ions, representation of mass spectrum, types of peaks (molecular ion, fragment and isotopic ion peaks). Determination of molecular formula. Mass spectrum of ethyl chloride, ethyl bromide and acetophenone.

**UNIT-III: Separation techniques-I (15 Hrs)**

**S5-A-E-III: Solvent Extraction-** Principle, Methods of extraction: Batch extraction, continuous extraction and counter current extraction. Application– Determination of Iron (III).

**Chromatography:** Classification of chromatographic methods, principles of differential migration, adsorption phenomenon, nature of adsorbents, solvent systems.

**Thin layer Chromatography (TLC):** Advantages, preparation of plates, solid phase and mobile phase used in TLC, eluotropic series, development of the chromatogram, Detection of the spots, factors effecting  $R_f$  values and applications of TLC.

**Paper Chromatography:** Principle, choice of paper and solvent systems, development of chromatogram – ascending, descending, radial and two dimensional chromatography, detection of spots, and applications of paper chromatography.

**UNIT-IV: Separation techniques-II (15 Hrs)**

**SS-A-E-IV: Column Chromatography-** Principle, Types of stationary phases, Column packing – Wet packing technique, Dry packing technique. Selection criteria of mobile phase solvents for eluting polar, non-polar compounds and its applications.

**Ion exchange chromatography:** Principle, cation and anion exchange resins, its application in separation of ions, de-ionized water.

**Gas Chromatography:** Principle, theory and instrumentation (Block Diagram), Types of stationary phases and carrier gases (mobile phase), application of GC.

**High performance liquid chromatography:** Principle, theory and instrumentation, stationary phases and mobile phases. Applications of HPLC, analysis of Paracetamol.

**Recommended Text Books and Reference Books:**

1. Fundamentals of Molecular Spectroscopy, C.N. Ban well & Mc Cash.
2. Organic spectroscopy, William Kemp, Palgrave Macmillan; 2<sup>nd</sup> Revised edition.
3. Spectroscopy, B K Sharma Krishna Prakashan Media, 1981.
4. Elements of Organic spectroscopy, YR Sharma.
5. Applications of Absorption spectroscopy of Organic compounds ( English paper back, Dyer R.John)
6. Organic chemistry, Morrison and Boyd, Pearson Publications.
7. Introduction to Spectroscopy by Donald Pavia, Gary Lampman and George Kriz. Saunders College Division, 2001.
8. Chemistry text book for B.Sc., published by Telugu academy, Govt. of Telangana.
9. Analytical Chemistry by David Krupadanam, Universities Press (India) Limited.
10. Principles of Instrumental Analysis, D.A.Skoog, F.J.Holler & T.A. Nieman, Cengage Learning India Ed.
11. Fundamentals of Analytical Chemistry 6<sup>th</sup> Edn, D.A.Skoog, D.M. West, F.J.Holler, Saunders College Publishing, Fort worth (1992).
12. Instrumental Methods of Analysis, 7th Ed. Willard, H.H., Merritt, L.L., Dean, J. & Settle, F.A. Wordsworth Publishing Co.Ltd., Belmont, California, USA, 1988.
13. A Text Book of Quantitative Inorganic Analysis 7<sup>th</sup> Ed., Vogel, A.I. Prentice Hall.
14. Analytical Chemistry 7 th Edition by Gary D.Christian (2004)
15. Separation Methods, M.N Sastry, Himalaya Publication (2004)

**B.Sc., III YEAR CHEMISTRY**

**SEMESTER-V**

**DSE-B: Chemistry Paper-V**

*(Metallurgy, Dyes and Catalysis)*

**(04 credits)**

**60 Hrs (04 Hrs/week)**

**Unit I: General Principles of Metallurgy and Production of Non Ferrous Metals (15 Hrs)**

**S5-E-B-I: Pyrometallurgy:** Drying and calcination, roasting, smelting, products of smelting,

**Hydrometallurgy:** Leaching methods, leaching agents, leaching of metals, oxides and sulphides.

Separation of liquid and solid phases and processing of aqueous solutions

**Electrometallurgy:** Electrolysis, Refining electrolysis, electrolysis from aqueous solutions, fused-salt electrolysis

**Refining processes:** Chemical and physical refining processes

**Production of selected non-ferrous metals (Copper, Nickel, Zinc):** Properties, raw materials, production (flow charts presentations and chemical reactions involved) and uses.

**Unit II: Natural and Synthetic Dyes (15 Hrs)**

**S5-E-B-II:** Definition and Classification of dyes - Natural dyes, Synthetic dyes: based on chemical constitution of dyes; Chemical nature of dyes; Application of dyes.

**Structures of Natural dyes:** Indigo, Tyrian purple, Alizarine, Indigotin.

**Structures of Synthetic dyes:** Nitro dyes, Nitroso dyes, Azo dyes (Mono azo dye, Bis azo dyes) Diaryl methane dyes, Triaryl methane dyes, Xanthenes dyes, Phenolphthalein, Fluoroseine, Acridine dyes.

**Synthesis of dyes:** Mono azo dye, Bis azo dyes (Congo red), Auromine O, Malachite Green, Crystal Violet, Rhodamine B, Acridine Yellow, Indigotin. Binding of dyes to fabric. Applications of dyes.

**Unit III: Catalysis-I (15 Hrs)**

**S5-E-B-III:** **Homogeneous and heterogeneous catalysis** - Definition of a catalyst and catalysis. Comparison of homogeneous and heterogeneous catalysis with specific examples. General characteristics of catalytic reactions.

**Acid-base catalysis-** Examples of acid and base catalysed reactions, hydrolysis of esters. Kinetics of acid catalysed reactions. Specific acid and general acid catalysis, Kinetics of base catalysed reactions. Specific base and general base catalysis. Examples- Aldol condensation and decomposition of nitramide, base catalysed conversion of acetone to di acetone alcohol, Mutarotation of Glucose. Effect of pH on reaction rate of acid and base catalysed reactions.

**Phase transfer catalysis:** Principle of phase transfer catalysis, classification of phase transfer catalysts. Factors influencing the rate of PTC reactions.

**Unit IV: Catalysis-II (15 Hrs)**

**S5-E-B-IV:** **Enzyme catalysis-** Characteristics of enzyme catalysis, Examples: (i) Invertase in inversion of cane sugar (ii) Maltase in conversion of maltose to glucose (iii) Urease in decomposition of urea (iv) Zymase in conversion of glucose to ethanol (v) working of carbonic anhydrase and (vi) Mechanism of oxidation ethanol by alcohol dehydrogenase. Factors affecting enzyme catalysis. Effect of temperature, pH, concentration and effect of inhibitor on enzyme catalysed reactions, Catalytic efficiency.



Kinetics of enzyme catalysed reactions: Michaelis-Menton Equation. Mechanism of enzyme catalysed reactions. Significance of Michaelis constant ( $K_m$ ) and maximum velocity ( $V_{max}$ ), Lineweaver-Burk plot. Types of enzyme inhibitors.

**Recommended Text Books and Reference Books:**

1. Industrial Chemistry B.K.Sharma
2. Engineering Chemistry, Jain and Jain
3. Industrial Chemistry, E. Stocchi, Vol-I, Ellis Horwood Ltd. UK.
4. Handbook of Industrial Chemistry, J. A. Kent: Riegel's, CBS Publishers, New Delhi.
5. Theory of production of non-ferrous metals and alloys Study. Kateřina Skotnicová, Monika Losertová, Miroslav Kursa.
6. The Chemistry of Synthetic Dyes, Volume 4, K.Venkataraman, Elsevier.
7. Organic Chemistry Vol-I by I.L. Finar.
8. Organic Chemistry by Jennice, Gorzinski Smith.
9. Natural Dyes: Sources, Chemistry, Application and Sustainability Issues by Sujata Saxena and A. S. M. Raja.
10. Physical Chemistry by Atkins and De Paula, 8 th Edn.
11. Physical Chemistry by Puri, Sharma and Pattania, 2017.
12. Kinetics and mechanism of chemical transformations by Rajarajm and Kuriacose, Published by Macmillan India Ltd.
13. Text book of Physical Chemistry by K.L. Kapoor Macmillan, 1999.
14. Catalysis by J.C. Kuriacose, Macmillan Publishers India Limited, 1980.
15. Phase Transfer Catalysis, Fundamentals, Applications and Industrial perspectives, C.M.Stark, C.Liotta & M.Halpern, Academic Press.
16. Phase Transfer Catalysis, E.V.Dehmlow & S.S. Dehmlow, Verlag Chemie, Weinheim.

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**B.Sc., III YEAR CHEMISTRY**

**SEMESTER-V**

**LABORATORY COURSE**

**Paper –V: Experiments in Physical Chemistry-I**

**(01 Credit)**

**45 Hrs (03 Hrs/week)**

**1. Distribution law**

- Determination of molecular status and partition coefficient of benzoic acid in Toluene and water.
- Determination of distribution coefficient of acetic acid between n-butanol and water.

**2. Electrochemistry**

- Determination of cell constant of conductivity cell.
- Verification of Ostwald's dilution law- Determination of dissociation constant ( $K_a$ ) of acetic acid by conductivity measurements.

**3. Colorimetry**

- Verification of Beer's - Lamberts law for  $KMnO_4$
- Determination of the concentration of the given  $KMnO_4$  solution.

**4. Adsorption**

- Adsorption of acetic acid on animal charcoal- Verification of Freundlich adsorption isotherm.

**5. Physical constants**

- Surface tension and b) Viscosity of liquids. (Demonstration Experiment)

**Reference books:**

- Senior Practical Physical Chemistry, B. D Khosla, V. C. Garg , Adarsh Gulati Published by R. Chand & Co.
- Practical Physical Chemistry, B.Vishwanathan and P.S. Raghavan. Viva Books.
- Practicals in Physical Chemistry by P.S. Sindhu ISBN-10: 1-4039-2916-5/1403929165 ISBN-13: 978-1-4039-2916-7/9781403929167.







## B.Sc., III YEAR CHEMISTRY

### SEMESTER-VI

#### DSE-A: Chemistry Paper-VI

*(Medicinal Chemistry)*

(04 credits)

60 Hrs (04 Hrs/week)

#### Unit- I: Introduction and Terminology (15 Hrs)

**S6-E-A-I: Diseases:** Common diseases, infective diseases—insect borne, air-borne, water-borne and hereditary diseases.

**Terminology in Medicinal Chemistry:** Drug, Active Pharmaceutical Ingredient (ADI), Pharmaceuticals, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics, metabolites, anti metabolites and therapeutic index.

**Drugs:** Nomenclature: Chemical name, Generic name and Trade names with examples; Classification: Classification based on structures and therapeutic activity with examples.

**ADMET:** a) Absorption: Definition, absorption of drugs across the membrane – active and passive absorption, routes of administration of drugs. b) Distribution: definition and effect of plasma protein binding. c) Metabolism: definition, phase I and phase II reactions. d) Elimination: definition and renal elimination. Toxicity.

#### Unit-II: Enzymes and Receptors (15 Hrs)

**S6-E-A-II: Enzymes: Introduction,** Mechanism and factors affecting enzyme action, Specificity of enzyme action (including stereo specificity), Enzyme inhibitors and their importance. Types of inhibition - reversible, irreversible and their subtypes with examples.

**Receptors:** Introduction, Drug action-receptor theory, Mechanism of drug action, concept of agonists and antagonists with examples. Drug receptor interactions involved in drug receptor complex. Binding role of -OH group, -NH<sub>2</sub> group, quaternary ammonium salts and double bond. Structure – activity relationships of drug molecules, explanation with sulfonamides.

#### Unit- III: Synthesis and Therapeutic Activity of Drugs (15 Hrs)

**S6-E-A-III:** Introduction, synthesis and therapeutic activity of:

**Chemotherapeutics:** Sulphanilamide, dapsone, Penicillin-G (semi synthesis), Chloroquin, Isoniazid, Cisplatin and AZT.

**Drugs to treat metabolic disorders:** Anti diabetic - Tolbutamide; Anti-inflammatory – Ibuprofen; Cardiovascular- Glyceryl trinitrate; Antipyretic (paracetamol, aspirin) and Antacid- Omeprazole.

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**Drugs acting on nervous system:** Anesthetics-definition, Classification-local and general. Volatile-Nitrous oxide, chloroform uses and disadvantages. Local anesthetics – benzocaine.

**Unit- IV: Molecular Messengers and Vitamins and Micronutrients (15 Hrs)**

**S6-E-A-IV: Molecular Messengers:** Introduction to hormones and neurotransmitters, Thyroid hormones, Antithyroid drug-Carbimazol. Adrenaline: Adrenergic drugs- salbutamol, atenelol. Serotonin: SSRIs- fluoxetine. Dopamine: Antiparkinson drug- Levodopa .

**Vitamins and Micronutrients:** Introduction, Vitamin sources, Deficiency disorders and remedy of Vitamins A,B, C, D, E, K and micronutrients – Na, K, Ca, Cu, Zn and I .

**Recommended Text Books and Reference Books:**

1. Introduction to Medicinal Chemistry, G.L. Patrick, Oxford University Press, New York. 2013.
2. Medicinal Chemistry, Thomas Nogrady, Oxford Univ. Press, New York.2005.
3. Foye's Principles of Medicinal Chemistry, David William and Thomas Lemke, Lippincott Williams & Wilkins, 2008.
4. Medicinal Chemistry, Ashutosh Kar, New Age International, 2005.
5. Synthetic Drugs, O.D.Tyagi & M.Yadav, Anmol Publications,1998.
6. Medicinal Chemistry, Alka L. Gupta, Pragati Prakashan.
7. Drugs, G. L. David Krupadanam, D.Vijaya Prasad, K.Varaprasad Rao, K. L. N. Reddy, C. Sudhakar, Universities Press (India) Ltd. 2012.

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## B.Sc., III YEAR CHEMISTRY

### SEMESTER-VI

#### DSE-B: Chemistry Paper-VI

*(Agricultural & Fuel Chemistry)*

(04 credits)

60 Hrs (04 Hrs/week)

#### Unit I: Pesticides (15 Hrs)

**S6-E-B-I: Introduction**, Definition, classification of pesticides based on use (target). Toxicity and chemical structure with examples. Adverse effects of pesticides and its impact on environmental pollution.

Synthesis, manufacture and uses of representative pesticides: Organochlorines (Cypermethrin); Organophosphates (Parathion); Carbamates (carbaryl); Quinones (Chloranil), Anilides (Alachlor).

**Pesticide formulations:** Dusts, Granules, Wettable powders, Emulsions and Aerosols.

**Biopesticides :** Introduction: Potential pesticidal plants of India, Role of Neem in plant protection-constituents, Azadirachtin and its role in pest control, Structure and mode of action of Pyrethrins (pyrethrin-1) and Pyrethroids (permethrin) and nicotinoids (Imidacloprid).

#### Unit II: Fertilizers (15Hrs)

**S6-E-B-II: Introduction:** (need of fertilizers), functions of essential plant nutrients (N, P, K), Classification formula and uses of fertilizers:

**Nitrogenous fertilizers:** Ammonium nitrate, Urea, Calcium Cyanamide, Calcium Ammonium Nitrate, Sodium Nitrate, Ammonium Chloride and their uses.

**Phosphate fertilizers:** Normal super phosphate, Triple Super Phosphate, Ammonium Phosphate and their uses.

**Potassium fertilizers:** Potassium chloride, potassium nitrate, potassium sulphate and uses.

**Complex fertilizers:** Diammonium Phosphate and mixed fertilizers their uses. Manufacture of urea and Super phosphate of lime and their reactions in the soil.

**Biofertilizers:** Introduction, definition, classification, Rhizobium, Azotobactor, Azospirillum, Azolla, Blue Green Algae, Vermicomposting and uses.

**Organic farming:** The principal methods, crop rotation, green manures and compost, biological pest control, and mechanical cultivation and uses.

#### Unit III: Energy Sources and Coal (15Hrs)

**S6-E-B-III:** Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value.

**Coal:** Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas—composition and uses. Fractionation of coal tar, uses of coal tar based chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification), Coal liquefaction and Solvent Refining.

**Unit IV: Petroleum and its products, Petrochemicals and non petroleum fuels (15Hrs)**

**S6-E-B-IV: Petroleum and its products**

**Petroleum:** Origin, Composition of crude petroleum and classification. Properties-flash point and its determination, Knocking and anti-knocking compounds; Octane number and Cetane number. Distillation of crude petroleum, Fractional Distillation - Principle and process, refining, fractions and uses. Cracking -Thermal and catalytic cracking, Reforming.

**Petroleum products** – Petrol, Diesel, LPG, Kerosene, Tar and their applications.

**Petrochemicals**-Vinyl acetate, Propylene oxide, Isoprene and their uses.

**Lubricants:** Classification of lubricants- Solid, semi solid and liquids; Properties (viscosity, flash point, fire point, cloud point, pour point) and their determination. Functions of Lubricants, Mechanism of lubrication.

**Non-Petroleum fuels:** Natural Gas- CNG, LNG, clean Fuels- H<sub>2</sub> gas, ethanol, Fuel from waste- bio gas, Fuel from bio mass-Bio ethanol, biodiesel, and Synthetic fuels- syngas based.

**Recommended Text Books and Reference Books:**

1. Chemistry of pesticides, N. N. Melnikov, Springer-Verlag- Technology & Engineering (2012).
2. Pesticide Synthesis, Thomas A. Unger, Elsevier, (2000).
3. Pesticides, R. Cremlyn, John Wiley, 1980.
4. Manures and Fertilisers, K. Kolay, Published by Atlantic (2007).
5. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).
6. A Text Book of Engineering Chemistry Paperback-2017 by Shashi Chawla.
7. Industrial Chemistry, Vol-I, Stocchi.E, Ellis Horwood Ltd. UK (1990).
8. Jain, P.C. & Jain, M. Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
9. Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Sons, Delhi.

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**B.Sc., III YEAR CHEMISTRY**

**SEMESTER-VI**

**LABORATORY COURSE**

**Paper –V: Experiments in Physical Chemistry-II**

**(01 Credit)**

**45 Hrs (03 Hrs/week)**

**1. Kinetics**

- Determination of specific reaction rate of the hydrolysis of methyl acetate catalyzed by hydrogen ion at room temperature.
- Determination rate of decomposition of hydrogen peroxide catalyzed by  $\text{FeCl}_3$ .

**2. Electrochemistry**

**A. Potentiometry:**

- Determination of redox potential of  $\text{Fe}^{2+}/\text{Fe}^{3+}$  by potentiometric titration of ferrous ammonium sulphate vs potassium dichromate.
- Precipitation titration of  $\text{KCl}$  vs  $\text{AgNO}_3$  –Determination of given concentration of silver nitrate.

**B. pH metry:**

- pH metric titration of strong acid ( $\text{HCl}$ ) vs strong base- Determination of the concentration of given acid.
- pH metric titration of strong acid (acetic acid) with strong base ( $\text{NaOH}$ )- Determination of acid dissociation constant ( $K_a$ ) of weak acid.

**3. Conductometry:**

- Determination of overall order: Saponification of ethyl acetate with  $\text{NaOH}$  by conductance measurement

**Reference books:**

- Senior practical physical chemistry, B.D.Khosla, V.C.Garg, Adarsh Guati.
- Advanced Practical Physical chemistry, J.B.Yadav.
- Practical Physical chemistry, B.Vishvanathan and P.S.Raghavan.
- Practical Physical chemistry, P.S. Sindhu.

*Jani*

*Key*

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**ANNUAL ACADEMIC PLAN FOR CURRICULAR PROGRAMME FOR THE YEAR**  
**2019-2020**

|                         |  |
|-------------------------|--|
| <b><u>JUNE</u></b>      | Annual Plan preparation, Syllabus division, Time Table allotment   |
| <b><u>JULY</u></b>      | Admission process, Regular class room activity   |
| <b><u>AUGUST</u></b>    | Assignments, Student Seminar , Distribution of study material.   |
| <b><u>SEPTEMBER</u></b> | Group Discussion, Student seminars, Remedial coaching.   |
| <b><u>OCTOBER</u></b>   | Supplementary Examinations, Project work, Conduction of Workshop and Seminars, Internal Exam- I.                                   |
| <b><u>NOVEMBER</u></b>  | Assignments, Quiz competitions, Student seminars, Extension Lecture  |
| <b><u>DECEMBER</u></b>  | Term Exams , Quiz competition , Student seminars , Field trip, University Theory Examinations.                                     |
| <b><u>JANUARY</u></b>   | Project work, Extension Lecture, work shop ,Internal Examination-  |
| <b><u>FEBRUARY</u></b>  | Review of Syllabus completed, Conduct of Pre-Final Examinations, Practical Examinations.<br>Free coaching for M.Sc. Entrance Exam. |
| <b><u>MARCH</u></b>     | Practical Examinations, Study Hours  |
| <b><u>APRIL</u></b>     | PG Entrance Examinations – Free coaching and supplying material to the students  |



## II. Teaching Learning & Evaluation

- Teaching Diary & Lecture Plan
- Annual Academic Plan
- Course Material and Question Papers
- Class Room Seminars
- Quiz competition
- Teaching Models and Aids
- Remedial Coaching
- Paper Clippings
- Study Projects
- Comparative Studies
- Extension Lectures
- Evaluation
- Additional Curriculum

### **Teaching Diary & Lecture Plan:**

- These are maintained by every member of the department.
- Periodical checking up these records is taken up once in a week by the in charge of the Department of Chemistry. Once in a month by the principal.
- If there is any non coverage of syllabus due to un presented holidays, Remedial measures are suggested.

### **Annual Academic Plan:**

- It is designed as per Almanac.

### **Study materials supplied to students:**

- Telugu Academy books supplied
- Charan Publications
- Running Notes

### **Question Paper:**

- The question papers of the previous years are supplied to the students or The question papers file is circulated among the students and allowed to note down the same.

### **Class Room Seminars:**

- The bright students are identified and the topic of their choice from the curriculum is allotted and allowed to present the seminar under the supervision of the lecturer concerned.

### Quiz Competitions:

- Quiz on Chemistry subject was conducted by selecting bright students (16 Members) and divided into four groups.
- Quiz Competition conducted for I year Students.

### Teaching Models:

- At present in teaching learning process, faculty follows Lecture method, demonstration methods and also ICT methods.

### Remedial Coaching:

- After publication of the results, in the beginning of the academic year, the student's performance is assessed and students are categorized in to three types.
  - a) Slow learners (failed candidates of B.Sc. I Sem. paper)
  - b) Medium learners – secured below 50% marks.
  - c) Advanced learners-achieved 60% and above

Assignments are given to slow and medium learners and also conducted study hours advanced learners are selected and engaged in doing study project work.

On the other hand for final year students who failed in second year and in first year, the concentration is bestowed in teaching certain important topics and also conducted remedial coaching in zero hours.

The details of remedial coaching are recorded and tabulated in the prescribed Performa.

### Paper Clippings:

- The news item pertaining to the subject as well as other subjects according to the importance of the matter appeared in the daily news papers and other magazines are procured and displayed on the departmental notice board.

### **EVALUATION:**

The methods adopted for the evaluation of the students are:

- a) Conducting Internal exams
- b) Conducting Assignments
- c) Student Seminars
- d) Quiz competition
- e) Group Discussion
- f) University examinations( external exams)

## List of Study Material Supplied To Students

| Sl. No. | CLASS          | PAPER  | NAME OF THE TOPIC                              |
|---------|----------------|--------|--|
| 01      | B.Sc. I Year   | I SEM  | Chemical Bonding                               |
| 02      | B.Sc. I Year   | I SEM  | P-Block Elements                               |
| 03      | B.Sc. I Year   | I SEM  | Acyclic Hydrocarbons-alkanes, alkenes, alkynes |
| 04      | B.Sc. I Year   | I SEM  | .Isomerism                                     |
| 05      | B.Sc. I Year   | I SEM  | Structural Theory in Organic Chemistry         |
| 06      | B.Sc. I Year   | II SEM | <b>p-block Elements -II</b>                    |
| 07      | B.Sc. I Year   | II SEM | Chemistry of Zero group elements               |
| 08      | B.Sc. I Year   | II SEM | <b>.Aromatic Hydrocarbons</b>                  |
| 09      | B.Sc. III Year | II SEM | Chemistry of d-block elements                  |
| 10      | B.Sc. III Year | V SEM  | Coordination compounds                         |

### LIST OF CLASS ROOM SEMINARS ORGANISED DURING 2019-2020

| Sl. No. | NAME OF THE STUDENT | CLASS    | TOPIC OF THE SEMINAR                 |
|---------|---------------------|----------|--------------------------------------|
| 1       | A. Bhagya           | MPC I Yr | SN1 & SN2 REACTIONS                  |
| 2       | S.Sravani           | MPC I Yr | Reactions of carbonyl compounds      |
| 3       | S.Shireesha         | MPC I Yr | D-BLOCK ELEMENTS                     |
| 4       | S. Apoorva          | BZC I Yr | Vander Waal's Equation               |
| 5       | G. Gamy             | BZC I Yr | Andrew's Isotherm of CO <sub>2</sub> |
| 6       | P.Jayanthi          | BZC I Yr | Henry's law & Raoult's law           |

### LIST OF EXTENSION LECTURES ORGANISED BY THE DEPARTMENT

| Sl No | NAME OF THE INVITEE | DESIGNATION AND ADDRESS            | DATE       | TOPIC DELIVERED          | No. of Students Participated | VENUE           |
|-------|---------------------|------------------------------------|------------|--------------------------|------------------------------|-----------------|
| 1     | Smt.K.Premalatha    | Asst Prof of Chemistry<br>GDC MNCL | 08/11/2019 | ISOMERISM-CLASSIFICATION | 20                           | GDC Bellampally |

### BIO-DATA OF TEACHING STAFF:

| SNo | Name of the Faculty | Designation | Qualifications | Regular/ Contract | Specialization | Length of service |
|-----|---------------------|-------------|----------------|-------------------|----------------|-------------------|
| 1   | M.Gopal             | HOD         | M.Sc. M.Ed.    | Regular           | Agro chemistry | 25 years          |

|   |                       |                       |              |          |                   |          |
|---|-----------------------|-----------------------|--------------|----------|-------------------|----------|
| 2 | P. Chandraprakash Rao | Lecturer in Chemistry | M.Sc. M.Phil | Contract | Organic Chemistry | 10 Years |
|---|-----------------------|-----------------------|--------------|----------|-------------------|----------|

## INDIVIDUAL PROFILE OF THE FACULTY MEMBER

1. Name : M.GOPAL
2. Father Name : RAJANNA
3. Date of birth : 08/08/1963
4. Qualification : M.Sc.(CHEM), B.Ed., M .Ed.
5. Designation : Lecturer in chemistry
6. Place of work : Govt. Degree College Bellampally
7. Date of appointment : 15/6/1995
8. Date of promotion : 27-11-2010
9. Experience : 11 years
10. Dte of working in the present College: 30/06/2018
11. Address: 12-12/4, Rallapet, Gouthaminagar, Mancherial, Dist. Mancherial
12. MobileNo : 9440549760

### **Achievements:**

1. Attended refresher course at GJC Hanamkonda, Warangal conducted by BIE, AP Hyderabad from 02-02-2001 to 007-05-2001
2. Attended the state level orientation programme in chemistry for the period from 12-05-2007 to 14-05-2007 at SVS Junior college, Warangal.
3. Attended the 3 days induction training programme to the lecturers of Govt. Degree College on 28-30<sup>th</sup> of November 2011 at DRC SSR Government Degree College Karimnagar, sponsored by commissioner ate of collegiate education.
4. Attended national seminar on “new trends in spectroscopy & Green chemistry, conducted by Govt. Degree &PG College for women, Begum pet, Hyderabad from 06-08-2014 to 07-08-2014.



5. Worked as chief superintendent for Degree University Examinations in the college
6. Worked as examination coordinator, academic Coordinator, Head of the Department, at GDC (M) MANCHERIAL during the year 2013 -15.
7. Worked as chief superintendent for Recruitment TEST for VRO/ VRA, forest Department, and SCRTJA 2015(during 2014-2015 and 2015- 2016.
8. Worked as Vice Principal to GDC Chennai since 2013-2018.
9. Attended Orientation Programme for Public Servants in the context of Telangana from 21/01/2019 to 23/01/2019.
10. Worked as Regional Coordinator, Bellampally Region for Recruitment TEST for TSLPRT-2018
11. At present I am working as Principal (FAC) , Examination Coordinator and TSKC Coordinator to GDC Bellampally.

### **Declaration**

I declare that the particulars furnished above are true to the best of my knowledge and belief. I am liable for the authenticity of each and every bit of this information and indemnify the college administration that I take full responsibility in this regard.

Signature

Date: 17/03/2021

(M.GOPAL)

**Note: Proof of every bit of information furnished in the Profile should be enclosed in print and electronic form.**

## INDIVIDUAL PROFILE OF THE FACULTY MEMBER

1. Name in Full (with Surname) : PAKA .SWAMY
2. Designation : Lecturer in Chemistry
3. Father's name : P.komuraiah
4. Mother's name : p.yellamma
5. Date of Birth : 26/07/1972
6. Qualifications (copies of certificates) : MSc M.Phil
7. Caste : BC.D
8. Date of first Appointment : 15-11-2006
9. Mode of Appointment : By three men committee
10. Teaching Experience ( enclose DL Appointment Order): 17 YEARS
11. Date of working in the present college : 04-07-2021
12. Books Published: (Title Page, concerned pages, Last Page, ISBN/ISSN No.)-Nil
  - a. Authored /Course Writer - Nil
13. E-mail: swamypaka@gmail.com
14. Contact No. : 9963731003
15. Residential Address: H.NO: 16-488/6-11, GOUTHAMESHWARA COLONY,MANCHERIAL

### 16. Achievements:

1. At present working as MANA TV (T SAT) Coordinator .

#### Declaration

I declare that the particulars furnished above are true to the best of my knowledge and belief. I am liable for the authenticity of each and every bit of this information and indemnify the college administration that I take full responsibility in this regard.

Signature

Date: 22-10-2021

(PAKA SWAMY)

**Note: Proof of every bit of information furnished in the Profile should be enclosed in print and electronic form.**

# STUDENT SUPPORT AND PROGRESSION

- For each class a staff member is appointed as counselor.
- Ward Registers are maintained.
- Bio-data of the students is procured.
- Consolidated Attendance is recorded.
- Parents are informed about the progress of the students.
- Unit tests marks are recorded.
- The in-charges are in constant contact with students to solve their problems.
- The members of this department drafted as ward counselors.

## ORGANIZATION AND MANAGEMENT

The following measures are adopted for effective Organization and supervision.

1. Departmental meetings are conducted
2. Academic plans are prepared.
3. Individual time table and syllabus division are allotted.
4. Maintenance of Academic Registers
  - a) Teaching Dairy
  - b) Synopsis
  - c) Attendance Registers
  - d) Central Marks Register
5. Conduct of Internal Examinations.
6. Review of the syllabus coverage-Remedial Measures

## HEALTHY PRACTICES

As the most of the programmes are collectively organized by the college through constituting the committees, the Department is Motivating the students to participate in the programmes like

- A) College level activities
- B) AIDS – Awareness programs
- C) Health Awareness programs
- D) NSS Activities
- E) Clean & Green Activities
- F) Haritha Haram Programmes

Apart from this for some classes, lecturers appointed as ward Counsellor to solve the problem pertaining to students.

- **Teaching and Learning resources of the departments – By using various Teaching methods like.**

### **Modern teaching methods practiced and use of ICT in teaching learning.**

1. Student study projects were conducted.
2. Questioning and Answering method is followed after the completion of every chapter.
3. Student Seminars are conducted frequently in every class by each Lecturer.
4. Extension Lectures conducted by Experts
5. Scientific updates like Study materials, Images etc. Shown to the students by down loading and using LCD Projector.

- **Plan of action of the Department for the next five years.**

In addition to normal academic works we strongly desire to handle some minor research projects. As the surroundings of **Bellampally** belongs to industrial and forest area ,many Tribes are origin's habitat in the Mancherial district, we plan for study the tribal poverty of this district. And also planning as under mentioned.

1. To handle extra classes on important topics to make the students to perform better in the forthcoming examinations.
2. To conduct student support and progressive activities like Quiz, Study Projects, Guest Lectures and etc.
3. To conduct tutorials, inculcate reading of public administration related to topics in news papers and magazines and collecting press clips from news papers and magazines.
4. Strategies for advanced learners inculcating the habit of consulting the reference books for knowing more information about subject topics.
5. Besides academic teaching to giving instruction for developing positive attitude, good manners and good behaviour.
6. Conduction of minor research project with involving the students.
7. Arranging field trips to the students which will helps their higher education as well as their scientific knowledge among them.
8. Conduct free coaching for PG entrance examinations
9. Conduct state and national level workshop to give exploitation to the institution.
10. Conduction of departmental activity with involvement of other departments which will observe the society and helpful to the institution.

# DEPARTMENTAL ACTIVITIES -PHOTO GALLERY

## Extension Lecture

Extension Lecture by Smt. K. Premalatha, Asst. Prof of Chemistry, GDC Mancherial

### Topic: ISOMERISM







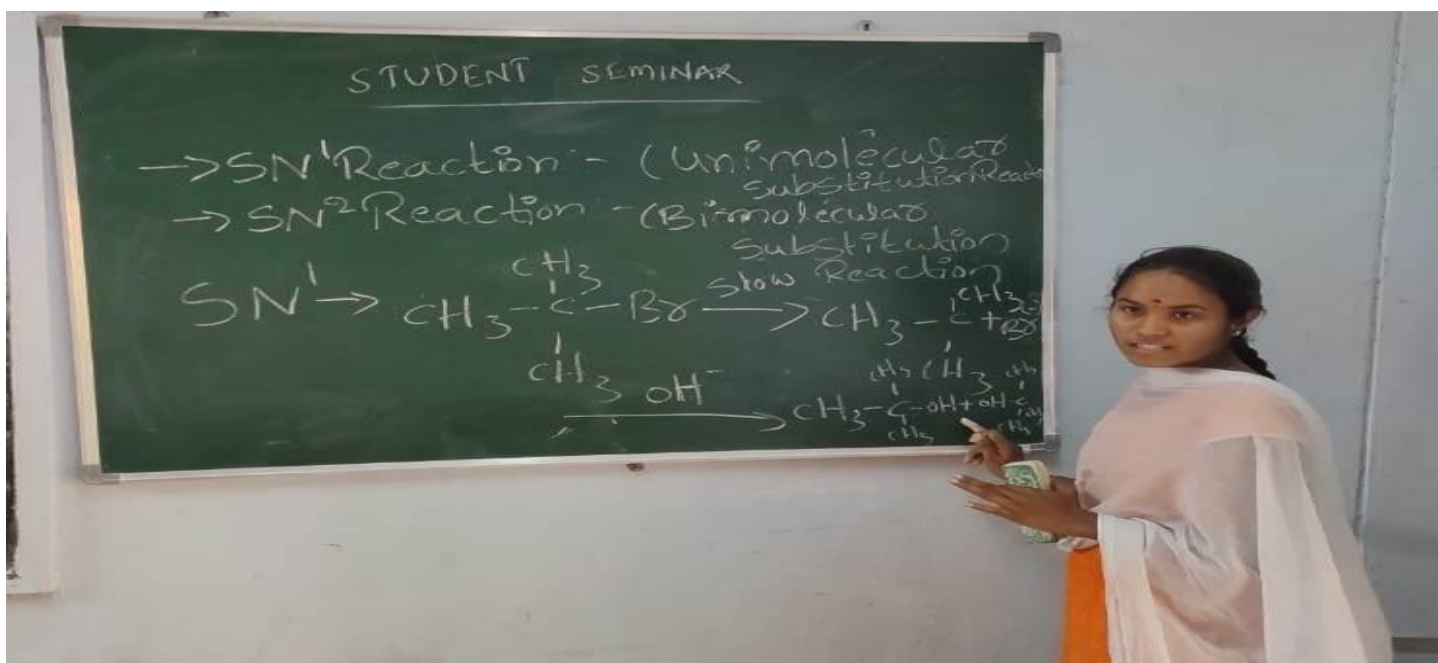
# STUDENT SEMINARS

## STUDENT SEMINARS-1

A. Bhagya

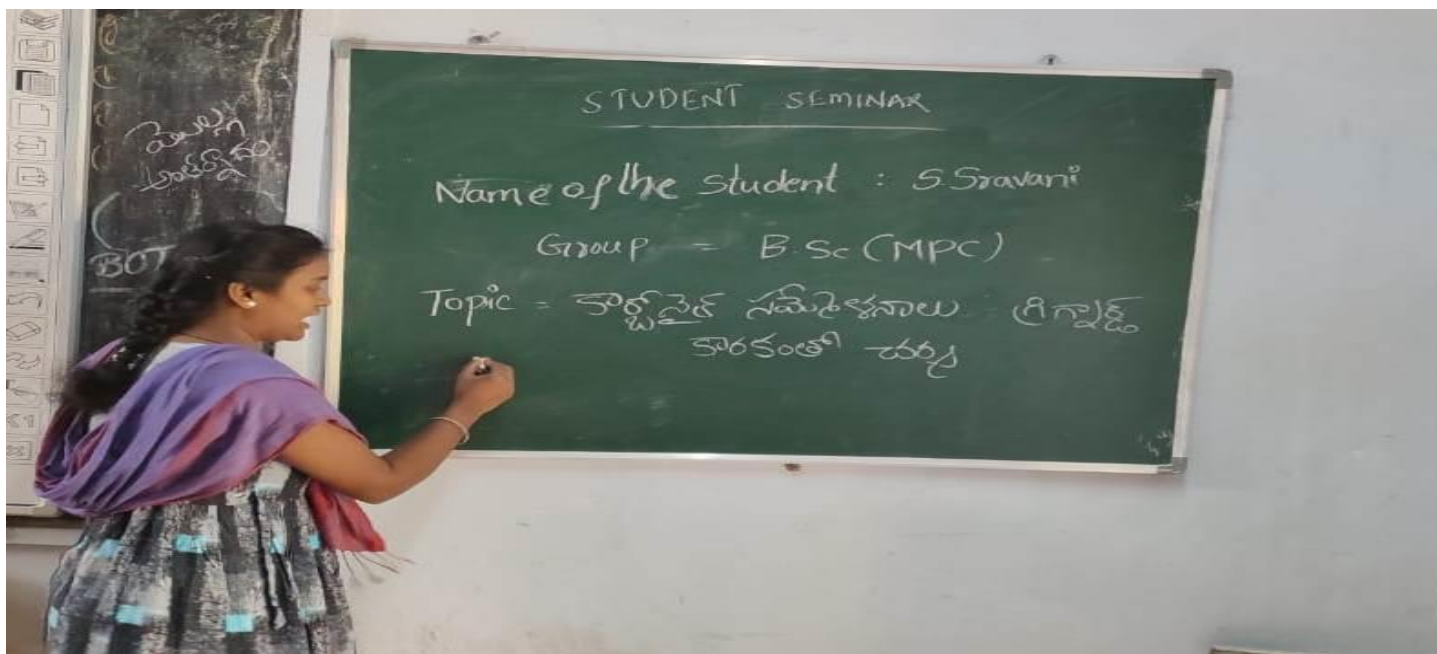
MPC I Yr

TOPIC : SN1 & SN2 Reactions



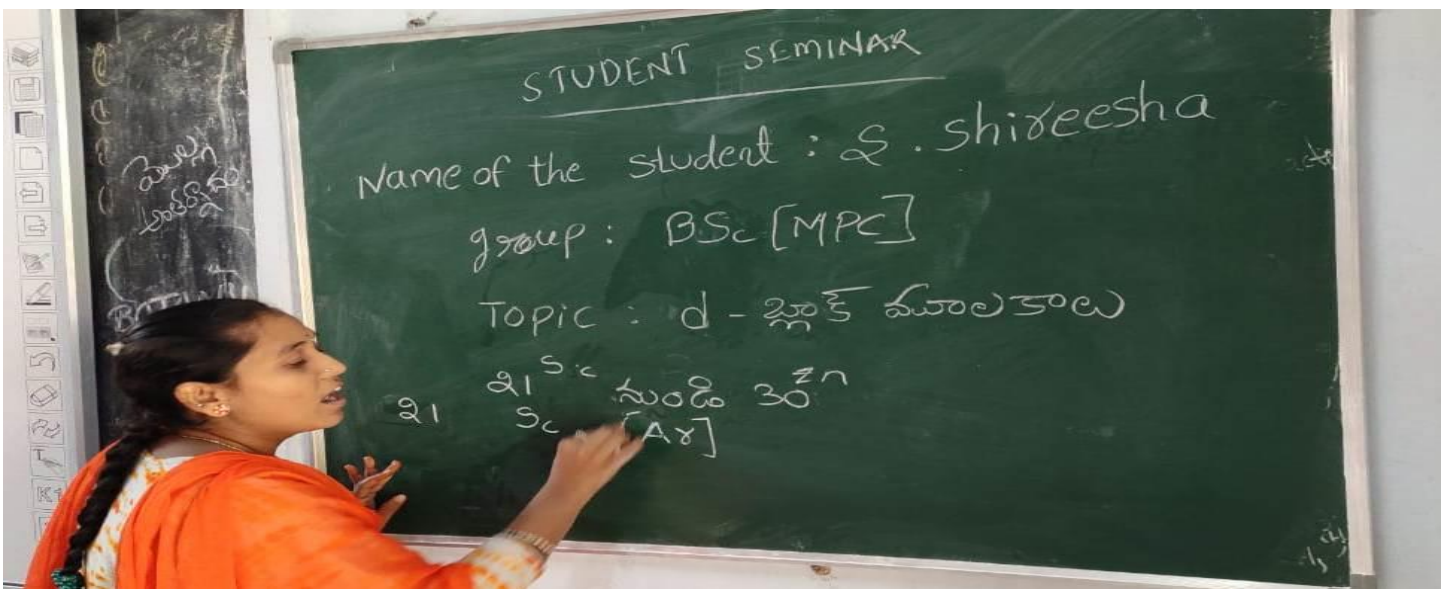
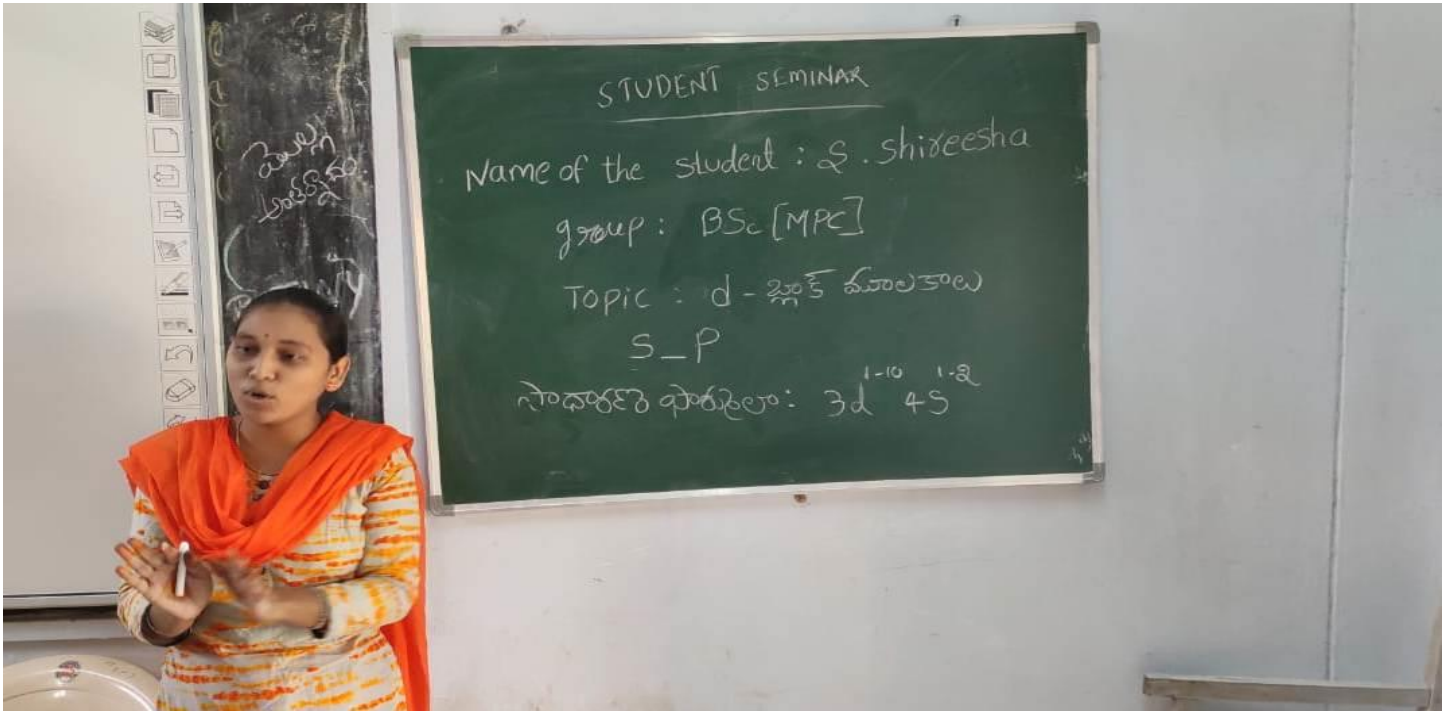
## STUDENT SEMINARS-2

|   |           |          |   |
|---|-----------|----------|---|
| 2 | S.Sravani | MPC I Yr | Topic : Reactions of carbonyl compounds |
|---|-----------|----------|---|



### STUDENT SEMINARS-3

|   |             |          |                         |
|---|-------------|----------|-------------------------|
| 3 | S.Shireesha | MPC I Yr | Topic: d-block elements |
|---|-------------|----------|-------------------------|



**STUDENT SEMINAR-4**

|    |                     |                   |   |
|----|---------------------|-------------------|---|
| 04 | <b>PRAVALLIKA.D</b> | BSc(BZC) 1st Year | Reactions with Ammonia<br>Derivatives & |
|----|---------------------|-------------------|---|



## QUIZ PROGRAMME

| Date       | Topic             | No.of Groups | Group-A     | Group-B     | Group-C     | Group-D     | WINNER         |
|------------|-------------------|--------------|-------------|-------------|-------------|-------------|----------------|
| 21/12/2019 | General Chemistry | 04           | Score<br>05 | Score<br>07 | Score<br>04 | Score<br>02 | <b>Group-B</b> |

**Quiz winners: Group-B**

### **CANDIDATES list**

**B.Rajith, B.Suresh,B.Shireesha, J.Sangeetha, L.Ramya, P.Jayanthi**



## GROUP DISCUSSTION

| Date | Topic                               | No.of Groups | Group-A<br>NAME OF THE PARTIPICIANT | Group-B<br>NAME OF THE PARTIPICIANT | Group-C<br>NAME OF THE PARTIPICIANT | Group-D<br>NAME OF THE PARTIPICIANT |
|------|-------------------------------------|--------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|      | HAZARDS-<br>POLLUTION<br>AND HEALTH | 04           | B.Rajitha                           | S.Ramya sri                         | T.Sravanthi                         | B.Sandya                            |

### GROUP-A List : MPC-I :

B.Rajitha, Ch.Swapna, A.Bhagyalaxmi.



**GROUP-B List :**

**BZC-I : S.Ramya sri, R.Saisuma , D.Mounika**



**GROUP-C List :**

**MPC/BZC-I :T.Sravanthi MPC,D.Pravallika BZC,E.Maheshwari BZC.**





## GROUP-D List

BZC-I: B.Sandya, P.Manasa, A.Krishnaveni



## FIELD TRIP 1

| <b>Date</b>       | <b>Name of the field trip</b>                              | <b>No.of students participated</b> | <b>Place of visit</b>            | <b>Name of the organizer</b> |
|-------------------|--|------------------------------------|----------------------------------|------------------------------|
| <b>29-01/2020</b> | Importance of water quality parameters in fish survivality | <b>20</b>                          | Krishi Vigyan Kendra Bellampally | M. GOPAL,<br>M.KUMARSWAMY    |



## **FIELD TRIP 2**

- Name of the organizer** : Department of Chemistry,  
GDC-BELLAMPALLY
- Name of the Field trip** : Shalivahana Green Energy Ltd., 6 M.W.  
Bio-Mass
- No. of students involved** : 25
- No. of teachers involved** : 02
- Date of the visit** : 27-10-2021.
- Place of the visit** : Shalivahana Green Energy Ltd., Patha  
Mancherial.

### **Objectives of the Field trip:**

The Main Objective of the field trip is to develop the knowledge, skill and character among the students. The field trips are a great way to bring excitement and adventure to learning. Especially the activity of educational field trips which are commonly conducted for the students at higher level are one of the major source of providing knowledge to the students by giving opportunity for knowledge for self-experiences and observations and self-long-lasting learning's.

### **Fuel used to Generate Power:**

1. Husk
2. Forestry Crops and Residues
3. Agricultural Crops and Residues

- 4. Sewage
- 5. Animal Residues

Production of Power by Plant: 6 M.W. per Hour.

Rotation of Turbine: 7500 RPM.

|  |   |  |
|--|---|--|
| <b>Expenditure incurred &amp; resources required</b> | : | NIL  |
| <b>Problems encountered</b>                          | : | NIL  |
| <b>Name of the resource person</b><br>Manager.       | : | Mr. Pradeep Kumar-<br><br>Mr. Sudhakar Plant |

Operator

**Outcome of the visit (or)**

**Students gained knowledge about :**

**By visiting Shalivahana Green Energy Limited, our students gained knowledge about, Bio-power technologies convert renewable biomass fuels into heat and electricity using processes similar to those used with fossil fuels.**

**Most electricity generated from biomass is produced by direct combustion. Biomass is burned in a boiler to produce to high pressure steam. The rotation of the turbine (7500 rpm)**

**Drives a generator, producing electricity. Biomass can also serve as substitute for portion of Coal in an existing power plant furnace in process called co-firing.**

**By this student understood that the how biomass can be utilized to produce power from the waste or residual organic materials.**



### **FIELD TRIP 3**

**Name of the organizer** : Department of Chemistry,  
GDC-BELLAMPALLY

**Name of the Field trip** : Ganesh Ceramics – Mancherial.

**No. of students involved** : 25

**No. of teachers involved** : 02

**Date of the visit** : 27-10-2021

**Place of the visit** : Ganesh Ceramics, Bokkala gutta- Mancherial

#### **Objectives of the Field trip:**

The main objective of the field trip is to develop the knowledge, skill and character among the students. The field trips are a great way to bring excitement and adventure to learning.

With the help of field trips we can ignite new ideas among the students and leadership qualities in the students.

Raw Material used :

White Clay from Kagaznagar Nagar Quarry.

**Expenditure incurred & resources required** : NIL

**Problems encountered** : NIL

**Name of the resource person** : Mr. Bhoomesh – In charge Of Ganesh Ceramics Company.

**Outcomeofthevisit (or)**

**Studentsgained knowledgeabout :**

By visiting Ganesh Ceramics –  
Mancherial the students gained knowledge about how the ceramics  
pipes are prepared from Raw Material White Clay.

Thisfieldtripismoreusefultoourstudents.



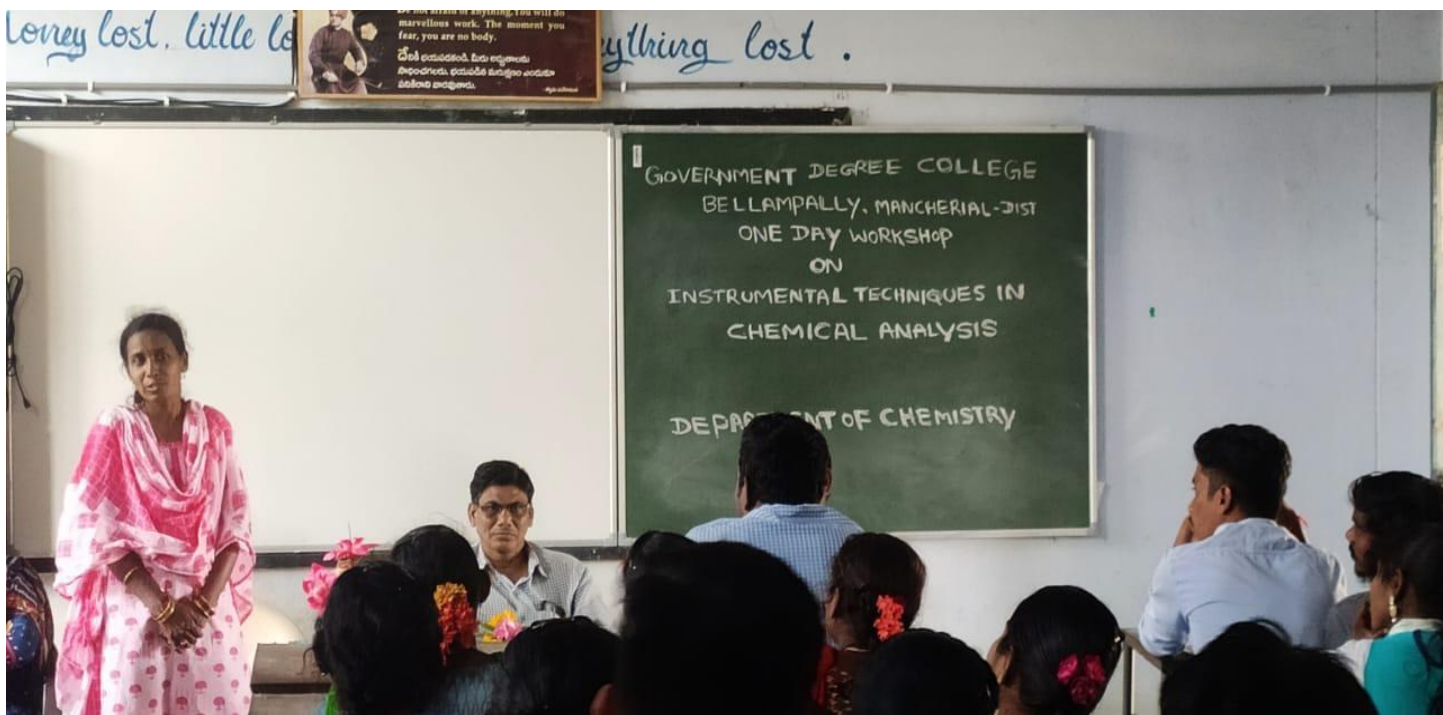
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# ONE DAY WORKSHOP

| Date       | Name of the WORKSHOP                                | No. of students participated | Name of the Resource person                                | Name of the organizer   |
|------------|---|------------------------------|--|-------------------------|
| 04/02/2020 | <i>Instrumental Techniques in Chemical Analysis</i> | 20                           | R.Krishnaveni<br>Lecturer in Chemistry,<br>GDC Kagaznagar. | Department of Chemistry |









## Extension Activities of the Department

### Harithaharam Programme



### Prevention of Child Abused Programme



# Dental Medical Camp



## దంత పరీక్షలు చేస్తున్న వైద్యుడు

బెల్లంపల్లి టౌన్: ప్రభుత్వ డిగ్రీ కళాశాల విద్యార్థులకు ఉచిత వైద్య దంత శిబిరాన్ని

శనివారం నిర్వహించారు. దంత వైద్యులు శ్రీధర్, భార్గవి విద్యార్థులకు వైద్య చికిత్సలు

## దంత వైద్య శిబిరం

చేశారు. జంతుశాస్త్ర విభాగం, జాతీయ సేవా పథకం ఆధ్వర్యంలో శిబిరం నిర్వహించారు. అనంతరం కళాశాల ప్రిన్సిపాల్ మేకల గోపాల్ మాట్లాడుతూ విద్యార్థులు చదువుతో పాటు ఆరోగ్య సంరక్షణపై శ్రద్ధ చూపాలన్నారు. ఆరోగ్యవంతమైన సమాజ నిర్మాణంలో భాగస్వాములు కావాలని పిలుపునిచ్చారు. వైస్ చాన్సలర్ శ్రీలత, లెక్చరర్లు రాధిక, గంగయ్య, కుమారస్వామి, శంకర్, ఏకాంబరం, తిరుపతి, ప్రభాకర్, రజిత, ఎన్ఎస్ఎస్ కోఆర్డినేటర్ గజెల్లి మోహన్ పాల్గొన్నారు.

