



TARA GOVERNMENT COLLEGE

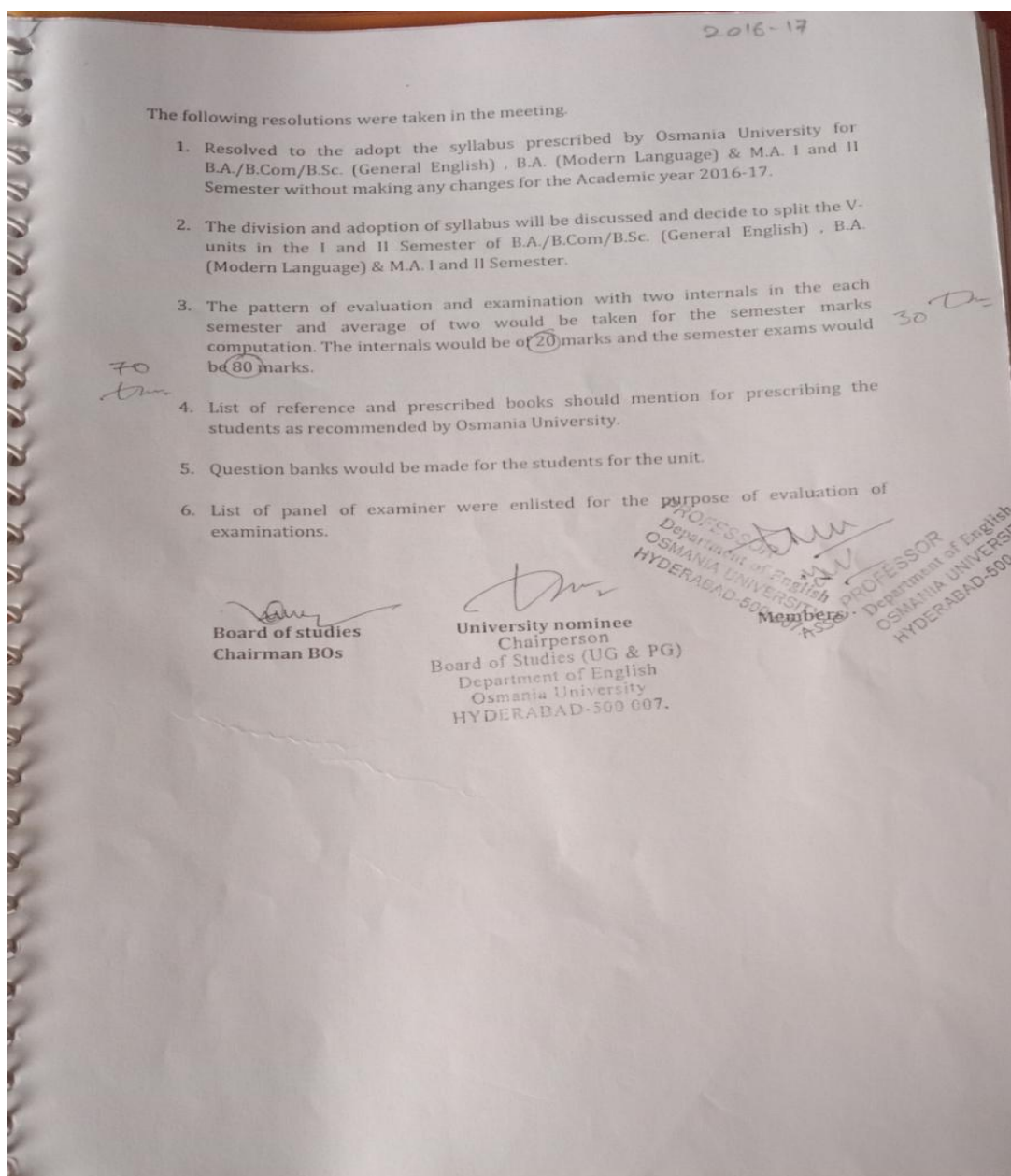
SANGAREDDY-T.S (A U T O N O M O U S)

DEPARTMENT OF ENGLISH



BOS RESOLUTIONS

2016-17

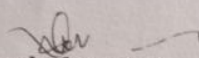


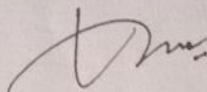
2017-18

2017-18

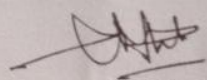
The following resolutions were taken in the meeting.

1. Resolved to the adopt the syllabus prescribed by Osmania University for B.A./B.Com./ B.Sc. (I & II year) & M.A (I & II Year) without making any changes for the Academic year 2017-18.
2. The syllabus was discussed and decided to split the syllabus into five units in the each paper of B.A./B.Com./ B.Sc. also each paper of M.A. English in four semesters are made into five units.
3. Scheme of instructions and conduct of examinations were discussed. Each paper consists of 100 marks i.e 70marks for end semester examinations and 30marks for internal assessment (20marks for test, 5marks for assignment and 5marks for seminar).
4. Prescribed books were purchased as recommended by the Osmania University.
5. List of examiners were mentioned for the purpose of evaluation of examinations. i.e Paper setting, Paper valuation, Conducting of practical examinations etc.,

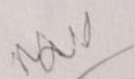

Board of studies
Chairman BOS


University nominee

Chairperson
Board of Studies (UG & PG)
Department of English
Osmania University
HYDERABAD-500 007.


Members

PROFESSOR
Department of English
OSMANIA UNIVERSITY
HYDERABAD-500 007.

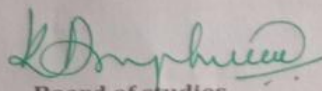

DEPARTMENT OF ENGLISH
UNIVERSITY COLLEGE FOR WOMEN
KOTHI, HYDERABAD-500 196.

2018-19

2018-19

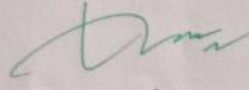
The following resolutions were taken in the meeting.

1. Resolved to adopt the syllabus prescribed by Osmania University for B.A./B.Com./B.Sc (General English), B.A.(Modern Language) & M.A (I & II Year) without making any major changes for the Academic year 2018-2019.
2. Scheme of instructions and pattern of examinations were discussed. Each paper consists of 100 marks. I.e. 70 marks for external examinations and 30 marks for internal examinations.(20 marks for test, 5 marks for assignment and 5 marks for Seminar/ Project/Quiz/PPT/any other.
3. Prescribed books will be purchased as recommended by the Osmania University.
4. Question banks will be made for the Students for internal examinations.
5. Examiners were enlisted for the purpose of evaluation of examinations.
6. All the other points that are not mentioned in the earlier BOS meeting shall remain same.



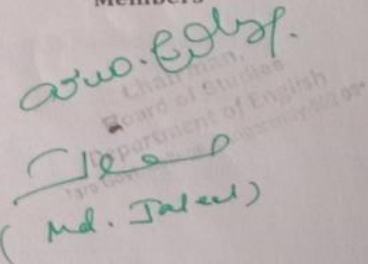
Board of studies
Chairman BOS

Chairperson
Board of Studies (UG & PG)
Department of English
Osmania University
HYDERABAD-500 007.

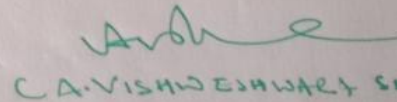


University nominee
PROFESSOR & HEAD
Department of English
OSMANIA UNIVERSITY
HYDERABAD-500 007.

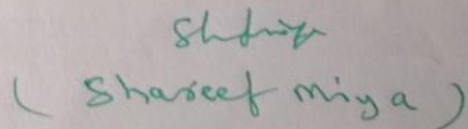
Members



Chairman
Board of Studies
Department of English
Osmania University
HYDERABAD-500 007.



C.A. VISHWESHWARI S



(Shafeef miya)

2019-20

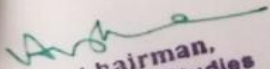
Board of Studies

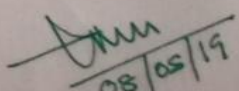
2019-20

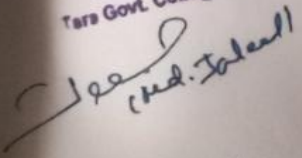
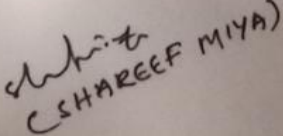
Resolutions


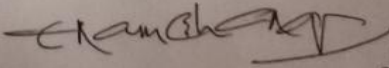
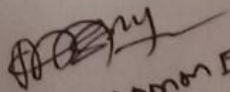
After discussions the following resolutions were adopted.

- 1) It was resolved to adopt the syllabus and course structure under reorganized CBCS approved by Osmania University for B.A./B.Com./ B.Sc English (First Language) for the academic year 2019-20. This includes Course Structure, Course Objectives, Course Outcomes, credits, syllabus, and Instructional Hours under the reorganized CBCS. There will be 4 units and 4 credits each for I and II semesters of English for B.A./B.Com./ B.Sc (First Language).
- 2) For B.A. (Modern Language) V and VI semesters, the syllabus will be as per the existing Osmania University B.A. (Modern Language) English syllabus. It was brought to the notice that owing to the lack of strength, the college was not accorded permission to offer B A ML (Optional English) from the academic year 2018-19. So there are no students studying in BA (ML) I to IV semesters. The students who are in the B.A. M L III year (V-VI semesters) will study the existing syllabus prescribed by the university last year (2018-19).
- 3) The syllabus and question paper pattern for UG III and IV semesters (General English) will be as per the resolution taken in the last BoS meeting. The new Osmania University ratified M A English CBCS syllabus (wef. A.Y. 2019-20) will be followed for the fresh batch of students except for distribution of marks.
- 4) The question paper pattern for both UG and PG courses will be followed as per the decision taken in the college academic council meeting. The pattern is 70:30 (70- end semester examinations and 30 Internal Assessment). There will be 2 sections, namely, A and B. Section A consists of 4 questions, each question carrying 5 marks. In this section, 6 questions are given. Section 'B' consists of 4 questions carrying 12 ¹/₂ marks each. The blue print, scheme of examination submitted by the department of English was approved. Internal assessment consists of 5 multiple choice questions, 5 fill in the blanks (1 mark each) and 5 short answer questions (each question carries 2 marks).
- 5) It was resolved to approve the panel of examiners prepared by the department of English.


Chairman,
Board of Studies
Department of English
Tara Govt. College, Sangareddy-502 004


08/05/19
Chairperson
Board of Studies (UG & PG)
Department of English
Osmania University
HYDERABAD-500 007


(Sharif)

(SHARIF MIYA)




(MOHAMMAD ASHFAQ)

Department of English, TARA GC Sangareddy (A)

2020-21

Board of Studies

Resolutions

After discussion the following resolutions were adopted.

- 1) It was resolved to adopt the syllabus and course structure under reorganized CBCS approved by Osmania University for B.A/B.Com./ B.Sc English (First Language) for the academic year 2020-21. This includes Course Structure, Course Objectives, Course Outcomes, credits, syllabus, and instructional hours under the reorganized CBCS. There will be 4 units and 4 credits each for I and II semesters of English for B.A/B.Com./ B.Sc (First Language) and 3 credits each for rest of the semesters. There is no change in number of units, credits and instructional hours per week.
- 2) Syllabi prescribed by Osmania University for M A English in CBCS syllabus (wef. A.Y. 2019-20) will be followed for the students except for distribution of marks.
- 3) The question paper pattern for both UG and PG courses will be followed as per the decision taken in the college academic council meeting. The pattern is 70:30 (70- end semester examinations and 30 Internal Assessment). There will be 2 sections, namely, A and B. Section A consists of 4 questions, each question carrying 5 marks. In this section, 6 questions are given. Section 'B' consists of 4 questions carrying 12 ¹/₂ marks each. The blue print, scheme of examination submitted by the department of English was approved. Internal assessment consists of 5 multiple choice questions, 5 fill in the blanks (1 mark each) and 5 short answer questions (each question carries 2 marks). The question paper pattern for M A English is as per the last year.
- 4) It was resolved to approve the panel of examiners prepared by the department of English.

[Handwritten Signature]

**Chairman,
Board of Studies
Department of English
Tara Govt. College, Sangareddy-502 004**

[Handwritten Signature]

**Chairperson
Board of Studies (UG & PG)
Department of English
Osmania University
HYDERABAD-500 007.**

[Handwritten Signature]
[Handwritten Signature]
[Handwritten Signature]

[Handwritten Signature]

[Handwritten Signature]

[Handwritten Signature]

**PROFESSOR & HEAD
Department of English
OSMANIA UNIVERSITY
HYDERABAD-500 007**

[Handwritten Signature]

Department of English, TARA GC Sangareddy (A)

2021-22

2020-22

Resolutions

After discussion the following resolutions were adopted:

- 1) It was resolved to adopt the syllabus, course structure and Credits under reorganized CBCS approved by Osmania University for B. A /B.Com./ B. Sc / B.B.A English (First Language) I-VI Semesters for the academic year 2021-22. This includes Course Structure, Course Objectives, Course Outcomes, credits, syllabi, and instructional hours under the reorganized CBCS. There will be 4 units and 4 credits each for I and II semesters of English for B.A/B.Com./ B.Sc / B.B.A (First Language) and 3 credits each for rest of the semesters (i.e III, IV, V and VI).
It was resolved to adopt the syllabus, course structure and Credits under reorganized CBCS for Skill Enhancement Course (SEC): Personality Development and Communication Skills for B.A-III Semester.
- 2) Syllabi prescribed by Osmania University for M. A English in CBCS syllabus for the semesters I-IV (w.e.f. A.Y. 2019-20) will be followed. This includes Course Structure, Course Objectives, Course Outcomes, credits, syllabus, and instructional hours under the reorganized CBCS.
- 3) The question paper pattern for both UG and PG courses will be followed as per the decision taken in the college academic council meeting. The pattern is 70:30 (70- end semester examinations and 30 Internal Assessment).

U.G question paper pattern : In the question paper for the End Semester examination of UG (B.A/B.Com./ B.Sc/ B.B.A) there will be 2 sections, namely, A and B. Section A consists of 4 questions, each question carrying 5 marks. In this section, 6 questions are given. Section 'B' consists of 4 questions with internal choice carrying 12^{1/2} marks each. Internal assessment consists of 5 multiple choice questions (1 mark each), 5 fill in the blanks (1 mark each) and 5 short answer questions (each question carries 2 marks). In this regard, 2 internal exams will be conducted and the average of them will be considered for the awarding of marks except for the 1 Semester. For 1 Semester, only ONE internal assessment test will be conducted. Five marks are allotted for assignment and 5 marks are allotted for student seminar / Group Discussion / Any other assessment the teacher deem fit.

P.G question paper pattern - In the question paper for the End Semester examination of PG (M.A- English), there will be 2 sections, namely, A and B. Section A consists of 5 questions, each question carrying 6 marks. In this section, 8 questions are given. Section 'B' consists of 4 questions with internal choice carrying 10 marks each. Internal assessment consists of 10 multiple choice questions (1/2 mark each), 10 fill in the blanks (1 mark each) and 5 short answer questions (each question carries 1 marks). In this regard, 2 internal assessments tests will be conducted and average of them will be considered for awarding of marks except for the 1 Semester. For 1 Semester, only ONE internal exam will be conducted. Five marks are allotted for assignment and 5 marks are allotted for student seminar in addition to regular Seminars.

- 4) It was resolved to approve the panel of examiners prepared by the Department of English of the college.

Person
UG & PG)
English
Department of English,
TARA GC Sangareddy-502 001.
TARA GC Sangareddy (A)

Principal
TARA GOVT. COLLEGE
AUTONOMOUS
SANGAREDDY-502 001
TARA GC Sangareddy (A)

Chairman,
Board of Studies
Department of English
Tara Govt. College, Sangareddy-502 001

(Dr. E. Srinivas Rao)

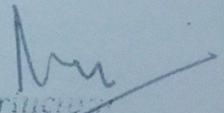
(Dr. E. Ram Bhaskar Rao)

(Alumni Member)

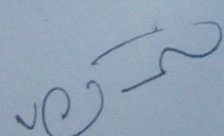
TARA GOVERNMENT COLLEGE, SANGAREDDY (AUTONOMOUS)
DEPARTMENT OF TELUGU
BOARD OF STUDIES OF TELUGU DEPARTMENT

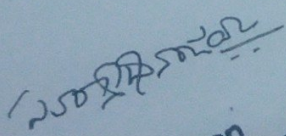
Lr. Rc. No.409/TGC-SRD/2017. Dated:09.10.2017

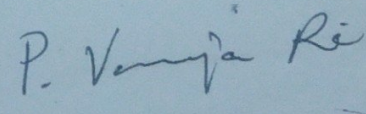
Sl. No.	Names of the Member	Position at the College/ Representing the Institution	Designation
1	Dr. M Manjusree, M.A., Ph.D.	Head Dept. of TELUGU Tara Govt. College, Sangareddy	Chairman
2	Dr. Surya Dhanunjay M.A., Ph.D.	BOS of Department of TELUGU O.U., Hyderabad	Member
3	Prof. V. Nityananda Rao, M.A., Ph.D.	Department of TELUGU, O.U., Hyderabad.	Member
4	Dr. Varija Rani, M.A., Ph.D.	Head Department of TELUGU, P.G. College, Secunderabad.	Member
5	Prof. Darla Venkateswara Rao	Dept of Telugu, University of Hyderabad, Hyderabad	Member
6	Smt. K Haritha, M.Sc.	Alumni Member Assistant Professor Department of Physics, Govt. Degree College, Gajwel	Member
7	Sri. Raja Shekar, M.A.	Academic Consultant Tara Govt. College, Sangareddy.	Member
8	Dr. Naleshwaram Shankar	Asst. Prof. in Telugu (Retd.) Academic Consultant Tara Govt. College, Sangareddy.	Member
9	Sri. Naresh, M.A.	Academic Consultant Tara Govt. College, Sangareddy.	Member


Principal

PRINCIPAL
(District Identified College)
Tara Govt. Degree & P.G. Colla
Sangareddy-502001, Medak Dist.


HEAD
DEPT. OF TELUGU
OSMANIA UNIVERSITY
HYDERABAD - 500 007


Chairman
Board of Studies In Telugu
Osmania University Hyderabad
Dr. Darla Venkateswara Rao
Professor, Department of Telugu
School of Humanities
UNIVERSITY OF HYDERABAD
Hyderabad-500 046., T.S. India


Asst. Professor
Dept. of Telugu,
Osmania University
Hyderabad, Telangana State

TARA GOVERNMENT COLLEGE (U.G & P.G),
(Autonomous)

Sangareddy, Sangareddy District.

(Affiliated to Osmania University)

Re-Accredited with 'B' grade by NAAC

Department of TELUGU

Board of Studies meeting for the year 2017-18.

The board of studies meeting for the Department of TELUGU (U.G. & P.G.) is held at 11:00PM on 10th, October, 2017 in the Department of TELUGU, Tara Government College, Sangareddy.

The following members are present in the meeting

1. Dr. Surya Dhanunjay
BOS of Department of TELUGU,
O.U., Hyderabad
2. Dr. M Manjusree
Head Dept. of TELUGU,
Tara Govt. College, Sangareddy
3. Prof. V. Nityananda Rao
Department of TELUGU,
O.U, Hyderabad.
4. Dr. Varija Rani
Head, Department of TELUGU,
P.G. College, Secunderabad
5. Dr. Ravinder Kumar,
Health Centre, University of Hyderabad,
Hyderabad
6. Smt. K Haritha
Alumni Member
Assistant Professor, Department of Physics,
Govt. Degree College, Gajwel
7. Sri. Raja Shekar
Academic Consultant
Tara Govt. College, Sangareddy
8. Dr. Naleshwaram Shankar
Asst. Prof. in Telugu (Retd.)
Academic Consultant,
Tara Govt. College, Sangareddy.
9. Sri. Naresh
Academic Consultant,
Tara Govt. College, Sangareddy

Chairman
Board of Studies in Telugu
Osmania University Hyderabad

P. Varija Rani

HEAD
DEPT. OF TELUGU
OSMANIA UNIVERSITY
HYDERABAD, 500 007

Asst. Professor
Dept. of Telugu,
Osmania University
Hyderabad, Telangana State

Dr. Darla Venkateswara Rao
Professor, Department of Telugu
School of Humanities
UNIVERSITY OF HYDERABAD
Hyderabad-500 046., T.S. India

TARA GOVERNMENT COLLEGE, SANGAREDDY
(AUTONOMOUS)
DEPARTMENT OF TELUGU
BOARD OF STUDIES OF TELUGU

C.NO. Telugu/TGC -SRD/2018-19

Dated: 24-07-2018

24.07.2018

S.No.	Names of the Member	Position at the College/ Representing the Institution	Designation
1	Dr. Rapolu Sreenivas	Asst. Professor, Department of Telugu, Tara Govt. Degree College, Sangareddy.	Chairman
2	Prof V. Nithyananda Rao	Chairperson & BOS, Department of Telugu, Osmania University, Hyderabad	University Nominee
3	Dr. Surya Dhanunjay	Head of the Department of Telugu, Osmania University, Hyderabad	Subject Expert
4	Dr Varija Rani	Dept. of Telugu, Osmania University, Hyderabad	Subject Expert
5	Smt.K.Haritha, M.Sc	Alumni Member Asst. Prof. Dept of Physics Govt.Degree College,	Member
6	Prof. Darla Venkateswara Rao	Dept. of Telugu University of Hyderabad, Hyderabad	Member
7	Dr.M.ManjuSree. M.A Phd	Asst. Prof. of Telugu Tara GDC, Sangareddy	Member
8	Smt. I. Sandhya Rani	Contract Lecture of Telugu Academic Consultant Tara GDC, Sangareddy	Member
9	Sri. Rajashekher	Guest Faculty of Telugu Academic Consultant Tara GDC, Sangareddy	Member
10	Dr.Nareshwaram Shankaram	Asst. Prof. of Telugu (Retd.) Academic Consultant Tara GDC, Sangareddy	Member
11	Sri. Naresh	Academic Consultant Tara GDC, Sangareddy	Member

Chairman
Board of Studies In Telugu
Osmania University Hyderabad

Dr. Darla Venkateswara Rao
Professor, Department of Telugu
School of Humanities
UNIVERSITY OF HYDERABAD
Hyderabad-500 046, T.S. India

Asst. Professor
Dept. of Telugu,
Osmania University
Hyderabad, Telangana State

[Handwritten signatures and initials]

TARA GOVERNMENT COLLEGE, SANGAREDDY
(AUTONOMOUS)

DEPARTMENT OF TELUGU

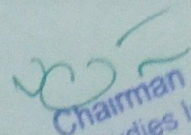
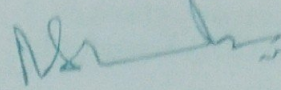
BOARD OF STUDIES OF TELUGU

Board of Studies meeting for the year 2018-19

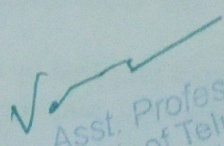
The Board of studies meeting for the Department of Telugu (U.G & P.G) is held at 11:00AM on 23-07-2018 in the department of TELUGU, Tara government Degree College,(A). Sangareddy.

The following members in the meeting.

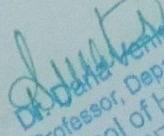
1. Dr. Rapolu Sreenivas
Asst. Professor, Department of Telugu,
Tara Govt. Degree College, Sangareddy.
2. Prof V. Nithyananda Rao
Chairperson & BOS,
Department of Telugu,
Osmania University, Hyderabad
3. Dr. Surya Dhanunjay
Head of the Department of Telugu,
Osmania University, Hyderabad
4. Dr Varija Rani
Dept. of Telugu,
Osmania University, Hyderabad
5. Smt.K.Haritha, M.Sc
Alumni Member
Asst. Prof. Dept of Physics
Govt.Degree College,
6. Prof. Darla Venketeshwara Rao
Dept. of Telugu
University of Hyderabad, Hyderabad
7. Dr.M.ManjuSree. M.A Phd
Asst. Prof. of Telugu
Tara GDC, Sangareddy
8. Smt. I. Sandhya Rani
Contract Lecture of Telugu
Academic Consultant
Tara GDC, Sangareddy



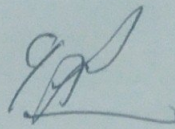
Chairman
Board of Studies in Telugu
Osmania University Hyderabad



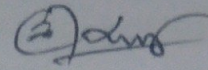
Asst. Professor
Dept. of Telugu,
Osmania University
Hyderabad, Telangana State



Dr. Darla Venketeshwara Rao
Professor, Department of Telugu
School of Humanities
UNIVERSITY OF HYDERABAD
Hyderabad-500 046., T.S. India

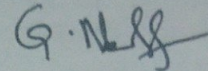


9. Sri. J Rajashekhar
Guest Faculty of Telugu
Academic Consultant



10. Dr. Naleshwaram Shankaram
Asst. Prof. of Telugu (Retd.)
Academic Consultant
Tara GDC, Sangareddy

11. Sri. Naresh
Academic Consultant
Tara GDC, Sangareddy



The following resolutions were taken in the meeting.

1. It is resolved to follow the syllabus prescribed by Osmania University and adopt the same to semester system with 5 units for each Semester.
2. It is also resolved to divide the each academic year syllabus into two semesters.
3. It is further resolved to allot 30 marks for internal examination and 70 marks for semester exams.
4. Internal examination marks shall be the average of two internal exams for each semester. The students shall appear for 20 marks for tests and 10 marks for assignments, Slip tests, quiz, seminar etc. (5+5)
5. The semester end exam question paper pattern will be in consonance with choice based credit system.
6. The model paper prepared by the members of the department for internal and semester end exams are approved and the evaluation system shall be as per the academic council resolution.
7. The list of panel of examiners prepared by the Department of ^{Telugu}~~Hindi~~ was accepted.
8. Other points that were not mentioned in this BoS but were approved in erstwhile BoS meeting shall remain without change.

**TARA GOVERNMENT COLLEGE, SANGAREDDY
(AUTONOMOUS)**

**DEPARTMENT OF TELUGU
BOARD OF STUDIES OF TELUGU**

PANEL OF EXAMINERS

Sl. No.	Names of the Member	Position at the College/ Representing the Institution	Contact No.
1	Dr. Surya Dhanunjay	Head, Department of Telugu, OU, Hyderabad	9849104187
2	Dr. Varija Rani	Department of Telugu, Arts College, OU, Hyderabad	9704179975
3	Prof. D. Venkateshwar Rao	Department of Telugu, HCU, Hyderabad	9718268565
4	Dr. G. Sukanya	Assoc. Prof. of Telugu, GDC BJR, Narayanguda, Hyderabad	9866526619
5	Dr. R. Sumathi	Asst. Prof of Telugu	
6	Dr. M. Ramesh Babu	Asst. Prof of Telugu, GDC Malkajigiri	7013873395
7	Dr. N. Deepika	Asst. Prof. of Telugu, N.G. College (A), Nalgonda	9032822036
8	Dr. J. Bharathi	Asst. Prof. GDC,	
9	Dr. Mallaiah	Asst. Prof. GDC,	
10	Dr. Shailaja	Asst. Prof. GDC, (A), Siddipet	8309640050
	Dr. A Sunitha	Asst. Prof. GDC,	

Proceedings of the Principal, Tara Government College (A), Sangareddy

Present Smt. Dr Chandra Mukherji

Procs. Rc. No 169/Department of Telugu /BOS/Tara.GDC, SRD/2019. Dated :

Sub: Constitution of the BOS in Telugu, for the term of 2019 - orders issued.

ORDER:

As per the UGC Guidelines, the Board of Studies in the Department of Telugu is constituted for the term of 2019-2020 with the following members.

1. **Dr.M.Manjusree**
Asst. Prof., Department of Telugu
Tara Govt. Degree College, Sangareddy
2. **Dr. Kasim C**
Chairperson & BOS,
Department of Telugu
O.U, Hyderabad
3. **Dr.SuryaDhanunjay**
Head of the Department of Telugu,
O.U, Hyderabad
4. **Dr.Varija Rani**
Department of Telugu
O.U, Hyderabad
5. **Prof. Darla Venkateshwara Rao**
Dept. of Telugu, University of Hyderabad
Hyderabad
6. **Smt. K.Haritha**
Alumni Member, Asst. Prof., Dept. of Physics
Govt. Degree College
7. **Smt. I. Sandhya Rani**
Contract Lecturer of Telugu,
Academic Consultant, Tara GDC, Sangareddy
8. **Sri. J.Rajashekar**
Guest Faculty of Telugu, Academic Consultant
Tara GDC, Sangareddy
9. **Dr. NaleshwaramShankaram**
Asst. Prof. of Telugu (Retd.)
Academic Consultant, Tara GDC, Sangareddy
10. **Sri. Naresh**
Academic Consultant, Tara GDC, Sangareddy
The tenure of BOS is 1 year only.

Chairperson
Chairman,
Board of Studies
Department of Telugu
Tara Govt. College, Sangareddy

BOS, Chairperson
Board of Studies in Telugu
Osmania University Hyderabad

HEAD
University Nominee
Dept. of Telugu
Osmania University
Hyderabad-07, Telangana

Subject Expert
Prof. P.V. Raju
Dept. of Telugu
Osmania University
Hyderabad-07, Telangana

Subject Expert
Dr. Darla Venkateswara Rao
Professor, Department of Telugu
School of Humanities
UNIVERSITY OF HYDERABAD
Hyderabad-500 046., T.S. India

Member

Member

Member

Member

Principal
PRINCIPAL
TARA GOVT. COLLEGE
AUTONOMOUS
SANGAREDDY-502 001

TARA GOVERNMENT COLLEGE, SANGAREDDY (AUTONOMOUS)
DEPARTMENT OF TELUGU
BOARD OF STUDIES OF TELUGU DEPARTMENT

Lr.Re.No. /TGC-SRD/2019.Dated: .12.2019

Sl. No.	Names of the Member	Position at the College/ Representing the Institution	Designation
1	Dr. M Manjusree, M.A., Ph.D.	Head Dept. of TELUGU Tara Govt. College, Sangareddy	Chairperson
2	Dr. Kasim M.A., Ph.D.	BOS of Department of TELUGU O.U., Hyderabad	Chairperson
3	Dr. Surya Dhanunjay M.A., Ph.D.	Head Department of TELUGU, O.U, Hyderabad.	Nominee
4	Dr. Varija Rani, M.A., Ph.D.	Department of TELUGU O.U	Subject Expert
5	Dr. D. Venkateshwara rao	Professor, Department Telugu, University of Hyderabad, Hyderabad	Subject Expert
6	Smt. K Haritha, M.Sc.	Alumni Member Assistant Professor, Department of Physics, Govt. Degree College, Gajwel	Member
7	Sri. I. Sandhya, M.A.	Academic Consultant Tara Govt. College, Sangareddy.	Member
8	Sri. J. Rajashekar, M.A	Academic Consultant Tara Govt. College, Sangareddy.	Member
9	Dr. Naleshwaram Shankar	Asst. Prof. in Telugu (Retd.) Academic Consultant Tara Govt. College, Sangareddy.	Member
10	Sri. Naresh, M.A.	Academic Consultant Tara Govt. College, Sangareddy.	Member

**TARA GOVERNMENT COLLEGE (U.G & P.G),
(Autonomous)**

Sangareddy, Sangareddy District.

*(Affiliated to Osmania University) Re-
Accredited with 'B' grade by NAAC*

Department of TELUGU

Board of Studies meeting for the year 2019-20.

The board of studies meeting for the Department of TELUGU (U.G. & P.G.) is held at **11:00PM** on.....2019 in the Department of TELUGU, Tara Government College, Sangareddy.

The following members are present in the meeting

1. Dr.M.Manjusree
Head Dept. of TELUGU,
Tara Govt. College, Sangareddy
2. Dr.Kasim C
CHAIRPERSON ,BOS O.U
Dept. of Telugu Hyderabad.
3. Dr.Suryadhanujay
Department of TELUGU
HOD O.U,Hyderabad.
4. Dr. VarijaRani
Department of TELUGU,
O.U
5. Dr.D.Venkateshwara rao,
Prof, Dept.of.Telugu
University of Hyderabad, Hyderabad.
6. Smt.K.Haritha
AlumniMember
Assistant Professor, Department of Physics,
Govt. Degree College, Gajwel
7. Smt. I.Sandhya
AcademicConsultant
TARA Govt College
Sangareddy
8. Sri.J.RajaShekar
AcademicConsultant
Tara Govt. College, Sangareddy

Hyne
Chair,
Board of Studies
Department of Telugu
Tara Govt. College, Sangareddy-202 991

Chaitanya
Board of Studies In Telugu
Osmania University Hyderabad

HEAD
Dept. of Telugu
Osmania University
Hyderabad-07, Telangana

P. Varija Rani
Asst. Professor
Dept. of Telugu
Osmania University
Hyderabad-07, Telangana.

Dr. Daria Venkateswara Rao

Dr. Daria Venkateswara Rao
Professor, Department of Telugu
School of Humanities
UNIVERSITY OF HYDERABAD
Hyderabad-500 046., T.S. India

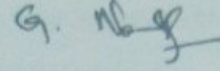
[Signature]

[Signature]

9. Dr. Naleshwaram Shankar
Asst.Prof.inTelugu(Retd.)
AcademicConsultant,
Tara Govt. College, Sangareddy.

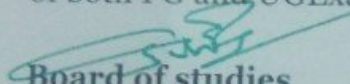


10. Sri.Naresh
Academic Consultant,
Tara Govt. College, Sangareddy



The following resolutions were taken in the meeting.

1. It is resolved to approve the proposed for B.A. and M.A. III and IV semesters for the academic year 2019-2020.
2. It is resolved to approve the proposal for conducting 2 Internals of each 30 marks and take the average of them besides the allocation for the end semester examination for 70 marks for both UG and PG.
3. It is proposed to approve the proposed panel of examiners for the evaluation of both PG and UG Examinations.



Board of studies
Chairman BOs
Board of Studies in Telugu
Osmania University Hyderabad



University nominee
HEAD
Dept. of Telugu
Osmania University
Hyderabad-07, Telangana

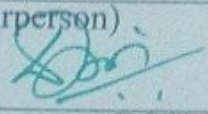
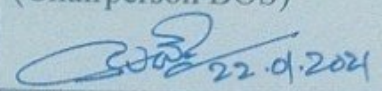

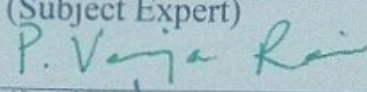
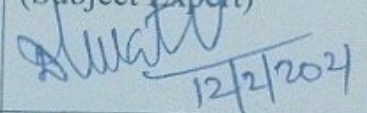
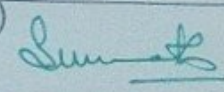
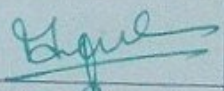
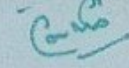
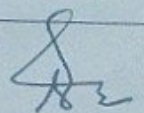
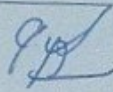
Members

TARA GOVERNMENT COLLEGE
(AUTONOMOUS)

DEPARTMENT OF TELUGU

BOARD OF STUDIES OF TELUGU DEPARTMENT

Lr Re.No. /TGC-SRD/2020-2021 Dated:

S.No	Names of the Members	Position at the college/ Representing the Institution	Designation
1	Dr. M. Manthaiiah M.A., M.Phil., Ph.D.	Head Dept.of TELUGU, Tara Govt. College Sangareddy	(Chairperson) 
2	Dr.C. Kasim M.A., M.Phil., Ph.D.	BOs of Dept.of TELUGU, O.U Hyderabad	(Chairperson BOS)  22.1.2024
3	Dr. Suryadhananjay M.A., Ph.D.	Dept.of TELUGU O.U Hyderabad	(University Nominee) 
4	Dr. Varija Rani M.A., Ph.D.	Dept.of TELUGU	(Subject Expert) P. Varija Rani 
5	Dr. D. Venkateshwar Rao M.A., M.Phil., Ph.D.	Prof.Dept.of TELUGU University of Hyderabad , Hyderabad	(Subject Expert)  12/2/2024
6	Smt. k. Haritha M.Sc.	Alumni Member Asst. Professor, Dept. Of physics GDC, Gajwel	(Member)
7	Smt R.Sumathi M.A., M.Phil.	Asst Professor of TELUGU Tara GDC, Sangareddy	(Member) 
8	Dr.M. Manjusree M.A., Ph.D.	Asst Professor of TELUGU Tara GDC, Sangareddy	(Member) 
9	Dr. P. Bhaskara yogi	Asst Professor of TELUGU Tara GDC, Sangareddy	(Member) 
10	Dr.Naleshwaram Shankaram	Asst Professor of TELUGU Academic Consultant Tara GDC Sangareddy	(Member) 
11	Smt.I.Sandhya M.A.	Asst Professor of TELUGU Academic Consultant Tara GDC Sangareddy	(Member) 

TARA GOVERNMENT COLLEGE (U.G & P.G)

(AUTONOMOUS)

Sangareddy , Sangareddy District

(Affiliated to Osmania University)

Re-Accredited with 'B' Grade by NAAC

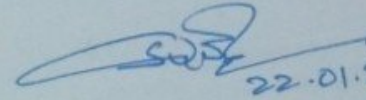
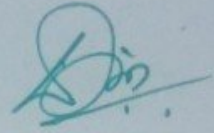
Department of TELUGU

Board of studies meeting for the year 2020-2021

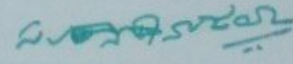
The Board of studies meeting for the Department of TELUGU (U.G & P.G) is held at 11:00am on 22.01.2021 in the Department of TELUGU, Tara Government College Sangareddy.

The following members are present in the meeting

1. Dr. M. Manthaiiah
Head Dept.of TELUGU,
Tara Govt. College Sangareddy
1. Dr.C. Kasim
CHAIRPERSON, BOS,O.U
Dept.of TELUGU, Hyderabad
2. Dr. Suryadhananjay
Dept.of TELUGU
HOD, O.U, Hyderabad
3. Dr. Varija Rani
Dept.of TELUGU
4. Dr. D. Venkateshwar Rao
Prof.Dept.of TELUGU
University of Hyderabad ,Hyderabad
5. Smt k. Haritha
Alumni Member
Asst. Professor , Dept. Of physics
GDC, Gajwel

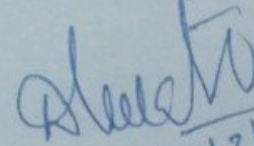


22.01.2021



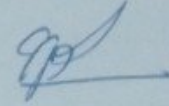
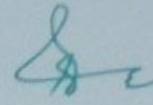
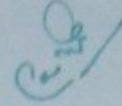
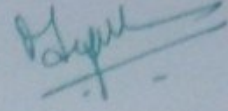
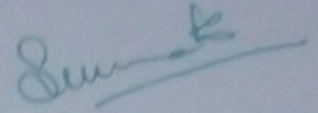
22.01.2021

P. Varija Rani



12/1/2021

6. Smt R Sumathi
Asst Professor of TELUGU
Tara GDC, Sangareddy
7. Dr.M. Manjusree
Asst Professor of TELUGU
Tara GDC Sangareddy
8. Dr. P. Bhaskara yogi
Asst Professor of TELUGU
Tara GDC Sangareddy
9. Dr.Naleshwaram Shankaram
Asst Professor of TELUGU
Academic Consultant
Tara GDC Sangareddy
10. Smt.I.Sandhya డిఐ
Asst Professor of TELUGU
Academic Consultant
Tara GDC Sangareddy



The following resolutions were taken in the meeting.

1. It is resolved to approve the proposed for B.A. and B.Sc. B.Com and M.A.
2. It is resolved to approve the proposal for conducting 2nd internal of each 30 marks and take the average of them besides the allocation for the end semester examination for 70marks for both U.G and P.G
3. It is proposed to approve the proposed panel of examinations for the evaluation of both P.G and U.G examinations.

TARA GOVERNMENT COLLEGE, SANGAREDDY
(AUTONOMOUS)
DEPARTMENT OF TELUGU
BOARD OF STUDIES OF TELUGU DEPARTMENT

RC.NO. Telugu/TGC -SRD/2021-22,

Dated: 07-12-2021.

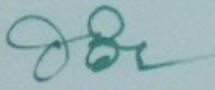
Sl. No.	Names of the Member	Position at the College/ Representing the Institution	Designation
1	Dr. Rapolu Sreenivas	Head, Department of Telugu, Tara Govt. Degree College, Sangareddy.	Chairman
2	Prof. Surya Dhanunjay	Department of Telugu, Osmania University, Hyderabad	University Nominee
3	Prof. Pillalamarri Ramulu	Dept of Telugu, (Pillalamarri Ramulu) University of Hyderabad, Hyderabad	Subject Expert
4	Prof. Darla Venketeshwara Rao	Dept of Telugu, University of Hyderabad- 500046, Hyderabad	Subject Expert
5	Dr. M. Manthaiiah	Asst. Prof. of Telugu Tara GDC, Sangareddy	Member
6	Smt. R. Sumathi	Asst. Prof. of Telugu Tara GDC, Sangareddy	Member
7	Dr.M.ManjuSree. M.A Phd	Asst. Prof. of Telugu Tara GDC, Sangareddy	Member
8	Dr. P. Bhaskara Yogi	Asst. Prof. of Telugu Tara GDC, Sangareddy	Member
9	Dr. I. Sandhya	Contract Lecture of Telugu Tara GDC, Sangareddy	Member
10	Sri. Rajashekher	Guest Faculty of Telugu Tara GDC, Sangareddy	Member
11	Dr.Naleshwaram Shankaram	Asst. Prof. of Telugu (Retd.) Academic Consultant Tara GDC, Sangareddy	Member
12	Sri. Naresh	Academic Consultant Tara GDC, Sangareddy	Member
13	Smt.K.Haritha, M.Sc	Alumni Member Asst. Prof. Dept of Physics Govt.Degree College,	Member
14	G. Venkanna, Industrialist,	Sri Srinivasa Industry, Sangareddy	Member

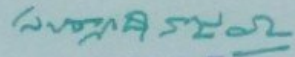
అధ్యక్షుడు దారలా వేంకటేశ్వర రావు
అధ్యక్షుడు, తెలుగు విభాగం
Head, Department of Telugu
मानविकी संकाय
School of Humanities
UNIVERSITY OF HYDERABAD
హైదరాబాద్ విశ్వవిద్యాలయం / UNIVERSITY OF HYDERABAD
హైదరాబాద్ / Hyderabad - 500 046, తెలంగాణ / T.S.

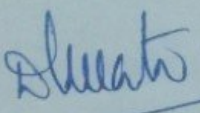
ELA
G
E
G.N.B.R

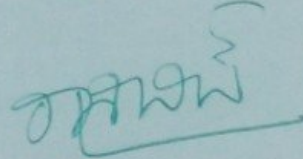
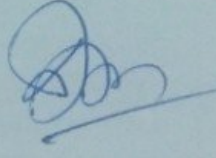
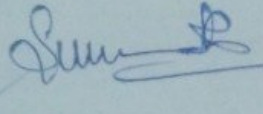
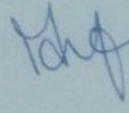
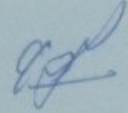
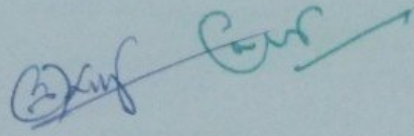
The following resolutions were taken in the meeting.

1. It is resolved to follow the syllabus prescribed by Osmania University and adopt the same to semester system with 5 units for each Semester.
2. It is also resolved to divide the each academic year syllabus into two semesters.
3. It is further resolved to allot 30 marks for internal examination and 70 marks for semester exams.
4. Internal examination marks shall be the average of two internal exams for each semester. The students shall appear for 20 marks for tests and 10 marks for assignments, Slip tests, quiz, seminar etc. (5+5)
5. The semester end exam question paper pattern will be in consonance with choice based credit system.
6. The model paper prepared by the members of the department for internal and semester end exams are approved and the evaluation system shall be as per the academic council resolution.
7. The list of panel of examiners prepared by the Department of Telugu was accepted.
8. Other points that were not mentioned in this BoS but were approved in erstwhile BoS meeting shall remain without change.


Prof. Pillalamarri Ramulu
MA Ph.D
Dept. of Telugu
University of Hyderabad
Gachibowli, Hyderabad- 500046.


HEAD
Dept. of Telugu
Osmania University
Hyderabad-07, Telangana


आचर्य दारला वेंकटेश्वर राव
PROF. DARLA VENKATESWARA RAO
अध्यक्ष, तेलुगु विभाग
Head, Department of Telugu
मानविकी संकाय
School of Humanities
हैदराबाद विश्वविद्यालय / UNIVERSITY OF HYDERABAD
हैदराबाद / Hyderabad - 500 046., तेलंगाना / T.S.

TARA GOVERNMENT COLLEGE, SANGAREDDY
(AUTONOMOUS)
DEPARTMENT OF TELUGU
PANEL OF EXAMINERS

Sl. No.	Names of the Member	Position at the College/ Representing the Institution	Contact No.
1	Prof. Surya Dhanunjay	Head, Department of Telugu, OU, Hyderabad	9849104187
2	Dr. S. Raghu	Department of Telugu, Govt. Women's College, OU, Koti, Hyderabad	9246526627
3	Prof. D. Venkateshwar Rao	Department of Telugu, HCU, Hyderabad	9182685231
4	Dr. M. Ramesh Babu	Assoc. Prof. of Telugu, GDC, Kukatpally, Hyderabad	70138725
5	Dr. N. Deepika	Asst. Prof of Telugu, N.G. College(A), Nalgonda	9032822036
6	Dr. J. Bharathi	Asst. Prof. of Telugu, SVS College, Vidyanagar, HYD.	9440494409
7	Dr. B. Lachaiah	Asst. Prof. of Telugu, GDC, Patancheru	98663 90738
8	Dr. N. Mrudula	Asst. Prof. of Telugu, GDC, Begumpert	944148393
9	Dr. S. Baby Ramani	Asst. Prof. of Telugu, GDC, Sadashivapet	8332932330

Prof. Darla Venkateswara Rao

आचर्य दारला वेंकटेश्वर राव
PROF. DARLA VENKATESWARA RAO
 अध्यक्ष, तेलुगु विभाग
 Head, Department of Telugu
 मानविकी संकाय
 School of Humanities
 हैदराबाद विश्वविद्यालय / UNIVERSITY OF HYDERABAD
 हैदराबाद / Hyderabad - 500 046., तेलंगान / T.S.


HEAD
 Dept. of Telugu
 Osmania University
 Hyderabad, Telangana
 PROF. DARLA VENKATESWARA RAO
 अध्यक्ष, तेलुगु विभाग
 मानविकी संकाय
 School of Humanities
 हैदराबाद विश्वविद्यालय / UNIVERSITY OF HYDERABAD
 हैदराबाद / Hyderabad - 500 046., तेलंगान

Tara Government Degree College
(Autonomous)
Sangareddy, Medak District
(Re-Accredited with 'B' Grade by NAAC)
Affiliated to the Osmania University- Hyderabad

Department of Hindi
Board of Studies meeting for the year 2016-17


The Board of studies meeting for the Department of Hindi is held at Tara Government Degree College, Sangareddy on October 2016 to discuss and finalize the syllabus and question papers for I and II semesters of B.A..B.Com./B.Sc., Hindi.

The following members are present in the meeting


1. Dr. Shubadha Vanjape,
Chairperson, BOS in Hindi,
Osmania University, Hyderabad. 
2. Dr. V. Ravi Kumar,
Asst. Professor, Chairman & BOS, Department of Hindi
Tara Govt. Degree College, Sangareddy.
3. Dr. Anita,
Principal, Govt. Degree College for Women, Sangareddy.
4. Dr. Rajshree,
Assistant Professor of Hindi, Women's College, Koti, Hyderabad
5. Sri H. Rajesh Kumar
Asst. Professor of Hindi, Govt. City College (Autonomous), Hyderabad


The following resolutions were taken in the meeting.


1. It is resolved to follow the syllabus prescribed by Osmania University and adopt the same to semester system with 5 units for each Semester
2. It is also resolved to divide the each academic year syllabus into two semesters.
3. It is further resolved to allot 30 marks for internal examination and 70 marks for semester exams
4. Internal examination marks shall be the average of two internal exams for each semester. The students shall appear for 20 marks for tests and 10 marks for assignment and seminar.
5. The semester end exam question paper pattern will be in consonance with choice based credit system.
6. The model paper prepared by the members of the department for internal and semester end exams are approved and the evaluation system shall be as per the academic council resolution.

1. 
DR. SHUBADHA VANJAPE
CHAIRPERSON
BOARD OF STUDIES
DEPARTMENT OF HINDI

2. 

3. 
PRINCIPAL
Govt. Degree College for Women
Sangareddy, Medak Dist.

4. 

5. 
SRI H. RAJESH KUMAR
Asst. Prof. Dept. of Hindi
Govt. City College
Sangareddy, Medak Dist.

TARA GOVERNMENT COLLEGE SANGAREDDY
(Autonomous)
Sangareddy District
(Re-Accredited with 'B' Grade by NAAC)
Affiliated to the Osmania University- Hyderabad
Department of Hindi
Board of Studies meeting for the year 2018-19

The Board of studies meeting for the Department of Hindi is held at Tara Government Degree College, Sangareddy on 17 July 2018 to discuss and finalize the syllabus and question papers for I to IV semesters of B.A., B.Com /B.Sc., in subject Hindi.

The following members are present in the meeting

1. Sri A Vishweshwara Sharma,
Asst. Professor of English,
Chairman, BOS Department of Hindi
Tara Government College, Sangareddy
2. Prof Sheela Mishra,
Chairperson, BOS in Hindi,
Osmania University, Hyderabad
3. Dr. Anita,
Principal,
Government Degree College for Women, Sangareddy
4. Dr Rakesh Sharma,
Assistant Professor of Hindi
SP College, Hyderabad
5. Sri M Uday kumar
Lecturer in Hindi,
TARA Government College, Sangareddy
6. Sri Jagadishwar,
Student Alumnus

The following resolutions were taken in the meeting.





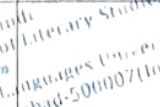
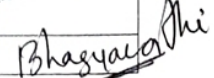
1. It is resolved to follow the syllabus prescribed by Osmania University and adopt the same to semester system with 5 units for each Semester.
2. It is also resolved to divide the each academic year syllabus into two semesters.
3. It is further resolved to allot 30 marks for internal examination and 70 marks for semester exams.
4. Internal examination marks shall be the average of two internal exams for each semester. The students shall appear for 20 marks for tests and 10 marks for assignments, Slip tests, quiz, seminar etc. (5+5)
5. The semester end exam question paper pattern will be in consonance with choice based credit system.

TARA GOVERNMENT COLLEGE SANGAREDDY
(Autonomous)
Sangareddy District
Affiliated to the Osmania University- Hyderabad
Department of Hindi
Board of Studies meeting for the year 2019-20

The Board of studies meeting for the Department of Hindi is held at Tara Government College Sangareddy (A) on 21/2/2020 to discuss and finalize the syllabus and question papers.

The following members are present in the meeting

21/2/2020

Sl. No.	Names of the Member/ Dr/ Mr / Ms	Position at the College/ Representing the Institution	Designation	Signature
1	Rajendra Kumar	Asst. Professor, Head, Department of Hindi, Tara Government College Sangareddy (A)	Chairman	
2	Dr. Mayadevi Department of Hindi, Osmania University, Hyderabad	Chairperson and BOS, Department of Hindi, Osmania University, Hyderabad	University nominee	 <div style="text-align: center;"> <p>CHAIRMAN Board of Studies Dept. Of Hindi Tara Government College Sangareddy-500007</p> <p>DR. MAYADEVI Chairperson</p> </div>
3	Dr. Avinash Jaiswal	HOD ,Dept of HINDI Nizam (A) College , Hyderabad	Member	
4.	Dr. Shyam Rao Rathod	Associate professor & Head, EFLU (The English and Foreign Languages University) Hyderabad 500007 Hyderabad	External Subject Expert	 <div style="text-align: center;"> <p>HEAD Department of Hindi NIZAM COLLEGE (Autonomous) Washim Bagh 29/12/2020</p> <p>DR. SHYAMRAO RATHOD</p> </div>
5.	Dr. Sitharam Rathod	Asst. Prof. of Hindi, NG Government Degree Nalgonda	External Subject Expert	 <div style="text-align: center;"> <p>Asst. Prof. of Hindi NG Government Degree Nalgonda</p> <p>Department of Hindi Faculty of Literary Studies English and Foreign Languages University Hyderabad-500007 (India)</p> </div>
6.	Mrs. Bhagyavathi	Associated Prof of Hindi	Member	

6. The model paper prepared by the members of the department for internal and semester end exams are approved and the evaluation system shall be as per the academic council resolution.
7. The list of panel of examiners prepared by the Department of Hindi was accepted.
8. Other points that were not mentioned in this BoS but were approved in erstwhile BoS meetings shall remain same without change.

PROF. SHEELA MISRA
CHAIRPERSON
BOARD OF STUDIES
Department of Hindi
Oriental University,
Hyderabad-500 007, T.S. India

CHAIRMAN 17.7.18
Board of Studies
Dept. Of Hindi
Tara Government College (A)
sangareddy-502001.

Dr. Rakesh Sharma.

Dr. ANITA
Principal
Govt. Degree College for Women
Sangareddy (T.S)

M. UDAYAKUMAR
DEPT OF HINDI
TARA GOVT COLLEGE (A)
SANGAREDDY.




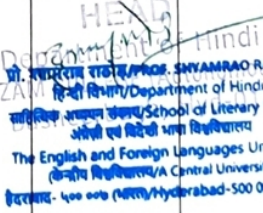

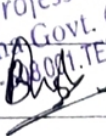
T. J. S. S. S.

(STUDENTS)

TARA GOVERNMENT COLLEGE SANGAREDDY
(Autonomous)
Sangareddy District
Affiliated to the Osmania University- Hyderabad
Department of Hindi
Board of Studies meeting for the year 2020-2021

The Board of studies meeting for the Department of Hindi is held at Tara Government College Sangareddy (A) on 2020 to discuss and finalize the syllabus and question papers.

The following members are present in the meeting

Sl. No.	Names of the Member/ Dr/ Mr / Ms	Position at the College/ Representing the Institution	Designation	Signature
1	Rajendra Kumar	Asst. Professor, Head, Department of Hindi, Tara Government College Sangareddy (A)	Chairman	 CHAIRMAN Board of Studies Dept. Of Hindi Tara Government College sangareddy-502301.
2	Dr. Mayadevi Department of Hindi, Osmania University, Hyderabad	Chairperson and BOS, Department of Hindi, Osmania University, Hyderabad	University nominee	 HEAD Department of Hindi Osmania University, Hyderabad
3	Dr. Avinash Jaiswal	HOD, Dept of HINDI Nizam (A) College, Hyderabad	Member	
4.	Dr. Shyam Rao Rathod	Associate professor & Head, EFLU (The English and Foreign Languages University) Hyderabad 500007 Hyderabad	External Subject Expert	 HEAD Department of Hindi DR. SITHARAM RATHOD, SHYAMRAO RATHOD NAGALGONDA सहितिक अखण्ड कक्षा/School of Literary Stu... अखिल एच विदेशी भाषा विश्वविद्यालय The English and Foreign Languages University (केन्द्रीय विश्वविद्यालय/A Central University) दिल्ली- 400 006 (NRM)/Hyderabad-500 007 (India)
5.	Dr. Sitharam Rathod	Asst. Prof. of Hindi, NG Government Degree College Nalgonda	External Subject Expert	 Sitharam Rathod M.A., M.Phil, Ph.d Asst. Professor of Hindi Govt. College (A) NAGALGONDA-508001, TELANGANA STATE
6.	Mrs. Bhagyavathi	Associated Prof of Hindi	Member	 NAGALGONDA-508001, TELANGANA STATE


Resolutions


The following resolutions were taken in the meeting.

1. It is resolved to follow the syllabus prescribed by Osmania University and adopt the same to semester system with 5 units for each Semester. The changes proposed by the department in th syllabus were adopted.
2. It is also resolved to divide the each academic year syllabus into two semesters.
3. It is further resolved to allot 30 marks for internal examination and 70 marks for semester exams.
4. The semester end exam question paper pattern will be in consonance with choice based credit system.
5. Internal examinations are as per the Academic Council minutes.
6. The model paper prepared by the members of the department for internal and semester end exams are approved and the evaluation system shall be as per the academic council resolution.
7. The list of panel of examiners prepared by the Department of Hindi was accepted.
8. Other points that were not mentioned in this BoS but were approved in erstwhile BoS meetings shall remain same without change.



Dr. W. RAYADEVI
Chairperson
Board of Studies
Department of Hindi
Osmania University, Hyderabad


Dr. W. RAYADEVI . 2020
Chairperson
Board of Studies
Department of Hindi
Osmania University, Hyderabad


29/2/2020

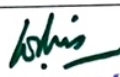


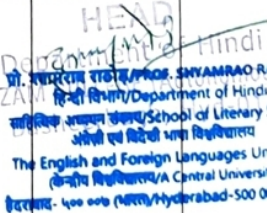

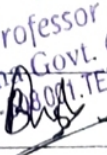
डॉ. श्यामराव राठोड/Dr. SHYAMRAO RATHOD
एसोसिएट प्रोफेसर एवं अध्यक्ष
Associate Professor & Head
हिन्दी विभाग/Department of Hindi
महाविद्यालय, अन्वयन संकाय/School of Literary Studies
The English and Foreign Languages University
हेदरबाद 500007 (India)




TARA GOVERNMENT COLLEGE SANGAREDDY
(Autonomous)
Sangareddy District
Affiliated to the Osmania University- Hyderabad
Department of Hindi
Board of Studies meeting for the year 2020-2021

The Board of studies meeting for the Department of Hindi is held at Tara Government College Sangareddy (A) on 2020 to discuss and finalize the syllabus and question papers.

The following members are present in the meeting

Sl. No.	Names of the Member/ Dr/ Mr / Ms	Position at the College/ Representing the Institution	Designation	Signature
1	Rajendra Kumar	Asst. Professor, Head, Department of Hindi, Tara Government College Sangareddy (A)	Chairman	 CHAIRMAN Board of Studies Dept. Of Hindi Tara Government College (A) sangareddy-502301.
2	Dr. Mayadevi Department of Hindi, Osmania University, Hyderabad	Chairperson and BOS, Department of Hindi, Osmania University, Hyderabad	University nominee	 Department of Hindi Osmania University, Hyderabad
3	Dr. Avinash Jaiswal	HOD, Dept of HINDI Nizam (A) College, Hyderabad	Member	
4.	Dr. Shyam Rao Rathod	Associate professor & Head, EFLU (The English and Foreign Languages University) Hyderabad 500007 Hyderabad	External Subject Expert	 HEAD Department of Hindi DR. SHYAM RAO RATHOD NIZAM (A) COLLEGE Department of Hindi सहस्यिक अखण्ड अण्डरु School of Literary Stu... अण्डरु एण्ड अण्डरु अण्डरु अण्डरु The English and Foreign Languages University (अण्डरु अण्डरु) Central University) अण्डरु - 400 000 (अण्डरु) Hyderabad-500 007 (India)
5.	Dr. Sitharam Rathod	Asst. Prof. of Hindi, NG Government Degree College Nalgonda	External Subject Expert	 Sitharam Rathod M.A., M.Phil, Ph.D Asst. Professor of Hindi Nagarjuna Govt. College (A) Nalgonda-500001, TELANGANA STATE
6.	Mrs. Bhagyavathi	Associated Prof of Hindi	Member	

Board of Studies meeting minutes


		BJR Govt Degree College, Narayanguda Hyderabad.		
7	Smt Sardar Jyothi	Asst Prof of Hindi Tara GDC (A) Sangareddy	Member	
8	Smt. J Latharani	Students alumnus	Member	

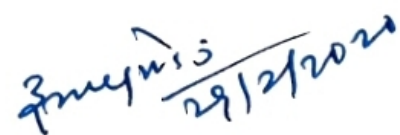
Resolutions

The following resolutions were taken in the meeting.

1. It is resolved to follow the syllabus prescribed by Osmania University and adopt the same to semester system with 5 units for each Semester. The changes proposed by the department in th syllabus were adopted.
2. It is also resolved to divide the each academic year syllabus into two semesters.
3. It is further resolved to allot 30 marks for internal examination and 70 marks for semester exams.
4. The semester end exam question paper pattern will be in consonance with choice based credit system.
5. Internal examinations are as per the Academic Council minutes.
6. The model paper prepared by the members of the department for internal and semester end exams are approved and the evaluation system shall be as per the academic council resolution.
7. The list of panel of examiners prepared by the Department of Hindi was accepted.
8. Other points that were not mentioned in this BoS but were approved in erstwhile BoS meetings shall remain same without change.




Dr. W. RAJAYADEV . 2020
Chairperson
Board of Studies
Department of Hindi
Osmania University, Hyderabad


29/2/2020

डॉ. श्यामराव राठोड / Dr. SHYAMRAO RATHOD
एसोसिएट प्रोफेसर एवं अध्यक्ष
Associate Professor & Head
हिन्दी विभाग / Department of Hindi
साहित्यिक अध्येतृ संकाय / School of Literary Studies
अण्डा एवं विदेशी भाषा विश्वविद्यालय
The English and Foreign Languages University
हेदराबाद ५००००७ (भारत) / Hyderabad-500007 (India)



Department of Hindi
Osmania University
Hyderabad


(Autonomous)
Sangareddy, Sangareddy District.
(Affiliated to Osmania University)
Re-Accredited with 'B' grade by NAAC


Department of Mathematics
Board of Studies meeting for the year 2017-18.

The board of studies meeting for the Department of Mathematics (U.G. & P.G.) is held at 02:00PM on 17th, July, 2017 in the Department of Mathematics, Tara Government College, Sangareddy.

The following members are present in the meeting

1. Prof. N. Kishan
University Nominee,
Osmania University, Hyderabad.
2. Sri. B. Rajendra Kumar
Chairman, BOS,
Head, Department of Mathematics.
Tara government College, Sangareddy.
3. Prof. J Anand Rao
Department of Mathematics,
Osmania University,
Hyderabad.
4. Dr M Chenna Krishna Reddy
Department of Mathematics,
Osmania University,
Hyderabad.
5. Prof. B. Surender Reddy,
Department of Mathematics,
Osmania University, Hyderabad.
6. Dr.G.Raghava Rao,
Managing Director, Medin Life Sciences Pvt. Ltd.
Nacharam, Hyderabad.
7. Sri Kishan, R.I.O
Alumni Member
Tara Government College,
Sangareddy, Sangareddy Dist.
8. Sri. K Anil Kumar,
Lecturer in Mathematics
Tara Govt. College, Sangareddy.
9. Sri P Linga Swamy



Chairman,
Board of Studies in Mathematics
Osmania University,
Hyderabad-500007


PROFESSOR,
Department of Mathematics,
OSMANIA UNIVERSITY,
HYDERABAD-500 007








Head
Department of Mathematics
Osmania University
Hyderabad-500007

TARA GOVERNMENT COLLEGE (U.G & P.G),
(Autonomous)
Sangareddy, Sangareddy District.
(Affiliated to Osmania University)
Re-Accredited with 'B' grade by NAAC

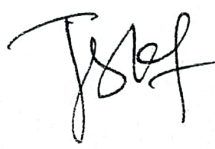

Department of Mathematics
Board of Studies meeting for the year 2018-19.

The board of studies meeting for the Department of Mathematics (U.G. & P.G.) is held at 02:00PM on ~~25.07.2018~~ in the Department of Mathematics, Tara Government College, Sangareddy.

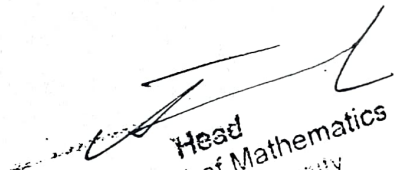
The following members are present in the meeting

1. Prof. N. Kishan
University Nominee, Osmania University, Hyderabad.

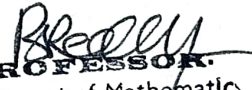
2. Sri.Ravi Kumar
Chairman, BOS,
Department of Mathematics.
Tara Government College ,Sangareddy.



Chairperson
BoS in Mathematics
Department of Mathematics
Osmania University
Hyderabad-500 007.

3. Prof. J.Anand Rao
Department of Mathematics,
Osmania University,
Hyderabad.


Head
Department of Mathematics
Osmania University
Hyderabad - 500 007

4. Prof. B.Surender Reddy,
Department of Mathematics,
Osmania University,
Hyderabad.




PROFESSOR.
Department of Mathematics
OSMANIA UNIVERSITY
HYDERABAD-500 007

5. Dr.G.Raghava Rao,
Managing Director, Medin Life Sciences Pvt. Ltd.
Nacharam, Hyderabad.

6. Kum.Shruthi
Alumni member, Lecturer

7. Sri. K Anil Kumar,
Lecturer in Mathematics
Tara govt. College, Sangareddy.

8. Sri P Linga Swamy
Lecturer in Mathematics
Tara Government College,
Sangareddy, Sangareddy Dist.

TARA Government College (A), Sangareddy, Sangareddy District
(Affiliated to Osmania University), Re-Accredited with 'B' grade by NAAC

Department of Mathematics

Board of Studies meeting for the year 2019-20

The board of studies meeting for the Department of Mathematics is held at Tara GDC Sangareddy, on 23-09-2019 to discuss and finalize the syllabus and evaluation pattern for I to VI semesters of B.Sc. in subject of Mathematics for the term of 2019-20.

The following members are present in the meeting:

S.No.	Name of the Faculty	Designation
1	Dr. S. Prasanna Rani, <i>M.Sc, Ph.D.</i> Head Dept. of Mathematics, Tara Govt. College, Sangareddy	Chairman
2	Prof. N. Kishan <i>M.Sc, Ph.D</i> Department of Mathematics, O.U, Hyderabad.	University Nominee
3	Prof.B. Surender Reddy, <i>M.Sc.,Ph.D.</i> Department of Mathematics, O.U, Hyderabad	Member
4.	Prof. Anand Rao <i>M.Sc, Ph.D</i> Department of Mathematics,O.U., Hyderabad	Member
5	Sri. K.Anil Kumar <i>M.Sc, B.Ed.</i> Lecturer in Mathematics Tara Govt. College, Sangareddy	Member
6	Sri P.Linga Swamy, <i>M.Sc, B.Ed.</i> Lecturer in Mathematics Tara Govt. College, Sangareddy	Member
7	M. Bhavana, <i>M.Sc.,M.Phil</i> Lecturer in Mathematics Tara Govt. College, Sangareddy	Member
8	K. Venkateshwarulu, <i>M.Sc</i> Lecturer in Mathematics Tara Govt. College, Sangareddy	Member
9	Smt. Y Sunitha <i>M.Sc. PGDCA</i> Academic Consultant, Tara Govt. College, Sangareddy.	Member
10	Sri.G.Venkatesham, <i>M.Sc., B.Ed</i> Academic Consultant, Tara Govt. College, Sangareddy.	Member
11	Dr.T.Tirumala Devi, Associate Professor in Mathematics, K.U.Warangal	External Member
12	M. Rajesh Asst.prof.in Mathematics, GDC Agraharam	External Member
13	Sri.G.Venkatesham, <i>M.Sc., B.Ed</i> Faculty of Mathematics, Tara Govt.College(A), Sangareddy	Alumni Member

PROFESSOR
Department of Mathematics,
OSMANIA UNIVERSITY,
HYDERABAD-500 007,

Head
Department of Mathematics
Osmania University
Hyderabad-500-007

Principal

PRINCIPAL
TARA GOVT. COLLEGE
(AUTONOMOUS)
SANGAREDDY-502 001

TARA GOVERNMENT COLLEGE (A), Sangareddy, Sangareddy District.
(Affiliated to Osmania University)
Re-Accredited with 'B' grade by NAAC

Department of Mathematics
Board of Studies meeting for the year 2020-21.

The board of studies meeting for the Department of Mathematics is held at Tara GDC, Sangareddy on 21st January 2021 to discuss and finalize the syllabus and evaluation pattern for I to VI th semesters of B.Sc. in subject of mathematics for the term of 2020-21.

The following members are present in the meeting

S. No.	Names of the faculty	Designation
1	Dr. S. Upender, <i>M.Sc, Ph.D.</i> Head Dept. of Mathematics, Tara Govt. College, Sangareddy	Chairman
2	Prof. B. Surender Reddy, <i>M.Sc., Ph.D.</i> BOS & HOD of Department of Mathematics O.U., Hyderabad	University nominee
3	Prof. N. Kishan <i>M.Sc., Ph.D</i> Department of Mathematics, O.U, Hyderabad	Member
4	Dr. B. Krishnareddy <i>M.Sc., Ph.D</i> Department of Mathematics, O.U, Hyderabad.	Member
5	Sri. K. Anil Kumar <i>M.Sc, B.Ed.</i> Lecturer in Mathematics Tara Govt. College, Sangareddy	Member <i>Rank</i>
6	Sri P. Linga Swamy, <i>M.Sc, B.Ed.</i> Lecturer in Mathematics, Tara Govt. College, Sangareddy	Member <i>Rank</i>
7	M. Bhavana, <i>M.Sc., M.Phil</i> Lecturer in Mathematics, Tara Govt. College, Sangareddy	Member <i>Rank</i>
8	Smt. Y Sunitha <i>M.Sc. PGDCA</i> Academic Consultant, Tara Govt. College, Sangareddy	Member <i>Rank</i>
9	Sri. G. Venkatesham, <i>M.Sc., B.Ed</i> Academic Consultant, Tara Govt. College, Sangareddy	Member <i>Rank</i>
10	Dr. V. Yadaiah <i>M.Sc., Ph.D</i> Asst. Prof. in Mathematics, N.G. College, Nalgonda	External Member <i>Rank</i>
11	Sri V. Srinivas Reddy, <i>M.Sc</i> Asst. Prof. in Mathematics, GDC, Ramannapet	External Member <i>Rank</i>
12	Sri. G. Venkatesham, <i>M.Sc., B.Ed</i> Faculty in Mathematics, Tara Govt. College(A), Sangareddy	Alumini member <i>Rank</i>

Rank

Rank
 Chairperson
 BoS in Mathematics
 Department of Mathematics
 Osmania University
 Hyderabad-500 007.

Rank
 Principal
 PRINCIPAL
 TARA GOVT. COLLEGE
 AUTONOMOUS
 SANGAREDDY-502 001

TARA Government College (A), Sangareddy, Sangareddy District

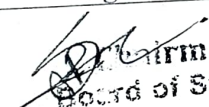


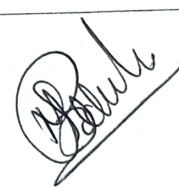



Re-Accredited with 'B' grade by NAAC

Department of Mathematics

Board of Studies meeting for the year 2021-22

The board of studies meeting for the Department of Mathematics is held at Tara GDC Sangareddy, on 20th Dec 2021 to discuss and finalize the syllabus and evaluation pattern for I to VI semesters of B.Sc. and I to IV semesters of M.Sc. in subject of Mathematics for the term of 2021-22.

The following members are present in the meeting:

S.No.	Name of the Faculty	Designation	Signature
1.	Dr S.Upender Associate Prof. of Mathematics Tara Government College (A), Sangareddy	Chairperson	 Chairman, Board of Studies Department of Statistics Tara Govt. College, Sangareddy-502 101
2.	Prof N.Kishan Head & Department of Mathematics University College of Science, Osmania University, Hyderabad	University Nominee	 Head Department of Mathematics Osmania University Hyderabad-500 007.
3.	Dr. K. Govardhan Assistant Professor of Mathematics Gitam University, Rudraram	External Member	
4.	Dr D. Mallikarjun Reddy Assistant Professor of Mathematics Gitam University, Rudraram	External Member	
5.	K. Anil Kumar Faculty of Mathematics Tara Government College (A), Sangareddy	Member	
6.	P. LingaSwamy Faculty of Mathematics Tara Government College (A), Sangareddy	Member	
7.	M. Bhavana Faculty of Mathematics Tara Government College (A), Sangareddy	Member	

DEPARTMENT OF PHYSICS
TARA GOVERNMENT COLLEGE



**Scheme of Instruction and
Syllabus**

B.Sc Physics (I – VI Semesters)
Under CBCS scheme
(From the academic year 2018-2019)

B.Sc. PHYSICS SYLLABUS UNDER CBCS SCHEME**SCHEME OF INSTRUCTION**

Semester	Paper: Theory and Practical	Instructions Hrs/week	Marks	Credits
I sem	Paper – I : Mechanics	4	100	4
	Practicals – I : Mechanics	3	50	1
II sem	Paper – II: Waves and Oscillations	4	100	4
	Practicals – II : Waves and Oscillations	3	50	1
III sem	Paper – III : Thermodynamics	4	100	4
	Practicals – III : Thermodynamics	3	50	1
IV sem	Paper – IV : Optics	4	100	4
	Practicals – IV : Optics	3	50	1
V sem	Paper – V : Electromagnetism	3	100	3
	Practicals – V: Electromagnetism	2	50	1
	Paper – VI : Elective – I Solid state physics/ Quantum Mechanics and Applications	3	100	3
	Practicals – VI : Elective – I Practical Solid state physics/ Quantum Mechanics and Applications	2	50	1
VI sem	Paper – VII : Modern Physics	3	100	3
	Practical – VII : Modern Physics Lab	2	50	1
	Paper – VIII : Elective – II Basic Electronics/ Physics of Semiconductor Devices	3	100	3
	Practicals – VIII : Elective – II Practical Basic Electronics/ Physics of Semiconductor Devices	2	50	1
	Total Credits			36

B.Sc. (Physics) Semester I-Theory Syllabus

56 hrs

Subject: Physics Paper – I: Mechanics

Unit – I

1. Vector Analysis (14)

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field and related problems. Vector integration- line, surface and volume integrals. Stokes, Gauss and Greens theorems- simple applications in physics

Unit – II

2. Mechanics of Particles (07)

Laws of motion, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, collisions in CM and lab frames, concept of impact parameter, scattering cross-section and **Rutherford Scattering**.

3. Mechanics of rigid bodies (07)

Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Euler's equation, precession of a top, Gyroscope, **Precession of Equinoxes and its consequences**.

Unit – III

4. Central forces (14)

Central forces – definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions. **Effects of Coriolis force**.

Unit – IV

5. Special theory of relativity (14)

Galilean relativity, absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, Twin Paradox, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism, **Principle of Equivalence and Applications of relativity in daily life**.

NOTE: Problems should be solved at the end of every chapter of all units.

Textbooks

1. Berkeley Physics Course. Vol.1, **Mechanics** by C. Kittel, W. Knight, M.A. Ruderman - *Tata-McGraw hill Company Edition 2008*.
2. **Fundamentals of Physics**. Halliday/Resnick/Walker *Wiley India Edition 2007*.
3. **First Year Physics** - *Telugu Academy*.
4. **Introduction to Physics for Scientists and Engineers**. F.J. Ruche. *McGraw Hill*.

Reference Books

1. **Fundamentals of Physics** by Alan Giambattista et al *Tata-McGraw Hill Company Edition, 2008*.
2. **University Physics** by Young and Freeman, *Pearson Education, Edition 2005*.
3. **Sears and Zemansky's University Physics** by Hugh D. Young, Roger A. Freedman *Pearson Education Eleventh Edition*.
4. **An introduction to Mechanics** by Daniel Kleppner & Robert Kolenkow. *The McGraw Hill Companies*.
5. **Mechanics**. Hans & Puri. *TMH Publications*.
6. **Engineering Physics**. R.K. Gaur & S.L. Gupta. *Dhanpat Rai Publications*.
7. R P Feynman, RB Lighton and M Sands - **The Feynman Hrs in Physics**, Vol.-1, BI Publications,
8. J.C. Upadhyaya - **Mechanics**.
9. P.K. Srivastava - **Mechanics**, New Age International.

I Semester Practicals

42 hrs

Paper – I: Mechanics

1. Study of a compound pendulum determination of g and k .
2. Y by uniform Bending
3. Y by Non-uniform Bending.
4. Moment of Inertia of a fly wheel.
5. Measurement of errors –simple Pendulum.
6. Rigidity moduli by torsion Pendulum.
7. Determine surface tension of a liquid through capillary rise method.
8. Determination of Surface Tension of a liquid by different methods.
9. Determine of Viscosity of a fluid.

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and reference books

1. D.P. Khandelwal, “**A laboratory manual for undergraduate classes**” (Vani Publishing House, New Delhi).
2. S.P. Singh, “**Advanced Practical Physics**” (Pragati Prakashan, Meerut).
3. Worsnop and Flint- **Advanced Practical physics** for students.
4. “**Practical Physics**” R.K Shukla, Anchal Srivastava

B.Sc. Semester II-Theory Syllabus
Subject: Physics
Paper – II: Waves and Oscillations

56 hrs

Unit – I

1. Fundamentals of vibrations (14)

Simple harmonic oscillator, and solution of the differential equation– Physical characteristics of SHM, torsion pendulum, - measurements of rigidity modulus, compound pendulum, measurement of g, combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies, Lissajous figures-uses of Lissajous Figures, Comparison of parallel and perpendicular super positions.

Unit – II

2. Damped and forced oscillations (14)

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with undamped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance, velocity resonance, Resonance in electrical circuits (LCR series circuit), Coupled Oscillators and An harmonic Oscillators.

Unit – III

3. Vibrating Strings (14)

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones, energy transport, transverse impedance, waves in two and three dimensions.

Unit – IV

4. Vibrations of bars (14)

Longitudinal vibrations in bars- wave equation and its general solution. Special cases (i) bar fixed at both ends ii) bar fixed at the midpoint iii) bar free at both ends iv) bar fixed at one end. Transverse vibrations in a bar- wave equation and its general solution. Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Comparison of longitudinal and transverse waves, Tuning fork.

NOTE:Problems should be solved at the end of every chapter of all units.

Textbooks

- 1. Fundamentals of Physics.** Halliday/Resnick/Walker *Wiley India Edition 2007.*
- 2. First Year Physics -** *Telugu Academy.*
- 3. Introduction to Physics for Scientists and Engineers.** F.J. Ruche. *McGraw Hill.*
- 4. Fundamentals of Acoustics by Kinsler and Fray,** Meer publishers.

Reference Books

- 1. Fundamentals of Physics** by Alan Giambattista et al *TMH Company Edition, 2008.*
- 2. University Physics** by Young and Freeman, *Pearson Education, Edition 2005.*
- 3. An introduction to Mechanics** by Daniel Kleppner & Robert Kolenkow. *The McGraw Hill Companies.*
- 4. Engineering Physics.** R.K. Gaur & S.L. Gupta. *Dhanpat Rai Publications.*

Practical Paper – II: Waves and Oscillations

1. Study of damping of an oscillating disc in Air and Water logarithmic decrement.
2. Study of Oscillations under Bifilar suspension.
3. Study of oscillations of a mass under different combination of springs.
4. Verification of Laws of a stretched string (Three Laws).
5. Determination of frequency of a Bar-Melde's experiment.
6. Observation of Lissajous figures from CRO.
7. Volume Resonator –determination of frequency of a tuning fork.
8. Velocity of Transverse wave along a stretched string.
9. Study of damping of a bar pendulum
10. Study of coupled oscillator.

Note: Minimum of eight experiments should be performed. .
Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and Reference books

1. D.P. Khandelwal, “**A laboratory manual for undergraduate classes**” (Vani Publishing House, New Delhi).
2. S.P. Singh, “**Advanced Practical Physics**” (PragatiPrakashan, Meerut).
3. Worsnop and Flint- **Advanced Practical physics for students.**
4. “**Practical Physics**” R.K Shukla, Anchal Srivastava

B.Sc. Semester III-Theory Syllabus
Subject: Physics
Paper – III: Thermodynamics

56 hrs

Unit – I

1.Kinetic theory of gases: (6)

Introduction – Deduction of Maxwell's law of distribution of molecular speeds, Transport Phenomena – Viscosity of gases – thermal conductivity – diffusion of gases.

2.Thermodynamics: (8)

Basics of thermodynamics-Kelvin's and Clausius statements – Thermodynamic scale of temperature – Entropy, physical significance – Change in entropy in reversible and irreversible processes – Entropy and disorder – Entropy of universe – Temperature-Entropy (T-S) diagram – Change of entropy of a perfect gas-change of entropy when ice changes into steam.

Unit – II

3.Thermodynamic potentials and Maxwell's equations: (7)

Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations – Clausius-Clayperon's equation – Derivation for ratio of specific heats – Derivation for difference of two specific heats for perfect gas.Joule Kelvin effect – expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

4.Low temperature Physics: (7)

Joule Kelvin effect – liquefaction of gas using porous plug experiment. Joule expansion – Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling – Liquefaction of helium, Kapitza's method – Adiabatic demagnetization – Production of low temperatures – Principle of refrigeration, vapour compression type.

Unit – III

5.Quantum theory of radiation: (14)

Black body-Ferry's black body – distribution of energy in the spectrum of Black body – Wein's displacement law, Wein's law, Rayleigh-Jean's law – Quantum theory of radiation - Planck's law – deduction of Wein's distribution law, Rayleigh-Jeans law, Stefan's law from Planck's law.
Measurement of radiation using pyrometers – Disappearing filament optical pyrometer – experimental determination – Angstrom pyroheliometer - determination of solar constant, effective temperature of sun.

Unit – IV

6.Statistical Mechanics: (14)

Introduction, postulates of statistical mechanics. Phase space, concept of ensembles and some known ensembles ,classical and quantum statistics and their differences, concept of probability, Maxwell-Boltzmann's distribution law -Molecular energies in an ideal gas-Maxwell-Boltzmann's velocity distribution law, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws, Application of B-E distribution to Photons-planks radiation formula, properties of B-E gas, Application of Fermi-Dirac statistics to white dwarfs and Neutron stars, **properties of F-D gas.**

Textbooks

1. **Fundamentals of Physics.** Halliday/Resnick/Walker.C. *Wiley India Edition 2007.*
2. **Second Year Physics** – *Telugu Academy.*
3. **Modern Physics** by R. Murugeshan and Kiruthiga Siva Prasath (for statistical Mechanics) *S. Chand & Co.*
4. **Heat and Thermodynamics** by Mark W.Zemansky 5th edition Mc Graw - Hill
5. **Heat and Thermodynamics** by D.S. Mathur.

Reference Books

1. **Modern Physics** by G. Aruldas and P. Rajagopal, *Eastern Economy Education.*
2. Berkeley Physics Course. Volume-5. **Statistical Physics** by F. Reif. *The McGraw-Hill Companies.*
3. **An Introduction to Thermal Physics** by Daniel V. Schroeder.*Pearson Education Low Price Edition.*
4. **Thermodynamics** by R.C. Srivastava, Subit K. Saha&Abhay K. *Jain Eastern Economy Edition.*
5. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand& Co. Publications.*
6. **Feynman's Hrs on Physics** Vol. 1,2,3& 4. *Narosa Publications.*
7. **Fundamentals of Optics** by Jenkins A. Francis and White E. Harvey, *McGraw Hill Inc.*
8. B.B. Laud "**Introduction to statistics Mechanics**"(Macmillan 1981)
9. F.Reif: "**Statistical Physics** "(Mcgraw-Hill,1998) 10 .K.Haug: "**Statistical Physics** "(Wile Eastern 1988)

III Semester Practicals **42 hrs**
Paper–III: Thermodynamics

1. Co-efficient of thermal conductivity of a bad conductor by Lee's method.
2. Measurement of Stefan's constant.
3. Specific heat of a liquid by applying Newton's law of cooling correction.
4. Heating efficiency of electrical kettle with varying voltages.
5. Determination of Thermo emf
6. Cooling Curve of a metallic body (Null method)
7. Resistance thermometer. To Determine temp coeff resistance
8. Thermal expansion of solids
9. Study of mechanical energy to heat.
10. Determine the Specific of a solid (graphite rod)
11. Thermistor Characteristics. Calculation of A and B

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (PragatiPrakashan, Meerut).
3. Worsnop and Flint- **Advanced Practical physics for students.**
4. "Practical Physics" R.K Shukla, Anchal Srivastava

B.Sc. Semester IV-Theory Syllabus
Subject: Physics
Paper – IV: Optics

56 hrs

Unit I

1. Interference: (14)

Principle of superposition – coherence – temporal coherence and spatial coherence – conditions for Interference of light

Interference by division of wave front: Fresnel's biprism – determination of wave length of light. Determination of thickness of a transparent material using Biprism – change of phase on reflection – Lloyd's mirror experiment.

Interference by division of amplitude: Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (Cosine law) – Colours of thin films – Non reflecting films – interference by a plane parallel film illuminated by a point source – Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film) – Determination of diameter of wire-Newton's rings in reflected light with and without contact between lens and glass plate, Newton's rings in transmitted light (Haidinger Fringes) – Determination of wave length of monochromatic light – Michelson Interferometer – types of fringes – Determination of wavelength of monochromatic light, Difference in wavelength of sodium D_1, D_2 lines and thickness of a thin transparent plate.

Unit II:

2. Diffraction: (14)

Introduction – Distinction between Fresnel and Fraunhofer diffraction Fraunhofer diffraction:- Diffraction due to single slit and circular aperture – Limit of resolution – Fraunhofer diffraction due to double slit – Fraunhofer diffraction pattern with N slits (diffraction grating)

Resolving Power of grating – Determination of wave length of light in normal and oblique incidence methods using diffraction grating.

Fresnel diffraction-Fresnel's half period zones – area of the half period zones –zone plate – Comparison of zone plate with convex lens – Phase reversal zone plate – diffraction at a straight edge – difference between interference and diffraction.

Unit III:

3. Polarization (14)

Polarized light : Methods of Polarization, Polarization by reflection, refraction, Double refraction, selective absorption , scattering of light – Brewsters law – Malus law – Nicol prism polarizer and analyzer – Refraction of plane wave incident on negative and positive crystals (Huygen's explanation) – Quarter wave plate, Half wave plate – Babinet's compensator – Optical activity, analysis of light by Laurent's half shade polarimeter.

Unit IV:

4. Aberrations and Fiber Optics : (14)

Introduction – Monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration – the achromatic doublet – Removal of chromatic aberration of a separated doublet.

Fiber Optics: Introduction – Optical fibers – Principles of fiber communication – Step and graded index fibers – Rays and modes in an optical fiber – Fiber material – Types of optical fibers and advantages of fiber communication.

NOTE: Problems should be solved at the end of every chapter of all units.

Textbooks

1. **Optics** by Ajoy Ghatak. *The McGraw-Hill companies.*
2. **Optics** by Subramaniam and Brijlal. *S. Chand & Co.*
3. **Fundamentals of Physics.** Halliday/Resnick/Walker. *C. Wiley India Edition 2007.*
4. **Optics and Spectroscopy.** R. Murugesan and Kiruthiga Siva Prasath. *S. Chand & Co.*
5. **Second Year Physics** – *Telugu Academy.*

Reference Books

1. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand & Co. Publications.*
2. **Feynman's Hrs on Physics** Vol. 1,2,3& 4. *Narosa Publications.*
3. **Fundamentals of Optics** by Jenkins A. Francis and White E. Harvey, *McGraw Hill Inc.*
4. K. Ghatak, **Physical Optics'**
5. D.P. Khandelwal, **Optical and Atomic Physics"** (Himalaya Publishing House, Bombay, 1988)
6. Jenkins and White: **"Fundamental of Optics"** (McGraw-Hill)
7. Smith and Thomson: **"Optics"** (John Wiley and sons)

IV Semester Practicals

42 hrs

Paper – IV: Optics

1. Thickness of a wire using wedge method.
2. Determination of wavelength of light using Biprism.
3. Determination of Radius of curvature of a given convex lens by forming Newton's rings.
4. Resolving power of grating.
5. Study of optical rotation-polarimeter..
6. Dispersive power of a prism
7. Determination of wavelength of light using diffraction grating minimum deviation method.
8. Wavelength of light using diffraction grating – normal incidence method.
9. Resolving power of a telescope.
10. Refractive index of a liquid and glass (Boys Method).
11. Pulfrich refractometer – determination of refractive index of liquid.
12. Wavelength of Laser light using diffraction grating.

Note: Minimum of eight experiments should be performed .

Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and Reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- **Advanced Practical physics for students.**
4. "Practical Physics" R.K Shukla, AnchalSrivastava

Unit I:**1. Electrostatics (11)**

Electric Field:- Concept of electric field lines and electric flux, Gauss's law (Integral and differential forms), application to linear, plane and spherical charge distributions. Conservative nature of electric field E , irrotational field. Electric Potential:- Concept of electric potential, relation between electric potential and electric field, potential energy of a system of charges. Energy density in an electric field. Calculation of potential from electric field for a spherical charge distribution. **Calculation of electric field and electric potential due to electric dipole.**

Unit II:**2. Magnetostatics (12)**

Concept of magnetic field B and magnetic flux, Biot-Savart's law, B due to a straight current carrying conductor. Force on a point charge in a magnetic field. Properties of B , curl and divergence of B , solenoidal field. Integral form of Ampere's law, applications of Ampere's law: field due to straight, circular and solenoidal currents. Energy stored in magnetic field. Magnetic energy in terms of current and inductance. Magnetic force between two current carrying conductors. Magnetic field intensity. Ballistic Galvanometer:- Torque on a current loop in a uniform magnetic field, working principle of B.G., current and charge sensitivity, electromagnetic damping, critical damping resistance.

Unit III:**3. Electromagnetic Induction (9)**

Faraday's laws of induction (differential and integral form), Lenz's law, self and mutual Induction. Self-Inductance of a long solenoid. Energy density in a magnetic shell. Mutual Inductance of two given coils. Continuity equation, modification of Ampere's law, displacement current, Maxwell equations

Unit IV:**4. Electromagnetic waves (10)**

Maxwell's equations in vacuum and dielectric medium, boundary conditions, plane wave equation: transverse nature of EM waves, velocity of light in vacuum and in medium, Poyting theorem, Production and detection of electromagnetic waves (Hertz Experiment). Polarization, reflection and transmission. Polarization of EM waves, Brewster's angle, description of linear, circular and elliptical polarization.

Text Books

1. **Fundamentals of electricity and magnetism** By Arthur F. Kip (McGraw-Hill, 1968)
2. **Electricity and magnetism** by J.H.Fewkes & John Yarwood. Vol. I (Oxford Univ. Press, 1991).
3. **Introduction to Electrodynamics**, 3rd edition, by David J. Griffiths, (Benjamin Cummings,1998).

Reference Books

4. **Electricity and magnetism** By Edward M. Purcell (McGraw-Hill Education, 1986)
5. **Electricity and magnetism**. By D C Tayal (Himalaya Publishing House,1988)
6. **Electromagnetics** by Joseph A.Edminister 2nd ed.(New Delhi: Tata Mc Graw Hill, 2006).

V Semester Practicals
Paper – V: Electromagnetism

36 hrs

Marks: 50

1. To verify the Thevenin Theorem
2. To verify Norton Theorem
3. To verify Superposition Theorem
4. To verify maximum power transfer theorem.
5. To determine a small resistance by Carey Foster's bridge.
6. To determine the (a) current sensitivity, (b) charge sensitivity, and (c) CDR of a B.G.
7. To determine high resistance by leakage method.
8. To determine the ratio of two capacitances by De Sauty's bridge.
9. To determine self-inductance of a coil by Anderson's bridge using AC.
10. To determine self-inductance of a coil by Rayleigh's method.
11. To determine coefficient of Mutual inductance by absolute method.

Note: Minimum of eight experiments should be performed.

Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Reference Books

1. B. L. Worsnop and H. T. Flint, **Advanced Practical Physics**, Asia Publishing House, New Delhi.
2. Indu Prakash and Ramakrishna, **A Text Book of Practical Physics**, Kitab Mahal

B.Sc. Semester V-Theory Syllabus

Subject: Physics

Paper-VI-A – Solid State Physics
(DSC- Elective-I)

42 hrs

Unit-I (11)

1. Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Bravais Lattices and Basis. Unit Cell. Miller Indices. Types of Lattices. Crystal Structures of FCC, BCC and HCP. CsCl, NaCl, ZnS and Diamond Structures. Reciprocal Lattice. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Laue and Powder methods. Atomic and Geometrical Factor.

2. Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T₃ law

Unit-II (11)

3. Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.

4. Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability.

Unit-III (10)

5. Free electron theory of metals. Behaviour of electron in periodic potentials. Bloch theorem. Elementary band theory: Kronig Penny model. Band Gap. Brillouin zones, effective mass of electron. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect, Electric Conductivity by four probe method & Hall coefficient.

UNIT IV (10)

6. Optical properties of Solids. Classical Model- Drude model. Ionic Conduction. Maser and Laser. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Types of Lasers. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. Applications of Lasers Einstein's A and B coefficients..

7. Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory. D.C and A.C Josephson effects. **Recent applications of superconductivity.**

Text Books:

1. **Solid-state Physics**, H. Ibach and H. Luth, 2009, Springer
2. **Elementary Solid State Physics**, 1/e M. Ali Omar, 1999, Pearson India
3. **Solid State Physics**, M.A. Wahab, 2011, Narosa Publications
4. **Solid State Physics** – S. O. Pillai (New Age Publication)
5. **Modern Physics** by R.Murugesham

Reference Books:

1. Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd.
2. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
3. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill
4. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning
5. Solid State Physics- R.K.Puri &V.K. Babbar (S.Chand Publication)2013
6. Lasers and Non linear Optics –B.B.Laud-Wiley Eastern.
7. LASERS: Fundamentals and Applications – Thyagarajan and Ghatak (McMillanIndia)

V Semester Practicals
Paper – VI A: Solid State Physics

36 hrs

1. Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method)
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. To measure the Dielectric Constant of a dielectric Materials with frequency
5. To study the PE Hysteresis loop of a Ferroelectric Crystal.
6. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
7. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150^o C) and to determine its band gap.
8. To determine the Hall coefficient of a semiconductor sample.
9. Calculation of d-values of a given Laue's pattern.
10. Calculation of d-values of powder diffraction method.
12. To study the spectral characteristics of a Photo- Voltaic cell.
13. Verification of Bragg's equation.

Reference Books

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
4. Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice-Hall of India

B.Sc. Semester V-Theory Syllabus

42 hrs

Subject: (Physics)

Paper-VI B – QUANTUM MECHANICS AND APPLICATIONS (DSE- Elective-II)

Unit-I (11 hrs)

Schrodinger equation & the operators: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; Conditions for Physical Acceptability of Wave Functions. Normalization. Linearity and Superposition Principles. Hermitian operator, Eigen values and Eigen functions. Position, momentum and Energy operators; commutator of position and momentum operators; Expectation values of position and momentum. Wave Function of a Free Particle.

Unit II (11 hrs)

Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigen values; expansion of an arbitrary wave function as a linear combination of energy eigen functions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states; Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Fourier transforms and momentum space wave function; Position-momentum uncertainty principle.

Unit-III (10 hrs)

General discussion of bound states in an arbitrary potential- continuity of wave function, boundary condition and emergence of discrete energy levels; application to one-dimensional problem-square well potential; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigen functions ground state, zero point energy & uncertainty principle. One dimensional infinitely rigid box- energy eigen values and eigen functions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension across a step potential & rectangular potential barrier.

Unit-IV (10 hrs)

Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton. Atoms in External Magnetic Fields:- Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only). (12 Hrs)

Text Books:

1. **A Text book of Quantum Mechanics**, P. M.Mathews and K.Venkatesan, 2nd Ed., 2010, McGraw Hill
2. **Quantum Mechanics**, Robert Eisberg and Robert Resnick, 2nd Edn., 2002, Wiley.
3. **Quantum Mechanics**, Leonard I. Schiff, 3rd Edn. 2010, Tata McGraw Hill.

Reference Books:

1. **Quantum Mechanics**, G. Aruldas, 2nd Edn. 2002, PHI Learning of India.
2. Cohen-Tannoudji, B Diu and F Laloë, **Quantum Mechanics** (2 vols) Wiley-VCH 1977.
3. **Basic Quantum Mechanics** –A.Ghatak (Mc Millan India) 2012
4. **Introduction to Quantum Mechanics**, D.J. Griffith, 2nd Ed. 2005, Pearson • Quantum Physics---S. Gasiorowicz (Wiley India) 2013

V – Semester Practicals
Paper – VI C: Quantum Mechanics and Applications

36 hrs

Use C/C++/Scilab for solving the following problems based on Quantum Mechanics like

1. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom: Here, m is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wavefunctions. Remember that the ground state energy of the hydrogen atom is ≈ -13.6 eV. Take $e = 3.795$ (eVÅ)^{1/2}, $\hbar c = 1973$ (eVÅ) and $m = 0.511 \times 10^6$ eV/c².
2. Solve the s-wave radial Schrodinger equation for an atom: where m is the reduced mass of the system (which can be chosen to be the mass of an electron), for the screened coulomb potential Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wavefunction. Take $e = 3.795$ (eVÅ)^{1/2}, $m = 0.511 \times 10^6$ eV/c², and $a = 3$ Å, 5 Å, 7 Å. In these units $\hbar c = 1973$ (eVÅ). The ground state energy is expected to be above -12 eV in all three cases.
3. Solve the s-wave radial Schrodinger equation for a particle of mass m : For the anharmonic oscillator potential for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose $m = 940$ MeV/c², $k = 100$ MeV fm⁻², $b = 0, 10, 30$ MeV fm⁻³ In these units, $\hbar c = 197.3$ MeV fm. The ground state energy I expected to lie between 90 and 110 MeV for all three cases.
4. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule: Where μ is the reduced mass of the two-atom system for the Morse potential Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function. Take: $m = 940 \times 10^6$ eV/C², $D = 0.755501$ eV, $\alpha = 1.44$, $r_0 = 0.131349$ Å

Laboratory based experiments:

5. Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency
6. Study of Zeeman effect: with external magnetic field; Hyperfine splitting
7. To show the tunneling effect in tunnel diode using I-V characteristics.
8. Quantum efficiency of CCDs

Reference Books:

1. Numerical Recipes in C: The Art of Scientific Computing, W.H. Press et al., 3rd Edn., 2007, Cambridge University Press.
2. An introduction to computational Physics, T.Pang, 2nd Edn., 2006, Cambridge Univ. Press • Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific & Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernández. 2014 Springer.
3. Scilab (A Free Software to Matlab): H. Ramchandran, A.S. Nair. 2011 S. Chand & Co.

B.Sc. Semester VI-Theory Syllabus

Subject: (Physics)

**Paper-VII – MODERN PHYSICS
(DSC- Compulsory)**

42 hrs

UNIT-I (11hrs)

Atomic Spectra and Models Inadequacy of classical physics:

Brief Review of Black body Radiation, Photoelectric effect, Compton Effect, dual nature of radiation, wave nature of particles. Atomic spectra, Line spectra of hydrogen atom, Ritz Rydberg combination principle. Alpha Particle Scattering, Rutherford Scattering Formula, Rutherford Model of atom and its limitations, Bohr's model of H atom, explanation of atomic spectra, correction for finite mass of the nucleus, Bohr correspondence principle, limitations of Bohr model, discrete energy exchange by atom, Frank Hertz Expt. Somerfield's Modification of Bohr's Theory.

UNIT-II (11hrs)

Wave Particle Duality de Broglie hypothesis, Experimental confirmation of matter wave, Davisson Germer Experiment, velocity of de Broglie wave, wave particle duality, Complementarity. Superposition of two waves, phase velocity and group velocity, wave packets, Gaussian Wave Packet, spatial distribution of wave packet, Localization of wave packet in time. Time development of a wave Packet; Wave Particle Duality, Complementarity. Heisenberg Uncertainty Principle, Illustration of the Principle through thought Experiments of Gamma ray microscope and electron diffraction through a slit. Time independent and time dependent Schrodinger wave equation. Estimation of ground state energy of harmonic oscillator and hydrogen atom, non-existence of electron in the nucleus. Uncertainty and Complementarities.

UNIT-III (9 hrs.)

Nuclear Physics Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers.

Unit IV (11 hrs.)

Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus. Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions), Classification of Elementary Particles, **Applications of Radioactivity (Radiometric Dating, Medical Applications, Industrial Applications)**

Text Books:

1. **Concepts of Modern Physics**, Arthur Beiser, 2002, McGraw-Hill.
2. **Modern Physics** ---Murugesan and Siva Prasad --(S. Chand Higher Academics)
3. **Introduction to Modern Physics**, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill
4. **Introduction to Quantum Mechanics**, David J. Griffith, 2005, Pearson Education.
5. **Physics for scientists and Engineers with Modern Physics**, Jewett and Serway, 2010, Cengage Learning. •
6. **Quantum Mechanics: Theory & Applications**, A.K.Ghatak & S.Lokanathan, 2004,

Reference Books

1. **Modern Physics** – Bernstein, Fishbane and Gasiorowicz (Pearson India) 2010
2. **Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles** -- R. Eisberg (Wiley India) 2012 Additional Books for Reference
3. **Modern Physics**, J.R. Taylor, C.D. Zafiratos, M.A. Dubson, 2004, PHI Learning.
4. **Theory and Problems of Modern Physics**, Schaum`s outline, R. Gautreau and W. Savin, 2nd Edn, Tata McGraw-Hill Publishing Co. Ltd.
5. **Quantum Physics, Berkeley Physics**, Vol.4. E.H.Wichman, 1971, Tata McGraw-Hill Co.
6. **Basic ideas and concepts in Nuclear Physics**, K.Heyde, 3rd Edn., Institute of Physics Pub.
Six Ideas that Shaped Physics: Particle Behave like Waves, T.A.Moore, 2003, McGraw Hill
7. **Modern Physics-Serway** (CENGAGE Learnings) 2014
2. **Physics of Atoms and Molecules** – Bransden (Pearson India) 2003

VI Semester Practicals
Paper VII: Modern Physics

36 hrs

1. Measurement of Planck's constant using black body radiation and photo-detector
2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
3. To determine the Planck's constant using LEDs of at least 4 different colors.
4. To determine the ionization potential of mercury.
5. To determine the absorption lines in the rotational spectrum of Iodine vapour.
6. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
7. To setup the Millikan oil drop apparatus and determine the charge of an electron.
8. To show the tunneling effect in tunnel diode using I-V characteristics.
9. To determine the wavelength of laser source using diffraction of single slit.
10. To determine the wavelength of laser source using diffraction of double slits.
11. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating
12. To determine the value of e/m for electron by long solenoid method.
13. Photo Cell – Determination of Planck's constant.
14. To verify the inverse square law of radiation using a photo-electric cell.
15. To find the value of photo electric work function of a material of the cathode using a photo-electric cell.
16. Measurement of magnetic field – Hall probe method.
17. To determine the dead time of a given G.M. tube using double source.
18. Hydrogen spectrum – Determination of Rydberg's constant
19. Energy gap of intrinsic semi-conductor
20. G. M. Counter – Absorption coefficients of a material.
21. To draw the plateau curve for a Geiger Muller counter.
22. To find the half-life period of a given radioactive substance using a G.M. Counter.

Reference Books

1. **Advanced Practical Physics for students**, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. **Advanced level Physics Practicals**, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

B.Sc. Semester VI-Theory Syllabus

Subject: Physics

Paper-VIII-A: Basic Electronics
(DSE- Elective-II)

42 hrs

Unit-I: (10 hrs)

1. Network Elements and Network Theorems

Passive elements, Power sources, Active Elements, Network Models: T and π Transformations, Super position theorem, Thevenin's Theorem, Norton's theorem. Reciprocity Theorem and Maximum power transfer theorem (Simple problems). Two-port Networks – Introduction- Z-parameters, Y-parameters, h-parameters and ABCD-parameters (Simple problems).

Unit – II: (10 hrs)

2. Band theory of P-N junction

Energy band in solids (band theory), valence band, conduction band and forbidden energy gap solids, Insulators, semi conductors and, pure or intrinsic semiconductors and impurity or extrinsic semi-conductors. N-type extrinsic semi-conductors, P-type extrinsic semi-conductors, Fermi level, continuity equation.

3. Diodes: P-N junction diode, Bridge rectifier. Half wave rectifier and Full wave rectifier. Zener diode & its Characteristics. Zener diode as voltage regulator.

Unit-III: (11hrs)

4. Bipolar Junction Transistor (BJT) – p-n-p and n-p-n transistors, current components in transistors, CB, CE and CC configurations – transistor as an amplifier -RC coupled amplifier. (Qualitative analysis)

5. Feedback Concept & Oscillators: Feedback, General theory of feedback–Concepts of a Oscillators, Barkhausen's criteria, Phase shift Oscillator. **Wein Bridge Oscillator.**

Unit-IV: (11 hrs)

6. Digital Electronics

Binary number system, converting Binary to Decimal and vice versa. Binary addition and subtraction (1's and 2's complement methods). Hexadecimal number system. Conversion from Binary to Hexadecimal – vice versa and Decimal to Hexadecimal vice versa.

7. Logic gates:

OR, AND, NOT gates, truth tables, realization of these gates using discrete components. NAND, NOR as universal gates, Exclusive – OR gate (EX-OR). De Morgan's Laws – Statement and proof. **Half Adder and Full Adder.**

NOTE: Problems should be solved from every chapter of all units.

Textbooks

1. **Electronic devices and circuits** – Millman and Halkias. *Mc.Graw-Hill Education.*
2. **Principles of Electronics** by V.K. Mehta – *S. Chand & Co.*
3. **Basic Electronics (Solid state)** – B. L. Theraja , S. Chand & Co.
4. **A First Course in Electronics-** Anwar A. Khan& Kanchan K. Dey, PHI.

Reference Books

1. Basic Electronics – Bernod Grob.
2. Third year Electronics – Telugu Academy
3. Digital Principles & Applications – A.P. Malvino and D.P. Leach
4. Circuit theory- Umesh.

VI Semester Practicals
Paper – VIII A: Basic Electronics

36 hrs

1. AND, OR, NOT, gates – Truth table Verification
2. AND, OR, NOT – gates constructions using universal gates – Verification of truth tables.
3. NAND and NOR gates truth table verification
4. Characteristics of a Transistor in CE configuration
5. R.C. coupled amplifier – frequency response.
6. Verification of De Morgan's Theorem.
7. Zener diode V-I characteristics.
8. Verification Thevenin's theorem.
9. Maximum Power Transfer theorem
10. P-n junction diode V- I characteristics.
11. Zener diode as a voltage regulator
12. Construction of a model D.C. power supply
13. R C phase shift Oscillator –determination of output frequency

Every student should complete minimum 06 experiments.

Text Books

1. **B.Sc. Practical Physics** – C. L. Arora – S. Chand & Co.
2. **Viva-voce in Physics** – R.C. Gupta, Pragathi Prakashan, Meerut.
3. **Laboratory manual for Physics Course** by B.P. Khandelwal.
4. **Practical Physics** by M. Arul Thakpathi by Comptex Publishers.
5. **B.Sc. practical physics** – Subbi Reddy.

B.Sc. Semester VI-Theory Syllabus **42 hrs**
(DSE- Elective-II)
Subject: Physics
Paper-VIII-B: Physics of Semiconductor Devices

Unit-I: (11 hrs)

Semiconductor Physics: Conductors, Semiconductors, forbidden orbits, energy levels, crystals and covalent bonds, free electrons and holes, recombination and life-time, energy bands. Intrinsic Semiconductor- intrinsic carrier concentration, density of electrons in conduction band, fermi-level, mass action law. Carrier transport phenomena- mobility, resistivity, diffusivity, Einstein's relation, current density equation. Extrinsic semiconductor-n-type semiconductor, p-type semiconductor, energy band diagram of extrinsic semiconductor. Hall effect- mobility and Hall angle, experiment arrangement for the study of Hall effect, significance of Hall effect.

Unit – II: (11 hrs)

P-N junction-Depletion layer, Energy level diagram of p-n junction, Band structure of an open circuited p-n junction, Biasing of p-n junction, effect of barrier potential on forward bias, reverse leakage current, reverse breakdown, P-n junction under various conditions-thermal equilibrium, forward and reverse bias, current-voltage characteristics. Derivation of ideal diode equation of p-n junction, diode model and its approximations. Forward and reverse resistance of diode. Dynamic characteristic of diode.

Unit-III: (10 hrs)

Special diodes-Zener diode, Light –emitting diode (LED), Photo-diode, Schottky diode, Backward diodes and Tunnel diode.

Transistors- Bipolar junction transistor (BJT), transistor characteristics, transistor equation in active region, field effect transistor (FET), Phototransistor and MOSFETs.

Unit-IV: (10 hrs)

Control devices- Shockley Diode, Silicon Controlled Rectifier (SCR), Silicon Controlled Switch (SCS), Unijunction transistor (UJT), Solar Cells, Opto-couplers.

Text books

1. A First Course in Electronics- Anwar A. Khan& Kanchan K. Dey, PHI
2. Physics of Semiconductor Devices- S. M. Sze
3. Physics of Semiconductors- Streetman

VI Semester Practicals
Paper – VIII-B
Physics of Semiconductor Devices

36 hrs

1. Characteristics of a Transistor in CE configuration
2. Zener diode V-I characteristics.
3. P-n junction diode V- I characteristics.
4. Zener diode as a voltage regulator
5. Determination of carrier concentration using Hall effect
6. Thermistor characteristics
7. Efficiency of a LED
8. Solar cell: fill factor and efficiency
9. FET characteristics
10. SCR characteristics
11. UJT characteristics

Every student should complete minimum 06 experiments.

Text Books

1. Basic electronics, Grob
2. Practical Electronics, Zbar

B.Sc. Semester III
Skill Enhancement Course (SEC) 30 hrs
RENEWABLE ENERGY AND ENERGY HARVESTING
(Credits: 02)

The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible.

Fossil fuels and Alternate Sources of energy: (3 hrs)

Fossil fuels and Nuclear Energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy, tidal energy, Hydroelectricity.

Solar energy: (6 hrs)

Solar energy, its importance, storage of solar energy, solar pond, non-convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector. Solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.

Wind Energy harvesting: (3 hrs)

Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, power electronic interfaces, and grid interconnection topologies.

Ocean Energy: (2 hrs)

Ocean Energy potential against Wind and Solar. Wave Characteristics and Statistics.

Wave Energy Devices. (3 hrs)

Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic power, Ocean Bio-mass.

Geothermal Energy: (2 hrs)

Geothermal Resources, Geothermal Technologies.

Hydro Energy: (2 hrs)

Hydropower resources, hydropower technologies, environmental impact of hydro power sources

Piezoelectric Energy Harvesting: (4 hrs)

Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectric energy harvesting applications, Human power.

Electromagnetic Energy Harvesting: (2 hrs)

Linear generators, physics mathematical models, recent applications.

Carbon captured technologies, cell, batteries, power consumption. **(2 hrs)**

Environmental issues and Renewable sources of energy, Sustainability.

Demonstrations and Experiments

1. Demonstration of Training modules on Solar energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials
3. Conversion of thermal energy into voltage using thermoelectric modules

Reference Books:

1. Non-conventional energy sources – G.D Rai – Khanna Publishers, New Delhi
2. Solar energy – M P Agarwal – S Chand and Co. Ltd
3. Solar energy – Suhas P Sukhative Tata McGraw – Hill Publishing Company Ltd
4. Godfrey Boyle, “Renewable Energy, Power for a sustainable future”, 2004.
5. Oxford University Press, in association with The Open University.
6. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
7. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).

B.Sc. Semester III
Skill Enhancement Course (SEC)
WEATHER FORECASTING
(Credits: 02)

30 hrs

The aim of this course is not just to impart theoretical knowledge in the students but to enable them to develop an awareness and understanding regarding the causes and effects of different weather phenomenon and basic forecasting techniques.

Introduction to atmosphere: (9 hrs)

Elementary idea of atmosphere: physical structure and composition: compositional layering of the atmosphere: variation of pressure and temperature with height: air temperature: requirements to measure air temperature: temperature sensors: types: atmospheric pressure: its measurements: cyclones and anticyclones : its characteristics.

Measuring the weather: (4 hrs)

Wind: forces acting to produce wind; wind speed direction units, its direction: measuring wind speed and direction: humidity, clouds and rainfall, radiation: absorption, emission and scattering in atmosphere; radiation laws.

Weather system: (3 hrs)

Global wind systems: air masses and fronts: classifications: jet streams: local thunderstorms: tropical cyclones: classification; tornadoes: hurricanes.

Climate and Climate Change: (6 hrs)

Climate: its classification: causes of climate change: global warming and its outcomes; air pollution: aerosols, ozone depletion, acid rain, environmental issues related to climate.

Basics of weather forecasting: (8 hrs)

Weather forecasting: analysis and its historical background:
Need of measuring weather; types of weather forecasting; weather forecasting methods; criteria of choosing weather station; basics of choosing site and exposure: satellites observations in weather forecasting; weather maps; uncertainty and predictability; probability forecasts.

Demonstrations and Experiments:

1. Study of synoptic charts & weather reports. Working principle of weather station
2. Processing and analysis of weather data:
 - (a) To calculate the sunniest time of the year.
 - (b) To study the variation of rainfall amount and intensity by wind direction.
 - (c) To observe the sunniest/driest day of the week
 - (d) To examine the maximum and minimum temperature throughout the year.
 - (e) To evaluate the relative humidity of the day
 - (f) To examine the rainfall amount month wise.
3. Exercises in chart reading: Plotting of constant pressure charts. Surfaces charts, upper wind charts and its analysis.
4. Formats and elements in different types of weather forecasts/ warning (both aviation and non aviation)

Reference books:

1. Aviation Meteorology. I.C. Joshi, 3rd edition 2014, Himalayan Books
2. The weather Observers Hand book, Stephen Burt, 2012, Cambridge University Press.
3. Meteorology, S.R. Ghadekar , 2001 , Agromet Publishers, Nagpur.
4. Text Book of Agrometeorology. S.R. Ghadekar, 2005, Agromet Publishers, Nagpur.
5. Why the weather, Charls Franklin Brooks,1924, Chpraman & Hall, London.
6. Atmosphere and Ocean, John G. Harvey, 1995, The Artemis Press.

B.Sc. Semester IV
Skill Enhancement Course (SEC)
BASIC INSTRUMENTATION SKILLS
(Credits: 02)

30 hrs

This course is to get exposure with various aspects of instruments and their usage through hands-on mode.

UNIT I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. . **(3 hrs)**

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage measurement (block diagram only). Specifications of an electronic Voltmeter/ Millimeter and their significance. AC millivoltmeter: Type of AC millivoltmeters. Block diagram ac millivoltmeter, specifications and their significance. **(4 hrs)**

Oscilloscope: Block diagram of basic CRO. CRT, electrostatic focusing and acceleration (Explanation only – no mathematical treatment), brief discussion on screen phosphor, visual persistence. Time base operation, synchronization. Front panel controls. Specifications of CRO and their significance. **(5 hrs)**

Use of CRO for the measurement of voltage (dc and ac), frequency and time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: principle of working. **(3 hrs)**

UNIT II

Signal and pulse Generators: (4 hrs) Block diagram, explanation and specifications of low frequency signal generator and pulse generator. Brief idea for testing, Specifications. Distortion factor meter, wave analysis.

Impedance Bridges: (4 hrs)

Block diagram of bridge. Working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram and working principles of a Q-Meter. Digital LCR bridges.

Digital Instruments: (3 hrs) Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter.

Digital Multimeter: (4 hrs) Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time- base stability, accuracy and resolution.

The test of lab skills will be of the following test items:

1. Use of an oscilloscope.
2. Oscilloscope as a versatile measuring device.
3. Use of Digital multimeter/VTVM for measuring voltages
4. Winding a coil / transformer.
5. Trouble shooting a circuit
6. Balancing of bridges


Reference Books:

1. **A text book in Electrical Technology** - B L Theraja - S Chand and Co.
2. **Performance and design of AC machines** - M G Say ELBS Edn.
3. **Digital Circuits and systems**, Venugopal, 2011, Tata McGraw Hill.
4. **Logic circuit design**, Shimon P. Vingron, 2012, Springer.

BOS Meeting Resolutions-2016-17, Department of Chemistry

The following resolutions were taken in the meeting.

1. Resolved to the adopt the syllabus prescribed by Osmania University for B.Sc. and M.Sc. I and II Semester without making any changes for the Academic year 2016-17
2. The division and adoption of syllabus was discussed and decided to split the IV- units of 11 chapters in the I Semester and 12 chapter in the II Semester of B.Sc. and M.Sc. each paper (four papers) contain 4 chapters.
3. The pattern of evolution and examination was discussed with two internals in the each semester and average of two would be taken for the semester marks computation. The internals would be 30 marks and the semester exams would be 70 marks in the B.Sc. and M.Sc. I and II Semester.
4. The practical examinations of B.Sc. and M.Sc. would be conducted at the end of the II semester of each year.
5. List of reference and prescribed books should mention for prescribing the students as recommended by Osmania University.
6. Question banks would be made for the students for the unit.
7. List of panel of examiner were enlisted for the purpose of evaluation of examinations.


Board of studies
Chairman BOS


University nominee
CHAIRMAN
Board of Studies in Chemistry
Dept. of CHEMISTRY
Osmania University, Hyd-07.

Members
1. 





**Telangana State Council of Higher Education, Govt. of Telangana B.Sc., CBCS Common
Core Syllabi for all Universities in Telangana
PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
B.Sc., Chemistry**

FIRST YEAR- SEMSTER I				
CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS
BS 101	Communication	AECC-1	2	2
BS 102	English	CC-1A	5	5
BS 103	Second language	CC-2A	5	5
BS 104	Optional I	DSC-1A	4T+2P=6	4+1=5
BS 105	Optional II	DSC-2A	4T+2P=6	4+1=5
BS 106	Optional III- Chemistry - I	DSC-3A	4T } = 6	4 } = 5
	Laboratory Course – I (Qualitative Analysis – I)		2P }	1 }
Total Credits				27
FIRST YEAR- SEMSTER II				
BS 201	Environmental studies	AECC-2	2	2
BS 202	English	CC-1B	5	5
BS 203	Second language	CC-2B	5	5
BS 204	Optional I	DSC-1B	4T+2P=6	4+1=5
BS 205	Optional II	DSC-2B	4T+2P=6	4+1=5
BS 206	Optional III- Chemistry - II	DSC-3B	4T } = 6	4 } = 5
	Laboratory Course - II (Qualitative Analysis – II)		2P }	1 }
Total Credits				27
SECOND YEAR- SEMSTER III				
BS 301	Safety Rules in Chemistry Laboratory and Lab Reagents	SEC-I	2	2
BS 302	English	CC-1C	5	5
BS 303	Second language	CC-2C	5	5
BS 304	Optional I	DSC-1C	4T+2P=6	4+1=5
BS 305	Optional II	DSC-2C	4T+2P=6	4+1=5
BS 306	Optional III- Chemistry - III	DSC-3C	4T } = 6	4 } = 5
	Laboratory Course - III (Quantitative Analysis – I)		2P }	1 }
Total Credits				27
SECOND YEAR- SEMSTER IV				
BS 401	Remedial Methods for Pollution, Drinking Water and Soil Fertility	SEC-2	2	2
BS 402	English	CC-1D	5	5
BS 403	Second language	CC-2D	5	5
BS 404	Optional I	DSC-1D	4T+2P=6	4+1=5
BS 405	Optional II	DSC-2D	4T+2P=6	4+1=5
BS 406	Optional III- Chemistry - IV	DSC-3D	4T } = 6	4 } = 5
	Laboratory Course - IV (Quantitative Analysis – II)		2P }	1 }
Total Credits				27

* **Optional III Chemistry** AECC: Ability Enhancement Compulsory Course; SEC: Skill Enhancement Course; DSC: Discipline Specific Course; GE: Generic Elective;

B.Sc I yr CHEMISTRY
SEMESTER WISE SYLLABUS
SEMESTER I
Paper – I
Chemistry - I

Unit-I (Inorganic Chemistry)

15h(1 hr/week)

S1-I-1. s-block elements:

General Characteristics of groups I and II elements, Diagonal relationship between Li and Mg, Be and Al **2 h**

S1-I-2. p-block elements 1:

7 h

Group-13: Synthesis and structure of diborane and higher Boranes (B_4H_{10} and B_5H_9), Boron nitrogen compounds ($B_3N_3H_6$ and BN), Lewis acid nature of BX_3

Group – 14: Carbides-Classification – ionic, covalent, interstitial – synthesis. Structures and reactivity. Industrial application. Silicones – Preparation – a) direct silicon process b) use of Grignard reagent c) aromatic silylation. Classification – straight chain, cyclic and cross-linked.

Group – 15: Nitrides – Classification – ionic, covalent and interstitial. Reactivity – hydrolysis. Preparation and reactions of hydrazine, hydroxyl amine, phosphazenes.

S1-I-3. General Principles of Inorganic qualitative analysis

6 h

Anion analysis: Theory of sodium carbonate extract, classification and reactions of anions- CO_3^{2-} , Cl^- , Br^- , SO_4^{2-} , PO_4^{3-} , BO_3^{3-} , CH_3COO^- , NO_3^- .

Cation Analysis: Principles involved - Solubility product, common ion effect, general discussion for the separation and identification of group I individual cations (Hg_2^{2+} , Ag^+ , 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 (Hg^{2+} , Pb^{2+} , Bi^{3+} , Cd^{2+} , Sb^{2+}), III (Al^{3+} , Fe^{3+}), IV (Mn^{2+} , Zn^{2+}) individual cations with flow chart and chemical equations. Application of concept of hydrolysis in group V cation analysis. General discussion for the separation and identification of group V individual cations (Ba^{2+} , Sr^{2+} , Ca^{2+}) with flow chart and chemical equations. Theory of flame test. Identification of Group VI cations (Mg^{2+} , NH_4^+).

Unit - II (Organic Chemistry)

15h(1 hr/week)

S1-O-1:Structural Theory in Organic Chemistry

6 h

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

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

S1-O-2:Acyclic Hydrocarbons

6 h

Alkanes– Methods of preparation: Corey-House reaction, Wurtz reaction, 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: Addition of Hydrogen – heat of hydrogenation and stability of alkenes. trans-addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H₂O, HOX, H₂SO₄ with mechanism and addition of HBr in the presence of peroxide (anti – Markonikov's addition). Oxidation (cis – additions) – hydroxylation by KMnO₄, OsO₄, trans addition- peracids (via epoxidation), hydroboration, ozonolysis – location of double bond. Dienes – Types of dienes, reactions of conjugated 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: Acidity of terminal alkynes (formation of metal acetylides) preparation of higher alkynes, Chemical reactivity – electrophilic addition of X₂, HX, H₂O (tautomerism), Oxidation (formation of enediol, 1,2 diones and carboxylic acids) and reduction (Metal-ammonia reduction, catalytic hydrogenation)

S1-O-3:Alicyclic Hydrocarbons

3 h

Nomenclature, preparation by Freund's method, Dickmann, heating dicarboxylic metal salts. Properties – reactivity of cyclo propane and cyclo butane by comparing with alkanes. Stability of cycloalkanes – Baeyer strain theory, Sachse and Mohr predictions and Pitzer strain theory. Conformational structures of cyclopentane, cyclohexane.

Unit-III (Physical Chemistry)**15 h (1 hr/week)****S1-P-1: Atomic structure and elementary quantum mechanics****6 h**

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, Schrodinger's wave equation and its importance. Physical interpretation of the wave function, significance of ψ and ψ^2 , a particle in a box, energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of variables, radial and angular functions (only equation), hydrogen like wave functions, quantum numbers and their importance.

S1-P-2: Gaseous State**5 h**

Deviation of real gases from ideal behavior. van der Waals equation of state. Critical phenomenon. PV isotherms of real gases, continuity of state. Andrew's isotherms of CO₂. The van der Waal's equation and critical state. Derivation of relationship between critical constants and van der Waal's constants. The law of corresponding states, reduced equation of states. Joule Thomson effect and inversion temperature of a gas. Liquefaction of gases: i) Linde's method based on Joule Thomson effect ii) Claude's method based on adiabatic expansion of a gas.

S1-P-3: Liquid State**4 h**

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). Liquid crystals, the mesomorphic state: Classification of liquid crystals into Smectic and Nematic, differences between liquid crystal and solid / liquid. Application of liquid crystals as LCD devices.

Unit – IV (General Chemistry)**15 h (1 hr/week)****S1-G-1 Chemical Bonding****11 h**

Ionic solids- lattice and solvation energy, solubility of ionic solids, Fajan's rule, polarity and polarizability of ions, covalent nature of ionic bond, covalent bond - Common hybridization and shapes of molecules.

Molecular orbital theory: Shapes and sign convention of atomic orbitals. Modes of overlapping. Concept of σ and π bonds. Criteria for orbital overlap. LCAO concept. Types of molecular orbitals- bonding, antibonding and non bonding. MOED of homonuclear diatomics - H₂, N₂, O₂, O₂⁻, O₂²⁻, F₂ (unhybridized diagrams only) and heteronuclear diatomics CO, CN⁻, NO, NO⁺ and HF. Bond order, stability and magnetic properties.

S1-G-2 Evaluation of analytical data**4 h**

Significant figures, accuracy and precision. Errors-classification of errors- determinate and indeterminate errors, absolute and relative errors, propagation of errors in mathematical operations – addition, subtraction, division and multiplication (with respect to determinate errors).

References:

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001. Chem.
4. Vogel's Qualitative Inorganic Analysis by Svehla
5. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn.
6. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press 1989.
7. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
8. Qualitative analysis by Welcher and Hahn.
9. Textbook of Inorganic Chemistry by R Gopalan
10. College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati

Unit- II

1. Text book of organic chemistry by Morrison and Boyd.
2. Text book of organic chemistry by Graham Solomons.
3. Text book of organic chemistry by Bruice Yuranis Powla.
4. Text book of organic chemistry by Soni.
5. General Organic chemistry by Sachin Kumar Ghosh.
6. Text book of organic chemistry by C N pillai

Unit III

1. Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara..
3. Text Book of Physical Chemistry by Puri and Sharma.
4. Text Book of Physical Chemistry by K. L. Kapoor.
5. Physical Chemistry through problems by S.K. Dogra.
6. Text Book of Physical Chemistry by R.P. Verma.
7. Elements of Physical Chemistry by Lewis Glasstone.

Unit IV

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001. Chem
4. Analytical chemistry by G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasada Rao, K.L.N. Reddy and C. Sudhakar

Laboratory Course

45h (3 h / week)

Paper I Qualitative Analysis - I

I. Preparations:

1. Tetrammine copper (II) sulphate,
2. Potash alum $\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$,
3. Bis (dimethylglyoximato) nickel(II)

II. Analysis of two anions (one simple and one interfering)

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

Unit-I (Inorganic Chemistry)

15 h (1 hr/week)

S2-I-1 p-block Elements -II

7 h

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: HNO_2 (reaction with FeSO_4 , KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$), HNO_3 (reaction with H_2S , Cu), HNO_4 (reaction with KBr, Aniline), $\text{H}_2\text{N}_2\text{O}_2$ (reaction with KMnO_4). Redox properties of oxyacids of Potassium: H_3PO_2 (reaction with HgCl_2), H_3PO_3 (reaction with AgNO_3 , CuSO_4).

Redox properties of oxyacids of Sulphur: H_2SO_3 (reaction with KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$), H_2SO_4 (reaction with Zn, Fe, Cu), $\text{H}_2\text{S}_2\text{O}_3$ (reaction with Cu, Au), H_2SO_5 (reaction with KI, FeSO_4), $\text{H}_2\text{S}_2\text{O}_8$ (reaction with FeSO_4 , KI)

Interhalogens- classification- general preparation- structures of AB , AB_3 , AB_5 and AB_7 type and reactivity. Poly halides- definition and structure of ICl_2^- , ICl_4^- and I_3^- . Comparison of Pseudohalogens with halogens.

S2-I-2 Chemistry of Zero group elements

2 h

General preparation, structure, bonding and reactivity of Xenon compounds – Oxides, Halides and Oxy-halides. Clathrate compounds and Anomalous behavior of He (II)

S2-I-3 Chemistry of d-block elements

6 h

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)

15 h (1 hr/week)

S2-O-1: Aromatic Hydrocarbons

7h

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.

S2-O-2: Arenes and Polynuclear Aromatic Hydrocarbons**3 h**

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.

S2-O-3: Halogen compounds**5 hrs**

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 of hydrolysis - comparison of alkyl, vinyl, allyl, aryl, and benzyl halides.

Unit – III (Physical Chemistry)**15 h (1 hr/week)****S2-P-1: Solutions****5 h**

Liquid - liquid mixtures, ideal liquid mixtures, Raoult's and Henry's laws. Non ideal systems. Azeotropes HCl-H₂O and C₂H₅OH - H₂O 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.

S2-P-2: Dilute Solutions & Colligative Properties**5 h**

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't Hoff factor, degree of dissociation and association of solutes.

S2-P-3: Solid state Chemistry**5 h**

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

S2-G-1: Theory of Quantitative Analysis**5 hours**

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 Ni^{2+}

S3-G-2: Theories of bonding in metals:**5 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.

S2-G-3: Material Science**5 h**

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).

References

Unit I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn
4. Wiley Publishers 2001. Chem
5. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press 1989.
6. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
7. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn.
8. Textbook of inorganic chemistry by R Gopalan

Unit II

1. Text book of organic chemistry by Morrison and Boyd.
2. Text book of organic chemistry by Graham Solomons.
3. Text book of organic chemistry by Bruice Yuranis Powla.
4. Text book of organic chemistry by Soni.
5. General Organic chemistry by Sachin kumar Ghosh.
6. Text book of organic chemistry by C N pillai

Unit III

1. Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara.
3. Text Book of Physical Chemistry by Puri and Sharma
4. Text Book of Physical Chemistry by K. L. Kapoor
5. Physical Chemistry through problems by S.K. Dogra.
6. Elements of Physical Chemistry by Lewis and Glasstone.
7. Material science by Kakani & Kakani

Unit IV

1. Vogel's Text Book of Quantitative Analysis by G.H.Jeffery, J.Bassett, J.Mendham and R.C. Denney 5th edn Addison Wesley Longman Inc. 1999.
2. Quantitative Analysis by Day and Underwood Prentice Hall (India) VI Edn..
3. Nano: The Essentials by T. Pradeep, McGraw-Hill Education.
4. Chemistry of nanomaterials: Synthesis, Properties and applications by CNR Rao et.al.
5. Nanostructured Materials and Nanotechnology, edited by Hari Singh Nalwa, Academic Press
6. College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati

Laboratory Course

45hrs (3 h / week)

Paper II - Qualitative Analysis - II

I Semi micro analysis of mixtures

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

Anions: CO_3^{2-} , SO_3^{2-} , S^{2-} , Cl^- , Br^- , I^- , CH_3COO^- , NO_3^- , PO_4^{3-} , BO_3^{3-} , SO_4^{2-}

Cations: Ag^+ , Pb^{2+} , Hg^+ , Hg^{2+}
 Pb^{2+} , Bi^{3+} , Cd^{2+} , Cu^{2+} , $\text{As}^{3+/5+}$, $\text{Sb}^{3+/5+}$, $\text{Sn}^{2+/4+}$
 Al^{3+} , Cr^{3+} , Fe^{3+}
 Zn^{2+} , Ni^{2+} , Co^{2+} , Mn^{2+}
 Ca^{2+} , Sr^{2+} , Ba^{2+}
 Mg^{2+} , NH_4^+

DEPARTMENT OF CHEMISTRY
OSMANIA UNIVERSITY
 (Effective from academic year 2016-2017 for Campus and Constituent colleges
[UNDER CBCS Scheme])

Semester I

	Hrs. /week internal assessment		Semester exam	Total	Credits
CH101T (*)	4	20 marks	80 marks	100 marks	4
CH102T (*)	4	20 marks	80 marks	100 marks	4
CH103T (*)	4	20 marks	80 marks	100 marks	4
CH104T (*)	4	20 marks	80 marks	100 marks	4
CH151P (IC LAB*)	6			75 marks	3
CH152P (OC LAB*) (4h + 2T)				50 marks	2
CH153P (PC LAB*)	6			75 marks	3
Total				600 marks	24

(*Core= compulsory papers common to all students admitted to M.Sc Chemistry, OU)

Semester II

	Hrs. /week internal assessment		Semester exam	Total	Credits
CH201T (*)	4	20 marks	80 marks	100 marks	4
CH202T (*)	4	20 marks	80 marks	100 marks	4
CH203T (*)	4	20 marks	80 marks	100 marks	4
CH204T (*)	4	20 marks	80 marks	100 marks	4
CH251P (IC LAB*)	6			75 marks	3
CH252P (OC LAB*)	6			75 marks	3
CH253P (PC LAB*) (4h + 2T)				50 marks	2
Total				600 marks	24

(*= compulsory papers common to all students admitted to M.Sc Chemistry, OU)

M.Sc CHEMISTRY SYLLABUS**(Effective from academic year 2016-2017 for Campus and Constituent colleges.)****SEMESTER –I**

Semester-I and Semester-II syllabus is common for all specializations i.e., Inorganic-Analytical, Organic, Physical, Physical- Organic and Chemistry (Pharmacoinformatics).

Paper 1 CH 101 (INORGANIC CHEMISTRY)**IC 01: Symmetry of molecules****IC 02: Bonding in Metal Complexes - I****IC 03: Coordination equilibria****IC 04: Ligational aspects of diatomic molecules**

Teaching hours-4/week

Marks-80

IC-01: Symmetry of Molecules:**15 hrs**

Concept of Symmetry in Chemistry – Symmetry Operations – Symmetry Elements: Rotational Axis of Symmetry and Types of Rotational Axes, Plane of Symmetry and types of Planes, Improper Rotational Axis of Symmetry , Inversion Center and Identity Element – More about Symmetry Elements – Molecular Point Groups: Definition and Notation of Point Groups, Classification Molecules in to C_1 , C_s , C_i , C_n , C_{nv} , C_{nh} , $C_{\infty v}$, D_n , D_{nh} , D_{nd} , $D_{\infty h}$, S_n (n =even), T_d , O_h , I_h , K_h Groups. Descent in Symmetry with Substitution – Exercises in Molecular Point Groups – Symmetry and Dipole moment – Symmetry criteria for Optical activity.

IC – 02: Bonding in metal complexes – I:**15 hrs**

Crystal Field Theory: Salient features of CFT. d-orbital splitting patterns in regular Octahedral, tetragonally distorted octahedral, Jahn-Teller theorem , trigonal bipyramidal, trigonal planar, Pentagonal bipyramidal, and linear geometries. Concept of weak field and strong fields. - Calculation of crystal field stabilization energies (CFSE's) in six and four coordinate complexes.

Types of magnetic behaviour – magnetic susceptibility – calculation of magnetic moment from magnetic susceptibility spin only formula , - Quenching of orbital angular momentum – Determination of magnetic moment from Guoy's method.. Applications of magnetic moment data for the determination of oxidation states, bond type and stereochemistry. Spin crossover: High spin, low spin cross over phenomenon in $[\text{Fe}(\text{Ophen})_2(\text{NCS})_2]$ and $[\text{Fe}(\text{R}_2\text{NCS}_2)_3]$. Spinels.

IC-03: Coordination Equilibria:**15 hrs**

Solvation of metal ions- Metal complex formation in solution-Binary metal complexes. Stability constants (types and relationships between them). – Factors influencing the stability constants: (i) Metal ion effects (charge/size, IP, crystal field effect, John-Teller effect, Pearson theory of hard and soft acids and bases (HSAB), electronegativity and hardness and softness, symbiosis. (ii) Ligand effects (Basicity , Substituent effect , Steric , Chelate(size and number of chelate rings), Macrocyclic and Cryptate effects- crown ethers , crypton, size match selectivity or concept of hole size, limitations, Macrocycles with pendent groups– Methods used for the determination of Stability constants (Basic Principles only): pH metric, Spectrophotometric and Polarographic methods.

Ternary Metal Complexes – definition – Formation of ternary metal complexes – Step-wise and simultaneous equilibria with simple examples.

IC – 04: Ligational Aspects of Diatomic molecules

15 hrs

Metal Carbonyls:- Carbon monoxide as a ligand – Molecular orbitals of CO - Donor and Acceptor molecular orbitals of CO; Bonding modes of CO- Terminal and Bridging; Evidence for multiple bonding from Bond lengths and Stretching frequencies; 18 Valence electron rule and its application.

Metal Nitrosyls: - NO as a ligand – Molecular orbitals of NO – Donor and Acceptor components; Bonding modes of NO – Terminal (Linear, Bent) and Bridging; Structural aspects of $[\text{IrCl}(\text{PPh}_3)_2(\text{CO})(\text{NO})]^+$ and $[\text{RuCl}(\text{PPh}_3)_2(\text{NO})_2]^+$.

Stereo chemical control of valence in $[\text{Co}(\text{diars})_2(\text{NO})]^{2+}$ and $[\text{Co}(\text{diars})_2(\text{NO})(\text{SCN})]^+$.

Metal Dinitrogen complexes: - N_2 as a ligand – Molecular orbitals of N_2 ; Bonding modes – Terminal and Bridging; Stretching frequencies; Structures of Ru (II) and Os(II) dinitrogen complexes; Chemical fixation of dinitrogen.

Suggested References:

1. Symmetry and Group theory in Chemistry, Mark Ladd, Marwood Publishers, London (2000).
2. Molecular Symmetry and Group Theory, Robert L.Carter, John Wiley & Son (1998).
3. Symmetry and Spectroscopy of Molecules. K.Veera Reddy, New Age International (P) Limited (1999).
4. Advanced Inorganic Chemistry. F.A.Cotton, G.Wilkinson, C.A.Murillo and M.Bochmann, 6th Edition, Wiley Interscience, N.Y (1999)
5. Inorganic Chemistry, J.E. Huheey, K.A.Keiter and R.L.Keiter 4 th Edition Harper Cottens College Publications (1993).
6. Homogeneous Catalysis by Metal complexes Vol I, M M Taqui Khan and A E Martell, Academic Press NY (1974).
7. Inorganic Chemistry, Keith F.Purcell and John C.Kotz, Holt-Saunders International Editions, London (1977).

Paper-II: CH 102 T (Organic Chemistry)

OC-01: Stereochemistry

OC-02: Reaction mechanism-1

OC-03: Conformational analysis (Acyclic systems)

OC-04: Heterocyclic compounds & Natural products

OC-01: Stereochemistry

15 hrs

Molecular representations: Wedge, Fischer, Newman and Saw-horse formulae, their description and interconversions.

Molecular Symmetry & Chirality: Symmetry operations and symmetry elements (C_n & S_n). Criteria for Chirality. Desymmetrization.

Axial, planar and helical chirality: Axially chiral allenes, spiranes, alkylidene cycloalkanes, chiral biaryls, atropisomerism, planar chiral ansa compounds and trans- cyclooctene, helically chiral compounds and their configurational nomenclature

Relative and absolute configuration: Determination of configuration by chemical correlation methods.

Racemisation and resolution techniques: Racemisation, resolutions by direct crystallization, diastereoisomer salt formation chiral chromatography and asymmetric transformation.

Determination of configuration in E, Z-isomers: Spectral and Chemical methods of configuration determination of E,Z isomers. Determination of configuration in aldoximes and ketoximes.

OC-02: Reaction mechanism-I

15 hrs

Electrophilic addition to carbon carbon double bond: Stereoselective addition to carbon carbon double bond; *anti* addition- Bromination and epoxidation followed by ring opening. *Syn* addition of OsO₄ and KMnO₄.

Elimination reactions Elimination reactions E2, E1, E1CB mechanisms. Orientation and stereoselectivity in E2 eliminations. Pyrolytic *syn* elimination and α -elimination, elimination Vs substitution.

Determination of reaction mechanism: Determination of reaction mechanism: Energy profiles of addition and elimination reactions, transition states, product isolation and structure of intermediates, use of isotopes, chemical trapping and crossover experiments. Use of IR and NMR in the investigation of reaction mechanism.

OC-03: Conformational analysis (acyclic systems)

15 hrs

Conformational isomerism: Introduction to the concept of dynamic stereochemistry. Conformational diastereoisomers and conformational enantiomers. Study of conformations in ethane and 1,2-disubstituted ethane derivatives like butane, dihalobutanes, halohydrin, ethylene glycol, butane-2, 3-diol amino alcohols and 1,1,2,2-tetrahalobutanes. Klyne-Prelog terminology for conformers and torsion angles

Conformations of unsaturated acyclic compounds: Propylene, 1-Butene, Acetaldehyde Propionaldehyde and Butanone.

Factors affecting the conformational stability and conformational equilibrium:

Attractive and repulsive interactions. Use of Physical and Spectral methods in conformational analysis.

Conformational affects on the stability and reactivity of acyclic diastereoisomers: Steric and stereoelectronic factors-examples. Conformation and reactivity. The Winstein-Holness equation and the Curtin – Hammett principle

OC-4: Heterocyclic compounds & Natural products

15 hrs

Heterocyclic compounds: Introduction, Nomenclature Synthesis and reactivity of indole, quinoline, isoquinoline, carbazole and acridine

Natural products : Importance of natural products as drugs.

Terpenoids : General methods in the structure determination of terpenes. Isoprene rule. Structure determination and synthesis of β -carotene, α -terpeniol and camphor.

Alkaloids: General methods of structure determination of alkaloids. Structure determination and synthesis of papaverine

References:

1. Stereochemistry of carbon compounds by Ernest L. Eliel and Samuel H. Wilen
2. Stereochemistry of organic compounds- Principles and Applications by D. Nasipuri
3. Heterocyclic Chemistry, T.L. Gilchrist, Longman UK Ltd, London (1985).
4. Benzofurans A. Mustafa, Wiley-Interscience, New York (1974).

5. Heterocyclic Chemistry, 3rd Edn J.A. Joule, K. Mills and G.F. Smith, Stanley Thornes Ltd, UK, (1998)
6. The Chemistry of Indole, R.J. Sundberg, Academic Press, New York (1970).
7. An introduction to the chemistry of heterocyclic compounds, 2nd Edn. R.M. Acheson, Interscience Publishers, New York, 1967.
8. Advanced Organic Chemistry by Jerry March
9. Mechanism and Structure in Organic Chemistry S. Mukerjee

Paper CH 103 (PHYSICAL CHEMISTRY)

PC-01: Thermodynamics-I

PC-02: Electrochemistry-I

PC-03: Quantum Chemistry-I

PC-04: Chemical Kinetics-I

PC-01: Thermodynamics-I

15 hrs

Concept of Entropy, Entropy as a function of V and T, Entropy as a function of P and T. Entropy change in isolated systems- Clausius inequality. Entropy change as criterion for spontaneity and equilibrium.

Third law of thermodynamics. Evaluation of absolute entropies from heat capacity data for solids, liquids and gases. Standard entropies and entropy changes of chemical reactions.

Thermodynamic relations. Gibbs equations. Maxwell relations.

Gibbs equations for non-equilibrium systems. Material equilibrium. Phase equilibrium. Clausius-Clapeyron equation. Conditions for equilibrium in a closed system.

Chemical potential of ideal gases. Ideal-gas reaction equilibrium-derivation of equilibrium constant. Temperature dependence of equilibrium constant-the van't Hoff equation.

Solutions: Specifying the Solution composition. Partial molar properties-significance. Relation between solution volume and partial molar volume. Measurement of partial molar volumes- slope and intercept methods. The chemical potential. Variation of chemical potential with T and P. Gibbs-Duhem equation-derivation and significance.

PC-02: Electrochemistry- I

15 hrs

Electrochemical Cells: Derivation of Nernst equation – problems. Chemical and concentration cells (with and without transference). Liquid junction potential (LJP) – derivation of the expression for LJP – its determination and elimination. Types of electrodes. Applications of EMF measurements: Solubility product, potentiometric titrations; determination of pH using glass electrode, equilibrium constant measurements.

Decomposition potential and its significance. Electrode polarization – its causes and elimination. Concentration over-potential.

Concept of activity and activity coefficients in electrolytic solutions. The mean ionic activity coefficient. Debye-Huckel theory of electrolytic solutions. Debye-Huckel limiting law (derivation not required). Calculation of mean ionic activity coefficient. Limitations of Debye-Huckel theory. Extended Debye-Huckel law.

Theory of electrolytic conductance. Derivation of Debye-Huckel-Onsager equation – its validity and limitations.

Concept of ion association – Bjerrum theory of ion association (elementary treatment)-ion association constant – Debye-Huckel-Bjerrum equation.

PC-03: Quantum Chemistry- I

15 hrs

A brief review of Black body radiation-Planck's concept of quantization-Planck's equation, average energy of an oscillator (derivation not required), Wave particle duality and uncertain principle-significance of these for microscopic entities. Emergence of quantum mechanics. Wave mechanics and Schrödinger wave equation.

Operators- Operator algebra. Commutation of operators, linear operators. Complex functions. Hermitian operators. Operators ∇ and ∇^2 . Eigenfunctions and eigenvalues. Degeneracy. Linear combination of eigenfunctions of an operator. Well behaved functions. Normalized and orthogonal functions.

Postulates of quantum mechanics: Physical interpretation of wave function. Observables and Operators. Measurability of operators. Average values of observables. The time dependent Schrodinger equation. Separation of variables and the time-independent Schrodinger equation. Theorems of quantum mechanics. Real nature of the eigen values of a Hermitian operator-significance. Orthogonal nature of the eigen values of a Hermitian operator-significance of orthogonality. Expansion of a function in terms of eigenvalues. Eigen functions of commuting operators-significance. Simultaneous measurement of properties and the uncertainty principle. Particle in a box- one dimensional and three dimensional. Plots of ψ and ψ^2 -discussion. Degeneracy of energy levels. Calculations using wave functions of the particle in a box-orthogonality, measurability of energy, position and momentum, average values and probabilities. Application to the spectra of conjugated molecules.

PC-04: Chemical Kinetics- I

Theories of reaction rates: Collision theory, steric factor. Transition state theory. Thermodynamic formulation of transition state theory. Potential energy surface diagram, Reaction coordinate, Activated complex. Activation parameters and their significance. The Eyring equation. Unimolecular reactions and Lindemann's theory.

Complex reactions- Opposing reactions, parallel reactions and consecutive reactions (all first order type). Chain reactions-general characteristics, steady state treatment. Example- H_2 - Br_2 reaction. Derivation of rate law.

Effect of structure on reactivity- Linear free energy relationships. Hammett and Taft equations-substituent (σ and σ^*) and reaction constant (ρ and ρ^*) with examples. Deviations from Hammett correlations, reasons- Change of mechanism, resonance interaction. Taft four parameter equation. Correlations for nucleophilic reactions. The Swain – Scott equation and the Edward equation. Reactions in solutions: Primary and secondary salt effects.

The reactivity-selectivity principle – Isokinetic temperature -Iselectivity rule, Intrinsic barrier and Hammond's postulate.

References:

1. Atkin's Physical Chemistry, Peter Atkins and Julio de Paula, Oxford University press
2. Physical Chemistry, Ira N. Levine, McGraw Hill
3. Physical Chemistry-A Molecular approach, D.A. McQuarrie and J.D. Simon, Viva Books Pvt. Ltd
4. Molecular Thermodynamics, D.A. McQuarrie and J.D. Simon, University Science Books
5. Quantum Chemistry, Ira N. Levine, Prentice Hall
6. Introduction to Quantum Chemistry, A.K. Chandra, Tata McGraw Hill
7. Chemical Kinetics, K.J. Laidler, McGraw Hill

8. Kinetics and Mechanism of Chemical Transformations, J. Rajaraman and J. Kuriacose, McMillan
9. Introduction to Electrochemistry, S. Glasstone
10. Modern Electrochemistry, J. O. M. Bockris & A. K. N. Reddy, Plenum
11. Principles of physical chemistry, Samuel H. Maron and Carl F. Prutton, Oxford & IBH
12. The Physical Basis of Organic Chemistry by Howard Maskill, Oxford University Press (New York)
13. Chemical Kinetics and Reaction Mechanisms, J. H. Espenson, McGraw Hill
14. Physical Organic Chemistry, N. S. Isaacs, ELBS
15. Elementary Quantum Chemistry, F. L. Pilar, McGraw Hill.
16. Quantum Chemistry – D.A. McQuarri Viva Publications

Paper-IV: CH 104 (ANALYTICAL TECHNIQUES and SPECTROSCOPY - I)

ASP 01: Techniques of Chromatography

ASP 02: NMR spectroscopy-I (¹H NMR)

ASP 03: Rotational and Vibrational spectroscopy

ASP 04: Electronic spectroscopy

ASP-01: Techniques of Chromatography

15 hrs

- i. Introduction, Classification of chromatographic techniques, differential migration rates, partition ratio, retention time, relation between partition ratio and retention time, capacity factor, selectivity factor. Efficiency of separation- resolution, diffusion, plate theory and rate theory.
- ii. **GC:** Principle, instrumentation, detectors- TCD, FID, ECD. Derivatisation techniques, PTGC.
- iii. **HPLC:** Principle, instrumentation, detectors- UV detectors, Photodiode array detector, fluorescence detector.
- iv. Applications: Methods of quantitation for GC and HPLC: GC analysis of hydrocarbons in a mixture, GC assay of methyl testosterone in tablets, atropine in eye drops. HPLC assay of paracetamol and aspirin in tablets.

ASP 02: NMR spectroscopy-I (¹H NMR)

15 hrs

¹H NMR spectroscopy: Magnetic properties of nuclei, Principles of NMR Instrumentation, CW and pulsed FT instrumentation, equivalent and non equivalent protons, enantiotopic and diastereotopic protons, Chemical shifts, factors affecting the chemical shifts, electronegativity and anisotropy, shielding and deshielding effects, Signal integration, Spin-spin coupling: vicinal, germinal and long range, Coupling constants and factors affecting coupling constants.

Applications of ¹H NMR spectroscopy: Reaction mechanisms (cyclic bromonium ion, electrophilic and nucleophilic substitutions, carbocations and carbanions), E, Z isomers, conformation of cyclohexane and decalins, keto-enol tautomerism, hydrogen bonding, proton exchange processes (alcohols, amines and carboxylic acids), C-N rotation. Magnetic resonance imaging (MRI). ¹H NMR of organic molecules and metal complexes: ethyl acetate, 2-butanone, mesitylene, paracetamol, aspirin, ethylbenzoate, benzyl acetate, 2-chloro propionic acid, [HNi(OPEt₃)₄]⁺, [HRh(CN)₅] (Rh I=1/2), [Pt(acac)₂].

ASP 03: Rotational, Vibrational and Raman spectroscopy**15 hrs**

a). Microwave Spectroscopy: Classification of molecules based on moment of inertia. Diatomic molecule as rigid rotator and its rotational energy levels. Selection rules (derivation not required). Calculation of bond lengths from rotational spectra of diatomic molecules. Isotope effect on rotational spectra. Calculation of atomic mass from rotational spectra. Brief description of microwave spectrometer.

b). Vibrational Spectroscopy. Vibrational energy levels of diatomic molecules, selection rules (derivation not required). Calculation force constant from vibrational frequency. Anharmonic nature of vibrations. Fundamental bands, overtones and hot bands, Fermi Resonance. Vibrationrotation spectra diatomic molecules. Vibrations of poly atomic molecules. Normal modes of vibration, concept of group frequencies. Characteristics of vibrational frequencies of functional groups; Stereochemical effects on the absorption pattern in carbonyl group, cis-trans isomerism and hydrogen bonding. Isotopic effect on group frequency. IR spectra of metal coordinated NO_3^- , SO_4^{2-} and CO_3^{2-} ions.

c) Raman Spectroscopy- Classical and Quantum theories of Raman effect. Rotational Raman and Vibrational Raman spectra, Stokes and anti- Stokes lines. Complementary nature of IR and Raman spectra.

ASP 04:Electronic spectroscopy**15 hrs**

Electronic spectroscopy: Electronic spectra: Elementary energy levels of molecules-selection rules for electronic spectra; types of electronic transitions in molecules. Chromophores: Congugated dienes, trienes and polyenes, unsaturated carbonyl compounds, Benzene, mono substituted derivative (Ph-R), di substituted derivative ($\text{R-C}_6\text{H}_4\text{-R}'$) and substituted benzene derivatives ($\text{R-C}_6\text{H}_4\text{-COR}'$), Woodward-Fieser rules. Polynuclear aromatic compounds (Biphenyl, stilbene, naphthalene, anthracene, phenanthrene and pyrene). Heterocyclic systems. Absorption spectra of charge transfer complexes. Solvent and structural influences on absorption maxima, stereochemical factors. Cis-trans isomers, and cross conjugation. Beer's law application to mixture analysis and dissociation constant of a weak acid.

References:

1. Fundamentals of Molecular Spectroscopy, Banwell and McCash.
2. Introduction to Molecular Spectroscopy, G.M. Barrow.
3. Absorption Spectroscopy of Organic Compounds, J.R. Dyer.
4. Biochemistry: Hames and Hooper.
5. Introduction to Spectroscopy, Pavia Lampman Kriz.
6. Pharmaceutical analysis, Watson
7. NMR in Chemistry- A multinuclear introduction, William Kemp.
8. Organic Spectroscopy, William Kemp.
9. Spectroscopy of organic compounds, P.S. Kalsi.
10. Structural methods n Inorganic chemistry, E.A.V Ebsworth.
11. Organic Spectroscopy, LDS Yadav
12. Organic Spectroscopy, Y.R. Sharma
13. Molecular Spectroscopy – Arhuldas
14. Vibrational spectroscopy – D.N. Satyanarayana

Practicals:**Paper CH 151: Inorganic chemistry practicals: 6 hrs/week****I. Calibrations:**

- (i) Calibration of weights.
- (ii) Calibration of pipettes.
- (iii) Calibration of standard flasks.
- (iv) Calibration of burette.

II. EDTA back-titrations:

- (i) Estimation of Ni^{2+} .
- (ii) Estimation of Al^{3+} .

III. EDTA substitution titrations:

Estimation of Ca^{2+} .

IV. Redox Titrations

- (i) Estimation of Ferrocyanide and Ferricyanide in a mixture

V. Preparation of complexes:

- (i). Hexaammine nickel (II) chloride.
- (ii). Tris (acetylacetonato) manganese.
- (iii). Tris (ethylenediamine) nickel (II) thiosulphate.
- (iv). Mercury tetrathiocyanato cobaltate (II).
- (v). Chloro pentaammine cobalt (III) chloride
- (vi). Tetrammine copper (II) sulphate and estimation of NH_3 and calculation of % purity.
- (vii) One component gravimetric estimations
 - (i) Estimation of Zn^{2+}
 - (ii) Estimation of Ba^{2+} (as BaSO_4)

Paper CH 152 Organic Chemistry Lab course 6 hours/ week

Synthesis of the following compounds: p-Bromoacetanilide, p- Bromoaniline, 2,4,6-tribromoaniline, 1,3,5-tribromobenzene, aspirin, tetrahydrocarbazole, 7-hydroxy-4-methyl coumarin, m-dinitrobenzene, m-nitroaniline, hippuric acid, azlactone, anthracene-maleic anhydride adduct, Phthalimide, 2,4-dihydroxyacetophenone

References.

1. Text book of practical organic chemistry, Vogel
2. Text book of practical organic chemistry, Mann and Saunders.

Paper 153 Physical Chemistry Lab course: 6 hrs / week**Physical properties:**

Data analysis I: Significant figures, Precision and accuracy

Distribution:

- Distribution of acetic acid between n-butanol and water
- Distribution of iodine between hexanes and water

Chemical kinetics:

- Acid-catalyzed hydrolysis of methyl acetate
- Peroxydisulphate- I reaction (overall order)
- Oxidation of iodide ion by hydrogen peroxide- iodine clock reaction

Conductometry:

- Titration of strong acid vs strong base
- Titration of weak acid vs strong base
- Determination of cell constant
- Determination of dissociation constant of a weak acid

Potentiometry:

- Titration of strong acid vs strong base
- Titration of weak acid vs strong base
- Determination of dissociation constant of a weak acid
- Determination of single electrode potential

Polarimetry:

- Determination of specific rotation of sucrose
- Acid-catalyzed hydrolysis of sucrose (inversion of sucrose)

Adsorption and others:

- Adsorption of acetic acid on animal charcoal or silica gel
- Determination of critical solution temperature of phenol-water system
- Effect of added electrolyte on the CST of phenol-water system

Determination of molecular weight of a polymer by viscometry.**References:**

1. Senior Practical Physical Chemistry: B.D. Khosla, V.C. Garg and A. Khosla
2. Experimental Physical Chemistry: V. Athawale and P. Mathur.
3. Practical Physical Chemistry: B. Vishwanathan and P.S. Raghavan.
4. Practical in Physical Chemistry: P.S. Sindhu
5. Advanced Practical Physical chemistr: J.B. Yadav
6. Vogel Text book of Quantitative Analysis, 6th edition, Pearson education Ltd. 2002.

SEMESTER –II

(Semester-I and Semester-II syllabus is common for all specializations i.e., Inorganic-Analytical, Organic, Physical, Chemistry (Pharmacoinformatics) and Physical- Organic.)

Paper CH 201 INORGANIC CHEMISTRY

IC 05: Reaction mechanisms of transition metal complexes

IC 06: Bonding in metal complexes-II

IC 07: Metal clusters

IC 08: Biocoordination chemistry

Teaching hours/week-4

Marks-80

IC-05: Reaction mechanisms of transition metal complexes:**15 hrs**

Ligand substitution reactions:

Energy profile of a reaction – Transition state or Activated Complex. Types of substitution reactions (SE, SN, SN¹, SN²). Langford and Grey classification – A mechanism, D-Mechanism, I_a, I_d, and Intimate mechanism.

Ligand substitution reactions in octahedral complexes:

Aquation or Acid hydrolysis reactions, Factors effecting Acid Hydrolysis, Base Hydrolysis, Conjugate Base Mechanism, Evidences in favour of SN¹CB Mechanism.

Substitution reactions with out Breaking Metal-Ligand bond. Anation reaction

Ligand Substitution reactions in Square-Planar complexes: Mechanism of Substitution in Square-Planar complexes- Trans-effect, Trans-influence, Grienberg's Polarization theory and Π - bonding theory – Applications of Trans-effect in synthesis of Pt (II) complexes.

Electron Transfer Reactions (or Oxidation-Reduction Reactions) in Coordination compounds:

Mechanism of One-electron Transfer Reactions: Atom (or group) Transfer or Inner Sphere Mechanism, Direct electron Transfer or Outer Sphere Mechanism. Factors affecting direct electron transfer reactions, Cross reactions and Marcus-Hush theory.

IC-06: Bonding in Metal Complexes – II:**15 hrs**

Free ion terms and Energy levels: Configurations, Terms, States and Microstates – Formula for the calculation of Microstates pⁿ and dⁿ configurations – L-S (Russel-Saunders) coupling scheme – j-j coupling scheme – Determination of terms for various pⁿ and dⁿ configurations of metal ions. Hole formalism – Energy ordering of terms (Hund's rules) Inter – electron repulsion Parameters (Racah parameters) – Spin-Orbital coupling parameters. Effect of weak cubic crystal fields on S,P,D and F terms- Orgel Diagrams.

IC-07: Metal Clusters:**15 hrs**

Carbonyl clusters: Factors favouring Metal-Metal bonding – Classification of Clusters – Low Nuclearity Clusters : M₃ and M₄ clusters, structural patterns in M₃(CO)₁₂ (M=Fe,Ru,Os) and M₄(CO)₁₂ (M=Co,Rh,Ir) Clusters. Metal carbonyl scrambling – High Nuclearity clusters M₅, M₆, M₇, M₈ and M₁₀ Clusters-, Polyhedral skeletal electron pair theory and Total Electron Count theory – Capping rule – Structural patterns in [Os₆(CO)₁₈]²⁻, [Rh₆(CO)₁₆], {Os₇(CO)₂₁}, {Rh₇(CO)₁₆}³⁻, [Os₈(CO)₂₂]²⁻, [Os₁₀C(CO)₂₄]²⁻ and [Ni₅(CO)₁₂]²⁻.

Metal Halide clusters: Major structural types in Dinuclear Metal-Metal systems – Edge sharing Bioctahedra, Face sharing Bioctahedra, Tetragonal prismatic and Trigonal antiprismatic structures -. Structure and bonding in $[\text{Re}_2\text{Cl}_8]^{2-}$ and Octahedral halides of $[\text{Mo}_6(\text{Cl})_8]^{4+}$ and $[\text{Nb}_6(\text{Cl})_{12}]^{2+}$. Trinuclear halides of Re(III). Hoffman's Isolobal analogy and its Structural implications. Boranes, carboranes, STYX Rule. Stereo chemical non-rigidity in $[\text{Rh}_4(\text{CO})_{12}]$ and $[\text{Fe}_2(\text{Cp})_2(\text{CO})_4]$.

IC-08: Bio coordination chemistry:

15 hrs

Metal ions in Biological systems: Brief survey of metal ions in biological systems. Effect of metal ion concentration and its physiological effects. Basic principles in the biological selection of elements.

Oxygen transport and storage: Hemoglobin (Hb) and Myoglobin (Mb) primary, secondary, tertiary and quarternary structures and non-covalent bonds present in them. Oxygenation equilibria for Mb and Hb. Factor effecting oxygenation equilibria. Cooperativity and its mechanism. Spin state of iron. Spatial and electronic aspects of dioxygen binding. Allosteric models (T and R states). Role of globin. Transport of NO and CO₂. Hemocynin (Hc) and Hemerythrin (Hr): Introduction-structure of active sites with oxygen and without oxygen. Comparison of Hemerythrin and Hemocyanin with hemoglobin.

Photosynthesis: Structural aspects of Chlorophyll. Photo system I and Photo system II.

Vitamin B₆ model systems: Forms of vitamin B₆ with structures. Reaction mechanisms of (1) Transamination (2) Decarboxylation and (3) Dealdolation in presence of metal ions.

References:

1. Inorganic Reaction Mechanisms. M.L.Tobe and John Burgess, Addison Wesley Longman (1999).
2. Metal ions in Reaction Mechanisms. K.Veera Reddy. Gologtia Publications (P) Ltd
3. Mechanisms of Reactions in Transition Metal Sites. Richard A Henderson, Oxford Science Publications, London (1993).
4. Inorganic Reaction Mechanisms, F.Basolo and R.G.Pearson, New York (1967).
5. Advanced Inorganic Chemistry. F.A.Cotton, G.Wilkinson, C.A.Murillo and M.Bochmann, 6 Th Edition, Wiley Interscience, N.Y (1999)
6. Inorganic Chemistry, J.E.Huheey , K.A.Keiter and R.L.Keiter 4 th Edition Harper Cottens College Publications (1993).
7. Inorganic Biochemistry Edited by G.L.Eichorn, Volume 1 Elsevier (1982).
8. The Chemistry of Metal Cluster Complexes. D.F.Shriver, H.D.Kaerz and R.D.Adams (Eds), VCH, NY (1990).
9. Inorganic Chemistry, Keith F.Purcell and John C.Kotz, Holt-Saunders International Editions, London (1977).
10. Bioinorganic Chemistry, I.Bertini, H.B.Gray, S.J.Lippard and S.J.Valentine, Viva Low-Priced Student Edition, New Delhi (1998).
11. Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life, W.Kain and B.Schwederski, John Wiley and Sons, NY (1999).

Paper-II: CH 202 T (Organic Chemistry)**OC-05: Reaction mechanism-II****OC-06: Pericyclic reactions-I****OC-07: Photochemistry****OC-08: Reactive intermediates and molecular rearrangements****OC-05: Reaction mechanism-II****15 hrs**

Nucleophilic Aromatic substitution: Aromatic Nucleophilic substitution: $S_N1(Ar)$, $S_N2(Ar)$, and benzyne mechanisms; evidence for the structure of benzyne. Von Richter rearrangement. Definition and types of ambident nucleophiles.

Neighbouring group participation : Criteria for determining the participation of neighbouring group. Enhanced reaction rates, retention of configuration, isotopic labeling and cyclic intermediates. Neighbouring group participation involving Halogens, Oxygen, Sulphur, Nitrogen, Aryl, Cycloalkyl groups, σ and π - bonds. Introduction to nonclassical carbocations.

Electrophilic substitution at saturated carbon and single electron transfer reactions.

Mechanism of aliphatic electrophilic substitution. S_E1 , S_E2 , and S_{Ei} . SET mechanism.

OC-06 Pericyclic reactions**15 hrs.**

Introduction, Classification of pericyclic reactions,

Electrocyclic reactions: con rotation and dis rotation. Electrocyclic closure and opening in $4n$ and $4n+2$ systems.

Cycloaddition reactions: suprafacial and antarafacial additions in $4n$ and $4n+2$ cycloadditions.

Sigmatropic reactions: [i, j] shifts- suprafacial and antarafacial shifts, Cope and Claisen rearrangement reactions.

Approaches for the interpretation of mechanism of pericyclic reactions: Aromatic Transition States (ATS)/Perturbation Molecular Orbitals (PMO) approach-Concept of Huckel –Möbius aromatic and antiaromatic transition states. Framing Woodward-Hofmann selection rules for all the pericyclic reactions by ATS approach. Solving problems based on ATS approach.

Molecular orbitals: ethylene, 1, 3-butadiene, 1, 3, 5-hexatriene, allyl cation, allyl radical, pentadienyl cation, pentadienyl radical.

Frontier Molecular Orbital (HOMO-LUMO) approach-concept: Framing Woodward-Hofmann selection rules for all the pericyclic reactions by Frontier Molecular Orbital (FMO) approach. Solving problems based on FMO approach.

Conservation of orbital symmetry: (Correlation Diagrams) approach- for electrocyclic and cycloadditions & cycloreversions.

OC-07 Photochemistry**15hrs**

Photochemistry: Photochemistry of π - π^* transitions: Excited states of alkenes, cis-trans isomerisation, and photo stationary state. Photochemistry of 1,3-butadiene Electrocyclisation and sigmatropic rearrangements, di- π methane rearrangement. Intermolecular reactions, photocycloadditions, photodimerisation of simple and conjugated olefins. Addition of olefins to α , β -unsaturated carbonyl compounds. Excited states of aromatic compounds, Photoisomerisation of benzene.

Photochemistry of (n- π^*) transitions: Excited states of carbonyl compounds, homolytic cleavage of α - bond, Norrish type I reactions in acyclic and cyclic ketones and strained cycloalkane diones.

Intermolecular abstraction of hydrogen: photoreduction-influence of temperature, solvent, nature of hydrogen donor and structure of the substrate.

Intramolecular abstraction of hydrogen: Norrish type II reactions in ketones, esters and 1,2 diketones, Addition to carbon-carbon multiple bonds, Paterno-Buchi reaction, Photochemistry of nitrites-Barton reaction.

OC-08: Reactive intermediates and Molecular rearrangements 15 hrs

Reactive Intermediates: Generation, detection, structure, stability and reactions of carbocations, carbanions, carbenes, nitrenes and free radicals.

Molecular rearrangements: Definition and classification. Molecular rearrangements involving 1) electron deficient carbon: Wagner- Meerwein, Pinacol-Pinacolone, Allylic and Wolf rearrangement. 2) electron deficient Nitrogen: Hofmann, Lossen, Curtius, Schmidt and Beckmann rearrangements 3) electron deficient Oxygen: Baeyer-Villiger oxidation. 4) Base catalysed rearrangements: Benzilic acid, Favorski, Transannular, Sommelet-Hauser and Smiles rearrangement

References :

1. Stereochemistry of Carbon compounds by Ernest L Eliel / Samuel H. Wilen
2. Stereochemistry of organic compounds – Principles and Applications by D Nasipuri
3. The third dimension in organic chemistry, by Alan Bassindale
4. Stereochemistry: Conformation and Mechanism by P S Kalsi
5. Stereochemistry by V M Potapov
6. Advanced Organic Chemistry by Jerry March
7. Mechanism and Structure in Organic Chemistry S. Mukerjee
8. Organic chemistry Vol.I and II by I.L.Finar
9. Comprehensive organic chemistry Vol.5 D.H.R.Barton and W.D..Ollis

Paper CH 203 PHYSICAL CHEMISTRY

PC-05: Thermodynamics-II & Statistical Thermodynamics

PC-06: Photochemistry-I

PC-07: Quantum Chemistry-II

PC-08: Solid state chemistry

PC-05:Thermodynamics-II & Statistical Thermodynamics

15 hrs

Ideal solutions. Thermodynamic properties of ideal solutions. Mixing quantities. Vapour pressure -Raoult's law. Thermodynamic properties of ideally dilute solutions. Vapour pressure- Henry's law.

Nonideal systems. Concept of fugacity, fugacity coefficient. Determination of fugacity. Non ideal solutions. Activities and activity coefficients. Standard-state conventions for non ideal solutions. Determination of activity coefficients from vapour pressure measurements. Activity coefficients of nonvolatile solutes using Gibbs-Duhem equation.

Multicomponent phase equilibrium: Vapour pressure lowering, freezing point depression and boiling point elevation

Statistical Thermodynamics:

Partition Functions: Concepts of distribution and probability, Boltzmann distribution law. Interpretation of partition functions- translational, rotational, vibrational and electronic partition functions. Relationship between partition functions and thermodynamic functions (only S & G).

PC-06: Photochemistry –I**15 hrs**

Electronic transitions in molecules. The Franck Condon principle. Electronically excited molecules- singlet and triplet states. Radiative life times of excited states-theoretical treatment. Measured life times. Quantum yield and its determination. Experimental set up of a photochemical reaction. Actinometry-ferrioxalate and uranyl oxalate actinometers – problems. Derivation of fluorescence and phosphorescence quantum yields. E-type delayed fluorescence- evaluation of triplet energy splitting(ΔE_{ST}). Photophysical processes- photophysical kinetics of unimolecular reactions. Calculation of rate constants of various photophysical processes-problems, State diagrams

Photochemical primary processes. Types of photochemical reactions- electron transfer, photodissociation, addition, abstraction, oxidation and isomerization reactions with examples. Effect of light intensity on the rates of photochemical reactions. Photosensitization. Quenching-Stern-Volmer equation. Introduction to fast reactions- Principle of flash photolysis.

PC-07: Quantum chemistry-II**15 hrs**

Cartesian, Polar and spherical polar coordinates and their interrelations.

Schrodinger equation for the hydrogen atom- separation into three equations. Hydrogen like wave functions. Radial and angular functions. Quantum numbers n , l and m and their importance. The radial distribution functions. Hydrogen like orbitals and their representation. Polar plots, contour plots and boundary diagrams.

Many electron systems. Approximate methods. The variation method-variation theorem and its proof. Trial variation function and variation integral. Examples of variational calculations. Particle in a box. Construction of trial function by the method of linear combinations. Variation parameters. Secular equations and secular determinant.

Bonding in molecules. Molecular orbital theory-basic ideas. Construction of MOs by LCAO, H_2^+ ion. The variational integral for H_2^+ ion. Detailed calculation of Wave functions and energies for the bonding and antibonding MOs. Physical picture of bonding and antibonding wave functions. Energy diagram. The MO wave function and the energy of H_2 molecule MO by LCAO method and Valence bond method (detailed calculations not required)-comparison of MO and VB models.

PC-08: Solid state chemistry**15 Hrs**

Electronic properties of metals, insulators and semi-conductors: Electronic structure of solids, Band theory, band structure of metals, insulators and semi-conductors. Electrons, holes and Excitons. The temperature dependence of conductivity of extrinsic semi-conductors. Photo conductivity and photovoltaic effect – p-n junctions.

Superconductivity: Occurrence of superconductivity. Destruction of superconductivity by magnetic fields – Meissner effect. Types of superconductors. Theories of super conductivity – BCS theory.

High temperature superconductors: Structure of defect perovskites. High T_c superconductivity in cuprates. Phase diagram of Y-Ba-Cu-O system. Crystal structure of $YBa_2Cu_3O_{7-x}$. Preparation of 1-2-3 materials. Origin of high T_c superconductivity.

Nanoparticles and their applications:

Introduction to nanoparticles. Reduced dimensionality in solids – zero dimensional systems, fullerenes, quantum dots. One dimensional systems, carbon nano tubes, preparation of nano particles –top down and bottom up methods. Preparation of nanomaterials- – sol gel methods, and chemical vapour deposition method; thermolysis. Characterization of nanoparticles – experimental methods – powder X-ray diffraction, transmission electron microscopy (TEM), and atomic force microscopy (AFM) (detailed theory and instrumentation are not required). Optical properties of nanoparticles, Applications of nanoparticles.

References:

1. Atkin's Physical Chemistry, Peter Atkins and Julio de Paula, Oxford University press
2. Physical Chemistry, Ira N. Levine, McGraw Hill
3. Physical Chemistry-A Molecular approach, D.A. McQuarrie and J.D. Simon, Viva Books Pvt Ltd
4. Molecular Thermodynamics, D.A. McQuarrie and J.D. Simon, University Science Books
5. Quantum Chemistry, Ira N. Levine, Prentice Hall
6. Introduction to Quantum Chemistry, A.K. Chandra, Tata McGraw Hill
7. Introduction to Solids, Leonid V. Azaroff, Tata McGraw Hill
8. Solid state Chemistry, D.K. Chakrabarty, New Age International
9. Solid state Chemistry and its applications, A.R. West, Plenum.
10. Fundamentals of Photochemistry, K.K.Rohtagi-Mukherji, Wiley-Eastern
11. Molecular Photochemistry, N.J. Turro, Benjamin
12. Photochemistry, R.P.Kundall and A. Gilbert, Thomson Nelson
13. Essentials of Molecular Photochemistry by A. Gilbert and J. Baggott, Blackwell Scientific Publications.
14. Organic Photochemistry by J.M.Coxon and B.Halton, Cambridge University press.
15. Introductory Photochemistry by A.Cox and T.J.Kemp. McGraw-Hill, London.
16. Principles of the Solid State, H. V. Keer, New Age International
17. Elements of Physical Chemistry by Peter Atkins and Julio de Paula, Oxford University Press
18. Elements of Statistical Thermodynamics, L. K. Nash, Addison – Wesley
19. Introduction to Statistical Thermodynamics, T. L. Hill, Addison Wiley
20. Statistical Thermodynamics, M. C. Gupta, New Age International
21. Quantum Chemistry, D.A. McQuarrie, Prentice Hall
22. Elementary Quantum Chemistry, F. L. Pilar, McGraw Hill.
23. Nanostructured Materials and Nanotechnology, edited by Hari Singh Nalwa, Academic Press
24. Self-Assembled Nanostructures, Jin Zhang, Zhong-lin Wang, Jun Liu, Shaowei Chen & Gan-Yu-Liu, Kluwer Academic/Plenum
25. Introduction to Nanotechnology, Charles P. Poole Jr, F. J. Owens, Wiley India Pvt. Ltd.
26. The physics and chemistry of solids by Stephen Elliott, Wiley Publishers.
27. Introductory Photochemistry by A.Cox and T.J.Kemp. McGraw-Hill, London.

Paper-IV: CH 204 (ANALYTICAL TECHNIQUES and SPECTROSCOPY - II)**ASP-05: Electro and thermal analytical Techniques.****ASP-06: NMR- II****ASP-07: Mass Spectroscopy****ASP-08: Photoelectron & ESR spectroscopy****ASP-05: Electro and thermal Analytical Techniques****15 hrs****I: Types and Classification of Electro analytical Methods:**

- a) D.C Polarography: Instrumentation - Dropping mercury electrode- -polarogram. Types of Currents: Residual, Migration, Limiting. Two and Three electrode assemblies. Ilkovic equation (derivation not necessary) and its consequences. Applications of polarography in qualitative and quantitative analysis. Analysis of mixtures. Application to inorganic and organic compounds. Determination of stability constants of complexes.
- b) Brief account of following techniques and their advantages over conventional d.c.polarography.
- (i) A.C.polarography (ii) Square-wave polarography (iii) Pulse polarography (iv) Differential pulse polarography
- c) Amperometric titrations: Principle, Instrumentation. Types and applications of amperometric titrations. Determination of SO_4^{2-} , metal ions viz., Mg^{2+} , Zn^{2+} , Cu^{2+} and other substances.
- d) Cyclic Voltammetry: Principle, instrumentation, Applications. Cyclic voltammetric study of insecticide parathion.

II: Thermal Analysis: Thermal techniques-Introduction, types of thermo analytical methods. Thermogravimetry principle and applications of thermogravimetry, differential thermal analysis- principle and applications of DTA. Differential scanning calorimetry. DSC: Principle, and application of DSC.

ASP 06: NMR spectroscopy-II (^1H , ^{19}F and ^{31}P NMR)**15 hrs**

^1H , ^{19}F , ^{31}P and solid state NMR spectroscopy: First order and non first order spectra e.g., AX, AX_2 , AX_3 , A_2X_3 , AMX and AB, ABC. Simplification of complex spectra: increased field strength, deuterium exchange, Lanthanide shift reagents and double resonance techniques. Discrimination of enantiomers by use of chiral NMR solvents (CSAs), chiral lanthanide shift reagents and Mosher's acid. Nuclear Overhauser enhancement (NOE). Fluxional molecules bullvalene, $[\eta^5\text{-C}_5\text{H}_5\text{M}]$, $[\eta^5\text{-(C}_5\text{H}_5)_2\text{Ti}\eta^1\text{-(C}_5\text{H}_5)_2]$ and $[\eta^4\text{C}_8\text{H}_8\text{Ru(CO)}_3]$.

^{19}F NMR spectroscopy: ^{19}F chemical shifts, coupling constants. Applications of ^{19}F NMR involving coupling with ^{19}F , ^1H and ^{31}P : 1,2 dichloro-1,1 difluoro ethane, BrF_5 , SF_4 , PF_5 , ClF_3 , IF_5 , $\text{CF}_3\text{CH}_2\text{OH}$

^{31}P NMR spectroscopy: ^{31}P chemical shifts, coupling constants. Applications of ^{31}P NMR involving coupling with ^{31}P , ^{19}F , ^1H and ^{13}C : ATP, Ph_3PSe , P_4S_3 , H_3PO_4 , H_3PO_3 , H_3PO_2 , HPF_2 , PF_6^- , PH_3 , $[\text{Rh}(\text{PPh}_3)\text{Cl}_3]$ ($\text{Rh } I=1/2$)
Introduction to solid state NMR: Magic angle spinning (MAS). Applications of solid state NMR.

ASP 07: Mass spectrometry**15 hrs**

Origin of mass spectrum, principles of EI mass spectrometer. Types of fragments: odd electron and even electron containing neutral and charged species (even electron rule), Nitrogen rule, isotopic peaks, determination of molecular formula, metastable ion peaks. High resolution mass spectrometry. Salient features of fragmentation pattern of organic compounds including β -cleavage, McLafferty rearrangement, retro Diels – Alder fragmentation and ortho effect. Principle of EI, CI, Fast Atom Bombardment (FAB), Secondary Ion Mass Spectrometry (SIMS), Electrospray (ESI) ionization and Matrix Assisted Laser Desorption Ionization (MALDI) methods. Introduction to principle and applications of Gas Chromatography-Mass Spectrometry (GC-MS) and Liquid chromatography-Mass Spectrometry (LC-MS) techniques.

ASP-08: Photoelectron & ESR spectroscopy

15 hrs

Photoelectron Spectroscopy

Principle and Instrumentation, Types of Photoelectron Spectroscopy – UPS & XPS. Binding Energies, Koopman's Theorem, Chemical Shifts. Photoelectron Spectra of Simple Molecules: N₂, O₂, F₂, - Vibrational Structure of PES Bands, Potential energy curves, Interpretation of Vibrational spectral data for ionized (M⁺) species, Prediction of Nature of Molecular Orbitals. ESCA in qualitative analysis, Principles of Auger electron spectroscopy.

Electron Spin Resonance

Introduction, principle, instrumentation, selection rules, interpretation of Lande's factor 'g'. Hyperfine and super hyperfine Coupling. Anisotropy in 'g' values and hyperfine coupling constants. Zero field splitting, Kramer's degeneracy and quadrupolar interactions. Study of free radicals and transition metal complexes. Evidence for covalency in complexes, ex. Cu(II) Bissalicylaldimine, Bis-acetylacetonovanadyl(II) and hexachloroiridium(IV) complexes.

References:

1. Spectroscopic identification of organic compounds by R.M. Silverstein and F.X. Webster.
2. Organic spectroscopy by William Kemp
3. Mass Spectrometry for Chemists and biochemists by M. Rose and R.A. W. Johnstone
4. Spectroscopic methods in organic chemistry by D.H. Williams and I. Fleming
5. Practical Pharmaceutical Chemistry by A. H. Beckett and J.B. Stenlake
6. Biological Mass Spectrometry by A.L. Burlingame
7. Principles and Practice of Biological Mass Spectrometry by Chhabil Das
8. Spectroscopic identification of organic compounds by R.M.Silverstein. G.C.Bassler and T.E.Morrill
9. NMR-A multinuclear introduction by William Kemp
10. Stereochemistry of Carbon compounds by Ernest L Eliel / Samuel H. Wilen
11. Principles of Polarography, Heyrovsky.
12. Principles of Polarography, Kapoor.
13. Modern Electroanalytical methods, edited by C.Charlot, Elsevier Company.
14. Principles of Instrumental analysis, Skoog, Holler and Nieman, Harcourt Asia PTE Ltd.
15. Analytical Chemistry-An Introduction, Skoog, West, Holler and Crouch, Saunders College Publishing.
16. Principles of Instrumental Analysis, Skoog and Leary, Saunders College Publishing.
17. International series of Monographs, Vol. 53: Photoelectron Spectroscopy, Edited by D. Becker and D. Betteridge 1972.
18. Structural methods in inorganic chemistry, E.A.V. Ebsworth

Practicals:**Paper CH 251 : Inorganic chemistry practicals****I. Analysis of Two component mixtures:**

- (i). Separation of Ni^{2+} and Cu^{2+} in a mixture and estimation of Ni^{2+} (gravimetric) and Cu^{2+} (volumetric).
- (ii). Separation of Fe^{2+} and Al^{3+} in a mixture and estimation of Fe^{2+} volumetrically and Al^{3+} gravimetrically.
- (iii). Separation of Ag^+ and Ca^{2+} in a mixture and estimation of Ag^+ volumetrically and Ca^{2+} volumetrically

II. Analysis of three component mixtures:

- (i). Separation of (Ni^{2+} and Cu^{2+}) from Mg^{2+} in the given mixture and estimation of Mg^{2+} (Gravi).

III Applied titrimetric analysis

- (i) Determination of Iron and calcium in Cement
- (ii) Determination of Calcium in calcium tablets
- (iii) Determination of alkali content in antacid

IV. Ion exchange methods of analysis:

- (i). Determination of capacity of an ion exchange resin.
- (ii). Separation of Zinc and Magnesium on an anion exchange resin and estimation of Mg^{2+} and Zn^{2+} .

Suggested Books: (For both semesters).

1. (i). Text book of Quantitative Inorganic Analysis by A.I.Vogel, 3rd edition, ELBS 1969.
- (ii). Vogel's text book of Quantitative Inorganic analysis. Jeffery etal, 4th edition, ELBS 1988.
- (iii). Vogel's text book of Quantitative Inorganic Analysis. 6th edition, Pearson education ltd 2002.
2. Practical Inorganic chemistry By G.Marr and R.W.Rockett 1972.
3. Experimental Inorganic/Physical Chemistry – An Investigative integrated approach to Practical Project work. By Mounir A.Malati, 1999.
4. Advanced experimental Inorganic chemistry by. Ayodhya Singh.
5. Practical Inorganic Chemistry by G. Pass & H. Sutchiffe, 2nd edn John Wiley & sons

Paper CH 252 Organic Chemistry Lab 6 hours/ week**Identification of organic compounds systematic qualitative analysis:**

Physical data BP / MP, Ignition test, solubility classification, Extra elements-N,S & Halogens, (Lassagnine sodium fusion test, Beilstein test)

Functional groups tests, Preparation of crystalline derivative and determination of their m.p.s and reference to literature to identify the compounds

A minimum of 8 following compounds to be studied as unknown covering atleast one from each of the solubility classes

Glucose, benzoic acid, 2-chloro benzoic Acid, Anisic acid, p-Nitrobenzoic acid; p-Cresol, p-Chlorophenol, β -Naphthol; Aniline, o/m/p-Chloroanilines; N-Methyl aniline/N-Ethylaniline, N,N-Dimethylaniline, Benzamide, Benzaldehyde, Anisaldehyde, Acetophenone, benzophenone, Ethylbenzoate, methylbenzoate, Nitrobenzene, chlorobenzene, bromobenzene, naphthalene, biphenyl anthracene.

Identification of unknown organic compounds from their IR, UV, ^1H nmr and MS:

Analysis of recorded spectra of 6 compounds belonging to i) aromatic carboxylic acid ii) alcohols and phenols iii) aldehydes and ketones iv) amides v) esters vi) alkenes and alkynes

References

1. Text book of practical organic chemistry, Vogel
2. Text book of practical organic chemistry, Mann and Saunders.
3. Spectral identification of organic compounds Bassler, Silverstein 5th Edition

Paper CH 253: Physical Chemistry Lab: 6 hrs /week

Data analysis II: Mean and standard deviation; absolute and relative errors; linear regression; covariance and correlation coefficient.

Distribution:

- 1) Distribution of I_2 between hexanes / cyclo hexanes / CCl_4 and aq. KI solution- calculation of equilibrium constant.
- 2) Study of complex formation between ammonia and metal ion

Chemical Kinetics

- 1) Stoichiometry of peroxydisulphide- iodide reaction
- 2) Peroxydisulphide- iodide reaction: order w.r.t $[I^-]$ by isolation method
- 3) Peroxydisulphide- iodide reaction: order w.r.t $[S_2O_8^{2-}]$ by initial rate method

Conductometry:

- 1) Titration of a mixture of strong and weak acids vs strong base
- 2) Determination of the hydrolysis constant of aniline hydrochloride
- 3) Determination of solubility product

Potentiometry:

- 1) Titration of Fe^{+2} vs $Cr_2O_7^{2-}$ (redox titration)
- 2) Titration of Cl^- vs Ag^+ (precipitation titration)
- 3) Determination of solubility product

Polarimetry:

- 1) Determination of specific rotation of glucose and fructose
- 2) Enzyme catalysed inversion of sucrose

Colorimetry:

- 1) Verification of Beer's law and calculation of molar absorption coefficient using $CuSO_4$ and $KMnO_4$ solutions

pH metry:

- 1) Calibration of a pH meter and measurement of pH of different solutions
- 2) Preparation of phosphate buffers
- 3) Titration of strong acid vs strong base

References:

1. Senior Practical Physical Chemistry: B.D. Khosla, V.C. Garg and A. Khosla
2. Experimental Physical Chemistry: V. Athawale and P. Mathur.
3. Practical Physical Chemistry: B. Vishwanathan and P.S. Raghavan.
4. Practical in Physical Chemistry: P.S. Sindhu
5. Advanced Practical Physical chemistr: J.B. Yadav
6. Vogel Text book of Quantitative Analysis, 6th edition, Pearson education Ltd. 2002

BOS Meeting Resolutions-2017-18, Department of Chemistry

The following resolutions were taken in the meeting.

1. Resolved to the adopt the syllabus prescribed by Osmania University for B.Sc.&M.Sc I to IV Semester without making any changes for the Academic year 2017-18.
2. The division and adoption of syllabus was discussed and decided to split the IV-units in every Semester of B.Sc. Each paper of M.Sc consists four chapters.
3. The pattern of evolution and examination was discussed with two internals in the each semester and average of two would be taken for the semester marks computation. The internals would be of 30 marks and the semester exams would be 70 marks.
4. The practical examinations would be conducted at the end of the every semester .
5. List of reference and prescribed books should mention for prescribing the students as recommended by Osmania University.
6. Question banks would be made for the students for the unit.
7. List of panel of examiner were enlisted for the purpose of evaluation of examinations.
8. Resolved to adopt the Skill Enhancement Course. In III Semester SEC is "Safety Rules in Chemistry Laboratory and Lab Reagents." 2 Credits allotted to SEC. In IV Semester SEC syllabus is same as university prescribed.


Board of studies
Chairman BOs


University nominee
Dept of Studies in Chemistry
Dept of Chemistry
Osmania University 500-08



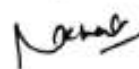
Members


P. Deep

G. Raghava




H.K.K. Anasudha


Name


R. Nyo

**Telangana State Council of Higher Education, Govt. of Telangana B.Sc., CBCS Common
Core Syllabi for all Universities in Telangana
PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
B.Sc., Chemistry**

FIRST YEAR- SEMSTER I				
CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS
BS 101	Communication	AECC-1	2	2
BS 102	English	CC-1A	5	5
BS 103	Second language	CC-2A	5	5
BS 104	Optional I	DSC-1A	4T+2P=6	4+1=5
BS 105	Optional II	DSC-2A	4T+2P=6	4+1=5
BS 106	Optional III- Chemistry - I	DSC-3A	4T } = 6	4 } = 5
	Laboratory Course – I (Qualitative Analysis – I)			
Total Credits				27
FIRST YEAR- SEMSTER II				
BS 201	Environmental studies	AECC-2	2	2
BS 202	English	CC-1B	5	5
BS 203	Second language	CC-2B	5	5
BS 204	Optional I	DSC-1B	4T+2P=6	4+1=5
BS 205	Optional II	DSC-2B	4T+2P=6	4+1=5
BS 206	Optional III- Chemistry - II	DSC-3B	4T } = 6	4 } = 5
	Laboratory Course - II (Qualitative Analysis – II)			
Total Credits				27
SECOND YEAR- SEMSTER III				
BS 301	Safety Rules in Chemistry Laboratory and Lab Reagents	SEC-I	2	2
BS 302	English	CC-1C	5	5
BS 303	Second language	CC-2C	5	5
BS 304	Optional I	DSC-1C	4T+2P=6	4+1=5
BS 305	Optional II	DSC-2C	4T+2P=6	4+1=5
BS 306	Optional III- Chemistry - III	DSC-3C	4T } = 6	4 } = 5
	Laboratory Course - III (Quantitative Analysis – I)			
Total Credits				27
SECOND YEAR- SEMSTER IV				
BS 401	Remedial Methods for Pollution, Drinking Water and Soil Fertility	SEC-2	2	2
BS 402	English	CC-1D	5	5
BS 403	Second language	CC-2D	5	5
BS 404	Optional I	DSC-1D	4T+2P=6	4+1=5
BS 405	Optional II	DSC-2D	4T+2P=6	4+1=5
BS 406	Optional III- Chemistry - IV	DSC-3D	4T } = 6	4 } = 5
	Laboratory Course - IV (Quantitative Analysis – II)			
Total Credits				27

* **Optional III Chemistry** AECC: Ability Enhancement Compulsory Course; SEC: Skill Enhancement Course;

DSC: Discipline Specific Course; GE: Generic Elective;

B.Sc. Chemistry II Year
Semester III
Skill Enhancement Course- I (SEC-I)

301 SEC: Safety Rules in Chemistry Laboratory and Lab Reagents

Unit I: Laboratory Safety Rules and Regulations.

General rules and regulations for lab safety: Minimizing Risks of Hazards, Personal Protective Equipment (PPE) - Hair, Dressing for the Laboratory, Eye Protection, Eye-wash fountain, Gloves, Laboratory Protocols, Labeling Chemicals, Careful reading of labels Prevention of Inhaling Harmful Chemicals, Guide to Chemical Hazards, Chemical Spills etc., Accidents use of fire extinguisher and first aid kit in the laboratory, safety symbols- Preparation of the charts by the students and display of charts in chemistry labs. Calibration of fractional weights, calibration of glass ware - burette, pipette, standard flask, Normality/Molarity and specific gravity of concentrated acids – Preparation of dilute solutions (Numerical problems). Precautions to be taken in the preparation of dilute acids and bases and bases. Preparation of stock solutions of salts with specific examples. Properties of primary standard salt and preparation of standard solution. Good laboratory practices-maintenance of observation book record.

UNIT 2: Preparation of Lab Reagents: Preparation of indicators and use of indicators in volumetric analysis- acid base titrations, redox titrations, precipitation titrations and complexometric titrations. Role of an indicator in detecting end point (Phenolphthalein, Methyl orange, Methyl-red, Potassium Chromate, Diphenylamine, EBT, Murexide, etc). Preparation of buffers – pH 10 ammonical buffer and acetate buffer solutions. Preparation of commonly used reagents : Ammonium hydroxide solution, Ammonium molybdate reagent, Ammonium hydrogen phosphate solution, Bayer's reagent, Benedict's solution, Bromine water, Dimethyl glyoxime reagent, 2,4-Dinitrophenyl hydrazine reagent, Eriochrome black-T reagent Fehling solution, Ferric chloride solution, Ferrous sulphate solution, Iodine solution, Molisch's reagent, Nessler's reagent, Neutral FeCl₃, Schiff's reagent, Silver nitrate solution, Sodium carbonate solution , Sodium hydroxide (Caustic soda) solution, Starch solution, Tollen's reagent.

(reference work and submission of assignments). Charts preparation depicting course content.

RECOMMENDED BOOKS

1. Vogel's Text Book of Quantitative Chemical Analysis, 5th edition.
2. Vogel's Text Book of macro and semimicro qualitative inorganic analysis. G. Svehla, 5th edition.
3. Chemistry Reagent Manual Prepared by Chemistry Department, SGTB Khalsa College under DBT's Star College Scheme, University of Delhi (Available: online)
4. American Chemical Society Safety in Academic Chemistry Laboratories 8th edition.

[Course objectives (CO)]

- To improve the skills of students in the application of theory and practical knowledge.
- To fill the gap between theory and practicals.
- To train the students in understanding laboratory safety rules and to improve the skills in preparation of laboratory reagents]

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

Unit-I (Inorganic Chemistry)

15 h (1 hr/week)

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

6 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: Symmetry of molecules

5 h

Symmetry operations and symmetry elements in molecules. Definition of Axis of symmetry types of C_n , Plane of symmetry (σ_h , σ_v , σ_d) Center of symmetry and improper rotational axis of symmetry (S_n). Explanation with examples.

S3-I-3: Non – aqueous solvents

4 h

Classification and characteristics of a solvent. Reactions in liquid ammonia – physical properties, auto-ionisation, examples of ammono acids and ammono bases. Reactions in liquid ammonia – precipitation, neutralization, solvolysis, solvation - solutions of metals in ammonia, complex formation, redox reactions. Reactions in HF – autoionisation, reactions in HF – precipitation, acid – base reactions, protonation.

Unit - II (Organic chemistry)

15 h (1 hr/week)

S3-O-1: Alcohols

6 h

Preparation: 1° , 2° and 3° alcohols using Grignard reagent, Ester hydrolysis, Reduction of Carbonyl compounds, carboxylic acids and esters. Physical properties: H-bonding, Boiling point and Solubility. Reactions with Sodium, HX/ $ZnCl_2$ (Lucas reagent), esterification, oxidation with PCC, alk. $KMnO_4$, acidic dichromates, conc. HNO_3 and Oppenauer oxidation.

Diols: Pinacol - pinacolone rearrangement

Phenols: Preparation: (i) from diazonium salts of anilines, (ii) from benzene sulphonic acids and (iii) Cumene hydroperoxide method.

Properties: Acidic nature, formation of phenoxide and reaction with R-X, electrophilic substitution nitration, halogenation and sulphonation. Reimer Tiemann reaction, Gattermann-Koch reaction, Azo-coupling reaction, Schotten-Boumann reaction, Houben-Hoesch condensation, $FeCl_3$ reaction.

S3-O-2: Ethers and epoxides**2 h**

Nomenclature, preparation by (a) Williamson's synthesis (b) from alkenes by the action of conc. H_2SO_4 . Physical properties – Absence of Hydrogen bonding, insoluble in water, low boiling point. Chemical properties – inert nature, action of conc. H_2SO_4 and HI.

S3-O-3 Carbonyl compounds**7 h**

Nomenclature of aliphatic and aromatic carbonyl compounds and isomerism.

Preparation of aldehydes & ketones from acid chloride, 1,3-dithianes, nitriles and from carboxylic acids. Special methods of preparing aromatic aldehydes and ketones by (a) Oxidation of arenes (b) Hydrolysis of benzal halides Physical properties – absence of Hydrogen bonding. Keto-enol tautomerism, polarisability of carbonyl groups, reactivity of the carbonyl groups in aldehydes and ketones. Chemical reactivity: Addition of [a] NaHSO_3 (b) HCN (c) RMgX (d) NH_3 (e) RNH_2 (f) NH_2OH (g) PhNHNH_2 (h) 2,4DNP (Schiff bases). Addition of H_2O to form hydrate (unstable), comparison with chloral hydrate (stable), addition of alcohols - hemiacetal and acetal formation. Base catalysed reactions with mechanism- Aldol, Cannizzaro reaction, Perkin reaction, Benzoin condensation, haloform reaction, Knoevenagel condensation. Oxidation reactions – KMnO_4 oxidation and auto oxidation, reduction – catalytic hydrogenation, Clemmenson's reduction, Wolf- kishner reduction, Meerwein Ponnoff Verly reduction, reduction with LAH, NaBH_4 . Analysis – 2,4 -DNP test, Tollen's test, Fehlings test, Schiff's test, haloform test (with equations).

UNIT – III (Physical Chemistry)**15 hr (1h/week)****S3-P-1: 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 – $\text{NaCl-H}_2\text{O}$ system.

S3-P-2: Colloids & surface chemistry**9 h**

Definition of colloids. Classification of colloids. Solids in liquids (sols): preparations and properties – (including 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.

Micelles: Classification of surface active agents. Surfactant action, micellization and micellar interactions, Structure of micelles – spherical and lamellar. Critical micellar concentration (CMC). Factors affecting the CMC of surfactants. Counter ion binding to micelles.

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

Unit –IV (General Chemistry)

15 h (1h/week)

S3-G-1: Nanomaterials:

3h

Nano structured materials – Definition, size, description of graphene, fullerenes, carbon nano tubes. Synthetic techniques, bottom-up-sol-gel method, top-down, electro deposition method. Production of carbon nano tubes – arc discharge, laser vaporization methods. General applications of nano materials.

S3-G-2: Stereochemistry of carbon compounds

10 h

Isomerism: Definition of isomers. Classification of isomers: Constitutional and Stereoisomers - definition and examples. Constitutional isomers: chain, functional and positional isomers. Stereoisomers: enantiomers and diastereomers – definitions and examples.

Optical activity: Definition, wave nature of light, plane polarised light, optical rotation and specific rotation, chiral centers. Chiral molecules: definition and criteria - absence of plane, center and S_n axis of symmetry – asymmetric and dissymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and dissymmetric molecules (trans-1,2-dichlorocyclopropane). Molecules with constitutionally symmetrical chiral carbons (Tartaric acid) Molecules with constitutionally unsymmetrical chiral carbons (2,3-dibromopentane) Number of enantiomers and mesomers - calculation. D, L & R, S configuration for asymmetric and dissymmetric molecules (Allenenes, spiro compounds and biphenyls), Cahn-Ingold-Prelog rules. Racemic mixture, Racemisation and Resolution techniques. Geometrical isomerism with reference to alkenes and cyclo alkanes– cis, trans and E, Z configuration.

S3-G-3: Conformational analysis

2 h

Classification of stereoisomers based on energy. Definition and examples Conformational and configurational isomers. Conformational analysis of ethane, n-butane, 1,2-dichloroethane, 2-chloroethanol and methylcyclohexane

Referances:

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications (1996).
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn Van Nostrand Reinhold Company(1977)
- 3.
4. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
5. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
6. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press (1989).
7. Inorganic Chemistry by Shriver and Atkins 3rd 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 Bruice Yuranis Powla. (2012)
6. Text book of organic chemistry by C N pillai CRC Press (2012)

Unit III

1. Principles of physical chemistry by Prutton and Marron. The Macmillan Company; 4th edition (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. Colloidal and surface chemistry , M. Satake, Y. Hayashi, Y.Mido, S.A.Iqbal and M.S.sethi, Discovery Publishing Pvt.Ltd (2014)
6. Material science by Kakani & Kakani, New Age International(2016)

Unit IV

1. Text book of organic chemistry by Morrison and Boyd, Person(2009)
2. Text book of organic chemistry by Graham solomons, Wiley(2015)
3. Text book of organic chemistry by Sony, Sultan Chand & Sons; Twenty Ninth 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- Quantitative Analysis - I

45hrs (3 h / week)

Acid - Base titrations

1. Estimation of Carbonate in Washing Soda.
2. Estimation of Bicarbonate in Baking Soda.
3. Estimation of Carbonate and Bicarbonate in the Mixture.
4. Estimation of Alkali content in Antacid using HCl.

Redox Titrations

1. Determination of Fe(II) using $K_2Cr_2O_7$
2. Determination of Fe(II) using $KMnO_4$ with sodium oxalate as primary standard.
3. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard

B.Sc. Chemistry II Year

Semester IV

Skill Enhancement Course- II (SEC -II)

401 SEC - REMEDIAL METHODS FOR POLLUTION, DRINKING WATER AND SOIL FERTILITY STANDARDS

UNIT I: Remedial Methods for Pollution

Prevention and control of air pollution, Ozone hole-causes and harm due to ozone depletion. The effect of CFC's in Ozone depletion and their replacements. Global Warming and Greenhouse Effect-Precautions to control global warming. Deleterious effect of pollutants - Endangered Monuments- acid rain. Precautions to protect monuments. Sources of Radiation pollution - Chernobyl accident and its Consequences. Radiation effect by the usage of cell phones and protection tips. Deleterious effects of cell phone towers and health hazards. Sources of water pollution-(i). Pollution due to pesticides and inorganic chemicals, (ii). Thermal pollution (iii). Ground water pollution (iv). Eutrophication. Methods for control of water pollution and water recycling. Dumping of plastics in rivers & oceans and their effect on aquatic life.

Determination of (i) Dissolved Oxygen and (ii) Chemical Oxygen Demand in polluted water - Illustration through charts (or) demonstration of experiments. Sources of soil pollution (i). Plastic bags, (ii). Industrial and (iii). Agricultural sources. Control of soil pollution.

Environmental laws in India. Environmental benefits of planting trees.

UNIT II: Drinking Water and Soil Fertility Standards and Analysis

Water Quality and Common Treatments for Private Drinking Water Systems: Drinking Water Standards-Primary Drinking Water Standards : Inorganics, Organics and Volatile Organic Chemicals. Secondary Drinking Water Standards-Inorganics and Physical Problems. Water Testing, Mineral Analysis, Microbiological Tests, Pesticide and Other Organic Chemical Tests. Principle involved in Water Treatment Techniques. (i) Reverse osmosis (ii) Disinfection methods such as chlorination, ultraviolet light, ozonation etc (iii) Chemical oxidation and (iv) Ion exchange (water softeners). Visit to nearby drinking water plants and interaction at sites.

Introduction to Soil Chemistry- Basic Concepts. Effect of pH on nutrient availability. Macronutrients and their effect on plants -Carbon, Hydrogen, Oxygen, Nitrogen and Phosphorus other macronutrients-Calcium, Magnesium and Sulfur. Micronutrients and their effect on plants. Boron ($B_4O_7^{2-}$), Copper (Cu^{2+}), Iron (Fe^{2+} , Fe^{3+}) Manganese (Mn^{2+}) Molybdenum (MoO_4^{2-}) Zinc (Zn^{2+}) Cobalt (Co^{2+}) Chlorine (Cl^-) and Others. Determination of soil nitrogen by Kjeldahl method- Illustration through charts (Or) demonstration of experiment.

Visit to nearby agricultural farms and interaction with farmers. Discussion with farmers on the use of Soil Analysis Kits.

References:

1. A Text book for 'Remedial methods for pollution, drinking water and soil fertility standards', First Edition, Authors: Dr Mudvath Ravi, Gopu Srinivas, Putta Venkat Reddy, Vuradi Ravi Kumar, Battini Ushaiah, ISBN No. 978-93-5311-183-0.
2. Remedial methods for pollution, drinking water and soil fertility standards, Author: Dr G. Vanjatha.
3. Remedial methods for pollution, drinking water and soil fertility standards, Telugu version, Authors: Dr N. Yogi Babu, Dr. G. Vanajatha, M. Srilatha.
4. Environmental Pollution, download.nos.org/333courseE/10.pdf

5. CFC Replacements, butane.chem.uiuc.edu/pshapley/Environmental/L21/3.html
6. Effects of Acid Rain on Buildings
www.air-quality.org.uk/12.php
7. Acid Rain Effects - Buildings - Chemistry
chemistry.elmhurst.edu/vchembook/196buildings.html
8. How to protect national heritage - ways to protect monuments
www.youthkiawaaz.com/2011/03/how-to-protect-national-heritage/.
9. Chernobyl nuclear power plant accident - NRC
www.nrc.gov/reading-rm/doc-collections/fact-sheets/chernobyl-bg.pdf
10. Side-effects of harmful radiation from mobile phones and towers
pib.nic.in/newsite/printrelease.aspx?relid=116304
11. Cell Phone Radiation Protection - 12 Highly Effective Tips <https://www.electricsense.com/775/how-to-protect-yourself-from-cell-phone-radiation/>
12. Chemical Waste That Impact on Aquatic Life or Water Quality
blog.idrenvironmental.com/chemical-waste-that-impact-on-aquatic-life-or-water-quality
13. Trees and Your Environment - Clean Air Gardening
www.cleanairgardening.com/plantingtrees
14. water quality and common treatments for private drinking water .
extension.uga.edu/publications/detail.html?number=b939
15. Soil chemistry
<https://casfs.ucsc.edu/about/publications/Teaching-Organic-Farming/PDF-downloads/2.2-soil-chemistry.pdf>
16. Soil Analysis-Determination of Available Nitrogen ... - Amrita Virtual Lab
vlab.amrita.edu/?sub=2&brch=294&sim=1551&cnt=1
17. Determination of dissolved oxygen (DO)
www.cutm.ac.in/pdf/env%20engg%20lab%20manual.pdf
18. Determination of chemical oxygen demand of wastewater
www.pharmaguideline.com > *quality control* > *test*

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-I

7 h

Simple inorganic molecules and coordination complexes. Nomenclature – IUPAC rules, 1. 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). 2. Coordination number, coordination geometries of metal ions, types of ligands. 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.

S4-I-2: Organometallic Chemistry

4h

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

S4-I-3: Metal carbonyls and related compounds

4h

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

UNIT - II (Organic chemistry)

15 h (1 hr/week)

S4-O-1: Carboxylic acids and derivatives

6h

Nomenclature, classification and methods of preparation a) Hydrolysis of Nitriles, amides and esters. b) Carbonation of Grignard reagents. Special methods of preparation of Aromatic Acids. Oxidation of the side chain of Arenes. Hydrolysis of benzotrichlorides. Kolbe reaction. Physical properties- hydrogen bonding, dimeric association, acidity – strength of acids with the examples of trimethyl acetic acid and trichloro acetic acid, Relative differences in the acidity of Aromatic, aliphatic acids & phenols. 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 – Reactions of acid halides, Acid anhydrides, acid amides and esters (mechanism of ester hydrolysis by base and acid).

S4-O-2: Synthesis based on Carbanions**3 h**

Acidity of α -Hydrogens of withdrawing groups, structure of carbanion. Preparation of Aceto acetic ester (ethylacetoester) by Claisen condensation and synthetic application of Aceto acetic ester. (a) Acid hydrolysis and ketonic hydrolysis: Butanone, 3-Methyl 2-butanone. Preparation of (i) monocarboxylic acids ii) dicarboxylic acids (b) malonic ester– synthetic applications. Preparation of (i) substituted mono carboxylic acids and (ii) substituted dicarboxylic acids.

S4-O-3 Nitro hydrocarbons:**6 h**

Nomenclature and classification of nitro hydrocarbons. Structure. Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes. Reactivity - halogenation, reaction with HNO_2 (Nitrous acid), Nef reaction, Mannich reaction, Michael addition and reduction. Aromatic Nitro hydrocarbons: Nomenclature, Preparation of Nitrobenzene by Nitration. Physical properties, chemical reactivity – orientation of electrophilic substitution on nitrobenzene. Reduction reaction of Nitrobenzenes in different media.

Unit – III (Physical Chemistry)**15 hr(1h/week)****S4-P-1: Electrochemistry & EMF****15 h**

Electrical transport – conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of specific and equivalent conductance with dilution. Migration of ions and Kohlrausch's law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf's method for attackable electrodes. Applications of conductivity measurements: Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Electrolyte and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurement. Computation of EMF. Types of reversible electrodes- the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes. Electrode reactions, Nernst equation, cell EMF and single electrode potential, standard Hydrogen electrode – reference electrodes (calomel electrode) – standard electrode potential, sign conventions, electrochemical series and its significance.

Applications of EMF measurements, Calculation of thermodynamic quantities of cell reactions (G , H and K). Determination of pH using hydrogen electrode, glass electrode and quinhydrone electrode, Solubility product of AgCl . Potentiometric titrations.

Unit –IV (General Chemistry)

15 h (1h/week)

S4-G-1: Pericyclic Reactions

5 h

Concerted reactions, Molecular orbitals of ethene, 1,3-butadiene and allyl radical. Symmetry properties, HOMO, LUMO, Thermal and photochemical pericyclic reactions. Types of pericyclic reactions – electrocyclic, cycloaddition and sigmatropic reactions – one example each and their explanation by FMO theory.

S4-G-2: Synthetic Strategies

5 h

Terminology – Target molecule (TM), Disconnection approach – Retrosynthesis, Synthons, Synthetic equivalent (SE), Functional group interconversion (FGI), Linear, Convergent synthesis. Retrosynthetic analysis of the following molecules: 1) acetophenone 2) cyclohexene and 3) phenylethylbromide.

S4-G-3: Asymmetric synthesis

5 h

Definition and classification of stereoselective reactions: substrate, product stereoselective reactions, enantio and diastereo selective reactions. Stereospecific reaction – definition – example – dehalogenation of 1,2-dibromides induced by iodide ion. Enantioselective reactions – definition – example – Reduction of Ethylacetoacetate by Yeast. Diastereoselective reaction – definition – example: Acid catalysed dehydration of 1-phenylpropanal and Grignard addition to 2-phenyl propanal. Definition and explanation of enantiomeric excess and diastereomeric excess.

References:

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications (1996).
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn. Van Nostrand Reinhold Company(1977)
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
4. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
5. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press (1989).
6. Inorganic Chemistry by Shriver and Atkins 3rd 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 Bruice Yuranis Powla. (2012)
6. Text book of organic chemistry by C N pillai CRC Press (2012)

Unit III

1. Principles of physical chemistry by Prutton and Marron. The Macmillan Company; 4th edition (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. Text book of organic chemistry by Morrison and Boyd, Person(2009)
2. Text book of organic chemistry by Graham solomons, Wiley(2015)
3. Fundamentals of organic synthesis and retrosynthetic analysis by Ratna Kumar Kar, NCBA,(2014)
4. Organic synthesis by Dr. Jagadamba Singh and Dr. L.D.S. Yadav, Pragati Prakashan, 2010
6. Stereochemistry of organic compounds by D. Nasipuri, New Academic Science Limited, 2012
7. Organic chemistry by Clayden, Greeves, Warren and Wothers, Oxford University Press, 2001
8. Fundamentals of Asymmetric Synthesis by G. L. David Krupadanam, Universities Press(2014)

Laboratory Course

Paper IV- Quantitative Analysis - II

45hrs (3h/ week)

1. Conductometry titrations:
 - i) Strong acid Vs Strong base;
 - ii) Weak acid Vs Strong base.
2. Potentiometry titration:
 - i) Strong acid Vs Strong base;
 - ii) Weak acid Vs Strong base.
3. Estimation of Nickel by back titration (Standard MgSO_4 solution will be given)
4. Estimation of Barium as Barium Sulphate

M.Sc. CHEMISTRY

ORGANIC CHEMISTRY SPECIALISATION

SYLLABUS OF III & IV SEMESTERS

REVISED AS PER NEW (CB) SYLLABUS

FOR STUDENTS ADMITTED FROM THE YEAR

2016 ONWARDS

M.Sc. CHEMISTRY (ORGANIC CHEMISTRY SPECIALISATION)

Syllabus for III and IV Semesters

(for the batches admitted in academic year 2016 & later under CBCS pattern)

[Under Restructured CBCS Scheme]

Grand total marks and credits (all 4 semesters) 2400 marks – 96 credits

(Approved in the P.G.BOS meeting held on 01-07-2017)

SEMESTER-III

Paper	Instruction Hrs/Week	Internal assessment marks*	Semester marks	Total marks	Total credits
CH(OC)301T	4	20	80	100	4
CH(OC)302T	4	20	80	100	4
CH(OC)303T	4	20	80	100	4
CH(OC)304T	4	20	80	100	4
CH(OC)351P	9	-	100	100	4
CH(OC)352P	9	-	100	100	4
Total				600	24

SEMESTER - IV

Paper	Instruction Hrs/Week	Internal assessment marks*	Semester marks	Total marks	Total credits
CH(OC)401T	4	20	80	100	4
CH(OC)402T	4	20	80	100	4
CH(OC)403T	4	20	80	100	4
CH(OC)404T	4	20	80	100	4
CH(OC)451P	9	-	100	100	4
CH(OC)452P	9	-	100	100	4
Total				600	24

** 15 marks for the written test and 5 marks for the assignment*

Grand total all 4 semesters: 2400 marks and 96 credits

[Under Restructured CBCS Scheme]

III SEMESTER SYLLABUS	IV SEMESTER SYLLABUS
<p>Paper-I CH (OC) 301T: Synthetic Reagents, Advanced NMR, Conformational Analysis and ORD OC-09: Synthetic Reagents-I OC-10: Synthetic Reagents-II OC-11: ¹³C NMR and 2D NMR spectroscopy OC-12: Conformational analysis (Cyclic systems) and ORD</p> <p>Paper II- CH (OC) 302T: Modern Organic Synthesis OC-13: Asymmetric synthesis OC-14: Synthetic strategies OC-15: New Synthetic reactions OC-16: New techniques and concepts in organic synthesis</p> <p>Elective-3A Paper-III CH (OC) 303T (CB1): Bioorganic Chemistry OC(CB1)-1: Carbohydrates OC(CB1)-2: Nucleic acids and Lipids OC(CB1)-3: Proteins and Enzymes OC(CB1)-4: Coenzymes and Vitamins</p> <p>Elective-3B: Paper-III CH (OC) 303T (CB2): Forensic Chemistry and Toxicology OC(CB2)-5: Forensic chemistry- I OC(CB2)-6: Forensic chemistry- II OC(CB2)-7: Forensic Toxicology-I OC(CB2)-8: Forensic Toxicology-II</p> <p>Elective-4A Paper-IV CH (OC) 304T (CB3): Green chemistry and Organic materials OC (CB3) - 9: Principles of Green chemistry OC (CB3) -10: Green Synthesis OC (CB3) -11: Organic nanomaterials OC (CB3) -12: Supramolecular chemistry</p> <p>Elective-4B Paper-IV CH (OC) 304T (CB4): Pesticides OC (CB4) - 13: Introduction to pesticides OC (CB4) - 14: Synthetic insecticides OC (CB4) - 15: Natural insecticides & herbicides OC (CB4) - 16: Fungicides, and Rodenticides</p> <p>LABORATORY COURSES Paper-V CH (OC) 351P: Synthesis of organic molecules, isolation of natural products & TLC. Paper-VI CH (OC) 352P: Separation and identification of organic compounds & Column chromatography</p>	<p>Paper-I CH (OC) 401T: Drug Design and Drug Discovery OC-17: Principles of Drug design and drug discovery OC-18: Lead modification and SAR Studies OC 19: QSAR studies and computer aided drug design OC 20: Combinatorial Synthesis</p> <p>Paper-II CH (OC) 402T: Drug synthesis and mechanism of action OC-21: Drugs acting on metabolic process, cell wall and specific enzymes OC-22: Drugs acting on genetic material and immune system OC-23: Drugs acting on receptors and ion channels OC-24: Chiral drugs</p> <p>Elective-3A Paper-III CH (OC)-403T (CB1): Advanced Heterocyclic Chemistry OC (CB1) 17: Non aromatic heterocyclics & aromaticity OC (CB1) 18: Five and six membered heterocyclics with two hetero atoms OC (CB1) 19: Heterocyclics with more than two hetero atoms OC (CB1) 20: Larger ring and other heterocycles</p> <p>Elective-3B Paper-III CH (OC)-403T (CB2): Polymers, dyes and Pigments OC (CB2) 21: Polymers- I OC (CB2) 22: Polymers- II OC (CB2) 23: Dyes-I OC (CB2) 24: Dyes-II and pigments</p> <p>Elective-4A (ID Paper) Paper-IV CH (OC) 404(CB3)T: Advanced Natural Products OC(CB3)-25: Biosynthesis of natural products OC(CB3)-26: Structure determination of natural products -I OC(CB3)-27: Structure determination of natural products-II OC(CB3)-28: Total stereo selective synthesis of natural products.</p> <p>Elective-4B (ID Paper) Paper-IV CH (OC) 404 (CB4) T: Biopharmaceutics and Pharmacodynamics OC(CB4)-29: Pharmacokinetics OC(CB4)-30: Pharmacodynamics OC(CB4)-31: Principles of Therapeutics OC(CB4)-32: Drug Interactions</p> <p>LABORATORY COURSES Paper-V CH (OC) 451P: Spectroscopic identification of organic compounds & practice of chemistry software programmes Paper-VI CH (OC) 452P: Synthesis and analysis of drugs</p>

M.Sc. ORGANIC CHEMISTRY SPECIALISATION
III SEMESTER SYLLABUS

(For the batch admitted during the academic year 2016-2017)

Paper-1CH (OC) 301T: Synthetic Reagents, Advanced NMR, Conformational Analysis and ORD

OC-09: Synthetic Reagents-I

OC-10: Synthetic Reagents-II

OC-11: ^{13}C NMR and 2D NMR spectroscopy

OC-12: Conformational analysis (Cyclic systems) & ORD

Paper II- CH (OC) 302T: Modern Organic Synthesis

OC-13: Asymmetric synthesis

OC-14: Synthetic strategies

OC-15- New Synthetic reactions

OC-16: New techniques and concepts in organic synthesis

Elective-3A Paper-III CH (OC)303T (CB1): Bioorganic Chemistry

OC(CB1)-1: Carbohydrates

OC(CB1)-2: Nucleic acids and Lipids

OC(CB1)-3: Proteins and Enzymes

OC(CB1)-4: Coenzymes and Vitamins

Elective-3B: Paper-III CH (OC) 303T (CB2): Forensic Chemistry and Toxicology

OC(CB2)-5: Forensic chemistry- I

OC(CB2)-6: Forensic chemistry- II

OC(CB2)-7: Forensic Toxicology-I

OC(CB2)-8: Forensic Toxicology-II

Elective-4A Paper-IV CH (OC) 304T (CB3): Green chemistry and Organic materials

OC (CB3) - 9: Principles of Green chemistry

OC (CB3) -10: Green Synthesis

OC (CB3) -11: Organic nanomaterials

OC (CB3) -12: Supramolecular chemistry

Elective-4B Paper-IV CH (OC) 304T (CB4): Pesticides

OC (CB4) - 13: Introduction to pesticides

OC (CB4) - 14: Synthetic insecticides

OC (CB4) - 15: Natural insecticides & herbicides

OC (CB4) - 16: Fungicides, and Rodenticides

Laboratory courses:

Paper-V CH (OC) 351P: Synthesis of organic molecules, isolation of natural products and TLC.

Paper-VI CH (OC) 352P: Separation and identification of organic compounds & Column chromatography.

(For the batch admitted during the academic year 2016 -2017 under the CBCS pattern)

**Paper-1CH (OC) 301T: Synthetic Reagents, Advanced NMR,
Conformational Analysis and ORD**

OC-09: Synthetic Reagents-I

OC-10: Synthetic Reagents-II

OC-11: ^{13}C NMR and 2D NMR spectroscopy

OC-12: Conformational analysis (Cyclic systems) & ORD

OC-09: Synthetic Reagents I 15 Hrs

i) Protecting groups: a) Protection of alcohols by ether, silyl ether and ester formation
b) Protection of 1,2-diols by acetal, ketal and carbonate formation
c) Protection of amines by benzyloxycarbonyl, t-butyloxycarbonyl, fmoc and triphenyl methyl groups.
d) Protection of carbonyls by acetal, ketal and thiol acetal (Umpolung) groups.
e) Protection of carboxylic acids by ester and ortho ester (OBO) formation.

ii) Organometallic Reagents: Preparation and application of the following in organic synthesis: 1) Organolithium 2) Organo copper reagents 3) Organoboranes in C-C bond formation 4) Organo silicon reagents: reactions involving β -carbocations and α -carbanions, utility of trimethyl silyl halides, cyanides and triflates.

iii) Carbonyl methylenation: a) Phosphorous ylide mediated olefination 1) Wittig reaction, 2) Horner-Wordsworth-Emmons reaction. b) Titanium- Carbene mediated olefination 1) Tebbe reagent, 2) Petasis reagent 3) Nysted reagent.

iv) Carbene insertions: Rh based carbene complexes, cyclopropanations.

v) C-H Activation: Introduction, Rh catalysed C-H activation.

OC-10: Synthetic Reagents II 15 Hrs

i) Oxidations: a) Oxidation of active C-H functions: DDQ and SeO_2 . b) Alkenes to diols: Prevost and Woodward oxidation
c) Alcohol to carbonyls: Cr^{VI} oxidants (Jones reagent, PCC, PDC) IBX, DMP, CAN, TEMPO, TPAP, Swern oxidation
d) Oxidative cleavage of 1,2-diols: Periodic acid and Lead tetra acetate.

ii) Reductions: a) Catalytic hydrogenation: Homogenous (Wilkinson's catalytic hydrogenation) and heterogeneous catalytic reduction. b) Non-metallic reductions: Diimide reduction
c) Dissolving metal reductions: Birch reduction. d) Nucleophilic metal hydrides: LiAlH_4 , NaBH_4 , and their modifications. e) Electrophilic metal hydrides: BH_3 , AlH_3 and DIBAL. f) Use of tri-n-butyl tin hydride: Radical reductions.

OC-11: ^{13}C NMR and 2D NMR spectroscopy 15 Hrs

i) ^{13}C NMR spectroscopy: Introduction, Types of ^{13}C nmr spectra: undecoupled, proton-

decoupled and off-resonance decoupled (ORD) spectra. ^{13}C chemical shifts, factors affecting the chemical shifts, chemical shifts of organic compounds. Calculation of chemical shifts of alkanes, alkenes and alkynes. Homonuclear (^{13}C , ^{13}C J) and heteronuclear (^{13}C , ^1H J and ^{13}C , ^2H J) coupling. Applications of ^{13}C -NMR spectroscopy: Structure determination, stereochemistry, reaction mechanisms and dynamic processes in organic molecules. ^{13}C -NMR spectral editing techniques: principle and applications of APT, INEPT and DEPT methods.

ii) 2D-NMR spectroscopy: Principles of 2D NMR, Classification of 2D-experiments. Correlation spectroscopy (COSY) HOMOCOSY (^1H - ^1H COSY), TOCSY (Total Correlation Spectroscopy), HeteroCOSY (^1H , ^{13}C COSY, HMQC), long range ^1H , ^{13}C COSY (HMBC), Homonuclear and Heteronuclear 2D-J-resolved spectroscopy, NOESY and 2D-INADEQUATE experiments and their applications.

OC-12: Conformational analysis (Cyclic systems) & ORD 15 Hrs

Conformational analysis (Cyclic systems)

Study of conformations of cyclohexane, mono, di and tri substituted cyclohexanes, (1,3,5-trimethyl cyclohexanes and Menthols), cyclohexanone (2-alkyl and 3-alkyl ketone effect), 2-halocyclohexanones, cycloheptane. Stereo chemistry of bicyclo[3,3,0]octanes, hydrindanes, decalins and perhydroanthracenes. Conformational structures of piperidine, N-Methylpiperidine, tropane, tropine, pseudotropine, decahydroquinoline and quinolizidine. Factors governing the reactivity of axial and equatorial substituents in cyclohexanes.

(oxidation, $\text{S}_{\text{N}}2$ reaction, rearrangements, Ester hydrolysis) Stereochemistry of addition to the carbonyl group of a rigid cyclohexanone ring.

Optical Rotatory Dispersion (ORD) and CD Spectroscopy: Optical rotation, circular birefringence, circular dichroism and Cotton effect. Plain curves and anomalous curves. Empirical and semiempirical rules-The axial haloketone rule, the octant rule, Helicity rule, Exciton chirality method. Application of the rules to the study of absolute configuration and conformations of organic molecules.

Recommended Books:

1. Some modern methods of organic synthesis by W. Carruthers
2. Guidebook to organic synthesis, by R K Meckie, D M Smith & R A Atken
3. Organic Synthesis by O House
4. Organic synthesis by Micheal B Smith
5. Reagents for organic synthesis, by Fieser & Fieser, Vol 1-11 (1984)
6. Organic synthesis by Robert E Ireland
7. Handbooks of reagents for organic synthesis by Reich and Rigby, Vol I-IV
8. Organic chemistry by Jonathan Clayden, Nick Greeves and Stuart Warren
9. Organic Reactions and their mechanisms by P.S. Kalsi
10. Organic reaction mechanisms by V.K. Ahulwalia and Rakesh Kumar Parashar
11. Spectroscopic identification of organic compounds by RM Silverstein, G C Bassler and T B Morrill
12. Organic Spectroscopy by William Kemp
13. Spectroscopic methods in Organic chemistry by DH Williams and I Fleming
14. Modern NMR techniques for chemistry research by Andrew B Derome

15. NMR in chemistry - A multinuclear introduction by William Kemp
16. Spectroscopic identification of organic compounds by P S Kalsi
17. Introduction to organic spectroscopy by Pavia
18. Carbon-13 NMR for organic chemists by GC Levy and O L Nelson
19. Nuclear Magnetic Resonance Basic principles by Atta-ur-Rahman
20. Basic one and two-dimensional NMR spectroscopy by Horst Friebolin
21. NMR spectroscopy by H.Gunther
22. Stereochemistry of organic compounds — Principles & Applications by D Nasipuri
23. Stereochemistry of Carbon compounds by Ernest L Eliel & Samuel H. Wilen
24. Stereochemistry: Conformation & Mechanism by P S Kalsi
25. The third dimension in organic chemistry, by Alan Bassendale
26. Stereo selectivity in organic synthesis by R S Ward.
27. Advanced organic chemistry. Part A Structure & Mechanism by Francis A. Corey and Richard J. Sundberg
28. Optical rotatory dispersion by C Djerassi
29. Optical rotatory dispersion and circular dichroism by P Crabbe
30. Mechanism and Structure in Organic chemistry by S Mukherjee

Paper II– CH (OC) 302T:Modern Organic Synthesis

OC-13: Asymmetric synthesis

OC-14: Synthetic strategies

OC-15: New Synthetic reactions

OC-16: New techniques and concepts in organic synthesis

OC-13:- Asymmetric synthesis 15 Hrs

Introduction: Brief revision of classification of stereo selective reactions

Prostereoisomerism: Topicity in molecules Homotopic, stereoheterotopic (enantiotopic and diastereotopic) groups and faces- symmetry criteria.

Prochiral nomenclature: Pro chirality and Pro-R, Pro-S, Re and Si.

Conditions for stereoselectivity: Symmetry and transition state criteria, kinetic and thermodynamic control. Methods of inducing enantioselectivity.

Analytical methods: % Enantiomeric excess and diastereomeric ratio. Determination of enantiomeric excess: specific rotation, Chiral NMR; Chiral derivatizing agents, Chiral solvent, Chiral shift reagents and Chiral HPLC.

Chiral Substrate controlled asymmetric synthesis: Nucleophilic additions to chiral carbonyl compounds. 1, 2- asymmetric induction, Cram's rule and Felkin-Anh model.

Chiral auxiliary controlled asymmetric synthesis: α -Alkylation of chiral enolates, Evans' oxazolidinone, 1, 4-Asymmetric induction and Prelog's rule..

Chiral reagent controlled asymmetric synthesis: Asymmetric reductions using BINAL-H. Asymmetric hydroboration using IPC_2BH and IPC_2BH_2 .

Chiral catalyst controlled asymmetric synthesis: Sharpless epoxidation. Asymmetric hydrogenations using chiral Wilkinson biphosphine catalyst.

Asymmetric aldol reaction: Diastereoselective aldol reaction (achiral enolate & achiral aldehydes) its explanation by Zimmerman-Traxel model.

OC-14: Synthetic Strategies 15 Hrs

Introduction: Terminology, Target, synthon, synthetic equivalent, functional group interconversion (FGI), functional group addition. Criteria for selection of target. Linear and convergent synthesis. Retrosynthetic analysis and synthesis involving chemoselectivity, regioselectivity, reversal of polarity and cyclizations. .

Order of events: S-Salbutamol, Propoxycaine..

One group C-C and C-X disconnections: Introduction .One group C-C disconnections in alcohols and carbonyl compounds. One group C-X disconnections in Carbonyl compounds, alcohols, ethers and sulphides.

Two group C-C and C-X disconnections : Introduction .Two group C-X disconnections in 1,1-difunctionalised, 1,2-difunctionalised and 1,3-difunctionalised compounds.

Two group C-C disconnections: Diels-Alder reaction, 1,3-difunctionalised compounds, 1,5-difunctionalised compounds, Michael addition and Robinson annulation.

Control in carbonyl condensations: oxanamide and mevalonic acid.

Strategic bond: definition, guidelines for disconnection; disconnection of C-X bonds, disconnect to greatest simplification, using symmetry in disconnection, disconnection corresponding to known reliable reaction, high yielding steps and recognizable starting materials. Retrosynthesis of Retronecene, longifoline.

OC-15: New Synthetic reactions

15 Hrs

- 1. Metal mediated C-C and C-X coupling reactions:** Suzuki, Heck, Stille, Sonogishira crosscoupling, Buchwald-Hartwig and Negishi-Kumada coupling reactions.
- 2. C=C Formation Reactions:** Shapiro, Bamford-Stevens, McMurrey reactions, Julia-Lythgoe olefination and Peterson's stereoselective olefination.
- 3. Multicomponent Reactions:** Ugi, Passerini, Biginelli, Bergman and Mannich reactions.
- 4. Ring Formation Reactions:** Pausan-Khand reaction, Nazarov cyclisation.
- 5. Click Chemistry:** Click reaction, 1,3-dipolar cycloadditions.
- 6. Metathesis:** Grubb's 1st and 2nd generation catalyst, Olefin cross coupling metathesis (OCM), ring closing metathesis (RCM), ring opening metathesis (ROM), applications.
- 7. Other important synthetic reactions:** Baylis-Hilman reaction, Eschenmoser-Tanabe fragmentation, Mitsunobu reaction, Stork-enamine reaction and Michael reactions.

OC-16: New techniques and concepts in organic synthesis 15 Hrs

- 1. Techniques in peptide synthesis:** Solid phase peptide synthesis, commonly used resins (Rink resin, Wang resin and Ellman resin, synthesis of cross linked Merrifield resin and drawbacks of solid phase synthesis.
- 2. Solid phase oligodeoxynucleotide synthesis:** Phosphotriester, phosphitetriester and phosphoramidite pathway
- 3. Oligosaccharide synthesis:** Glycosidation: cyclic oxocarbenium ion, glycosyl donors and glycosyl acceptors, Kuhn glycosidation, convergent and linear oligosaccharide synthesis.
- 4. Phase Transfer catalysis:** Onium and crown ethers as PTC.
- 5. Tandem synthesis:** Tandem reactions; conjugate addition-aldol reaction, polymerization-cyclisation, electrocyclic-Diels Alder reaction.
- 6. Baldwin Rules:** Exo and Endo cyclisation, tetrahedral, trigonal and diagonal systems, favoured and disfavoured cyclisations.
- 7. Chiron approach in organic synthesis:** Nature's chiral pool, carbohydrates, amino acids, hydroxy acids, terpenes as chiral precursors. Synthesis of shikimic acid from D-arabinose, furanonycin from D-glucose, S-(-)-ipenol from S-leucine.
- 8) Determination of absolute configuration:** Mosher's method.

Recommended Books:

1. Asymmetric synthesis by Nogradi
2. Asymmetric organic reactions by J D Morrison and H S Mosher
3. Principles in Asymmetric synthesis by Robert E. Gawley & Jeffrey Aube
4. Stereo differentiating reactions by Izumi
5. Some modern methods of organic synthesis by W Carruthers
6. Guidebook to organic synthesis, by R K Meckie, D M Smith & R A Atken
7. Organic synthesis by Michael B Smith
8. Organic Synthesis-The disconnection approach by S Warren
9. Organic Synthesis by C Willis and M Willis
10. Problems on organic synthesis by Stuart Warren
11. Organic chemistry Jonathan Clayden, Nick Greeves and Stuart Warren
12. The logic of chemical synthesis by Elias James Corey and Xue-Min Cheng
13. Name reactions by Jie-Jie Li

Elective-3A

Paper-III CH (OC)303T (CB1): Bioorganic Chemistry

OC(CB1)-1: Carbohydrates**OC(CB1)-2: Nucleic acids and Lipids****OC(CB1)-3: Proteins and Enzymes****OC(CB1)-4: Coenzymes and Vitamins****OC(CB1)-1: Carbohydrates****15 Hrs**

Introduction to the importance of Carbohydrates. Types of naturally occurring sugars. Deoxy sugars, aminosugars, branched chain sugars methyl ethers and acid derivatives of sugars. Determination of configuration and determination of ring size of D-glucose and D-Fructose. Conformational analysis of monosaccharides. 4C_1 and 1C_4 conformations of D-glucose. Reactions of six carbon sugars: Ferrier, Hanesian reaction and Ferrier rearrangement. Synthesis of amino, halo and thio sugars. Structure, ring size determination of sucrose and maltose. Conformational structures of sucrose, lactose, maltose, cellobiose and gentobiose. Structure and biological functions of starch, cellulose, glycogen and chitin. Role of sugars in cell to cell recognition, blood groups.

OC(CB1)-2: Nucleic acids & lipids**15 Hrs**

Nucleic acids: Retro synthetic analysis of nucleic acids - Nucleotides, Nucleosides, Nucleotide bases and Sugars. Structure and synthesis of nucleosides and nucleotides. Primary, secondary and tertiary structure of DNA. Types of mRNA, tRNA and rRNA. Replication, transcription and translation. Genetic code. Protein biosynthesis. DNA finger printing.

Lipids: Introduction and classification of lipids. Stereochemical notation in lipids. Chemical synthesis and biosynthesis of phospholipids and glycolipids. Properties of lipid aggregates, micelles, bilayers, liposomes and biological membranes.

OC(CB1)-3: Proteins and Enzymes**15 Hrs**

Proteins: Introduction. Peptide bond, classification and nomenclature of peptides. Amino acid sequence of polypeptides and proteins: terminal residue analysis and partial hydrolysis. Peptide synthesis by solution phase and solid phase synthesis methods. Proteins - Biological importance and classification - Primary, secondary and tertiary structure of proteins.

Enzymes: Definition. Classification based on mode of action. Mechanism of enzyme catalysis - Lock and Key, Induced-Fit and three point contact models. Enzyme selectivity - chemo, regio, diastereo and enantio selectivity - illustration with suitable examples. Factors affecting enzyme catalysis. Enzyme inhibition - reversible and irreversible inhibition. Enzymes in organic synthesis. Immobilised enzymes

OC(CB1)-4: Coenzymes and Vitamins**15 Hrs**

Coenzymes: Introduction. Co-factors - cosubstrates - prosthetic groups.

Classification — Vitamin derived coenzymes and metabolite coenzymes. Structure and biological functions of coenzyme A, thiamine pyrophosphate (TPP), pyridoxal phosphate (PLP), oxidized and reduced forms of I) nicotinamide adenosine dinucleotide / their phosphates (NAD), NADH, NADP⁺ NADPH) ii) Flavin adenine nucleotide FAD, FADH₂ and iii) Flavin mononucleotide (FMN, FMNH₂) lipoic acid, biotin, tetrahydrofolate and ubiquinone. Adenosine triphosphate (ATP) and adenosine diphosphate (ADP), S-adenosyl

methionine (SAM) and uridine diphosphosugars (UDP-sugars) Mechanism of reactions catalyzed by the above coenzymes.

Vitamins: Introduction, classification and biological importance of vitamins. Structure determination and synthesis of vitamins A, B₁, and B₂. Synthesis of vitamins - B₆, C, E and K. Structure of vitamin B₁₂.

Reference Books:

1. Organic Chemistry Vol.I and Vol.II by I.L.Finar
2. Carbohydrate Chemistry by Barton Volumes
3. Carbohydrate chemistry by G.J.Boons
4. The chemistry of natural products:vol.V - carbohydrates by S.F.Dyke
5. Organic Chemistry by McMurry
6. Nucleic acids in Chemistry and Biology by G M Blackburn MI Gait
7. LehningerPrinciples of Biochemistry by D L Nelson and M MCoxon
8. Outlines of Biochemistry by Conn and Stumpf
9. Enzyme structure and mechanism by Fersht and Freeman
10. Enzymes for green organic synthesis by V.K.Ahluwalia
11. Biotransformations in Organic Chemistry by K Faber.
12. Principles of biochemistry by Horton &others.
13. Bioorganic chemistry - A chemical approach to enzyme action by Herman Dugasand Christopher Penney.
14. Concepts in Biotechnology by D.Balasubramanian& others
15. Chemistry and physiology of the vitamins by H.R.Rosenberg.

Paper-III CH (OC)303T (CB2): Forensic Chemistry & Toxicology

OC(CB2)-5: Forensic chemistry- I

OC(CB2)-6: Forensic chemistry- II

OC(CB2)-7: Forensic Toxicology-I

OC(CB2)-8: Forensic Toxicology-II

OC(CB2)-5: Forensic chemistry-I

15 Hrs

Forensic Chemistry - Introduction - Types of cases / exhibits - Preliminary screening - presumptive tests (colour and spot tests) - Examinations procedures involving standard methods and instrumental techniques

Qualitative and quantitative forensic analysis of inorganic and organic material - Chemical fertilizers (N,P,K) - Insecticides (Endosulfan, Malathion, Carbaryl) - Metallurgical analysis (Fe, Cu, Zn, Au, Ag) - Natural products (tobacco, tea, sugars, rubber) - Industrial chemicals - Sulphuric, Nitric and Hydrochloric acids, Sodium, Potassium hydroxide, Ammonium nitrate, Potassium chlorate, Organic solvents like Methanol, Ethanol, Acetone, Chloroform and Ether Organic chemicals like Acetanilide, P- Aminophenol, and Nitrobenzene etc. with reference to forensic work.

OC(CB2)-6: Forensic chemistry-II

15 Hrs

Examination of petroleum products - Distillation and fractionation - various fractions and their commercial uses - Standard method of analysis of petroleum products - Analysis of petroleum products for adulteration and arson residues. Chemistry of fire - Investigation and evaluation of fires - Causes of fire - Analysis of arson residues by conventional and instrumental methods. Analysis of trace evidence - Cosmetics, Dyes, Trap related evidence materials, Paints, Pigments, Fibres, Oils fats, Greases, Industrial dusts, Chemicals and Plant materials.

OC(CB2)-7: Forensic Toxicology-I 15 Hrs

Toxicology- Introduction- History- Scope- Areas of Toxicology- Role of forensic toxicologist- Poisons- Classification of poisons- Types of poisoning- Sample collection and preservation of toxicological exhibits in fatal and survival cases- Storage of samples- Signs and symptoms of poisoning- Toxicological investigation/examination of poisoned death- Interpretation of toxicological data- Courtroom testimony in toxicological cases. Case Histories.

OC(CB2)-8: Forensic Toxicology-II

15 Hrs

Principles of Toxicology- Introduction - Pharmacokinetics - Methods of transportation of toxicant- Absorption- Distribution- Storage of toxicants- Redistribution - Metabolism- Oxidation

- Reduction - Hydrolysis - Conjugation - Excretion- Other routes of elimination-Toxicokinetics- one and two compartmental model - Toxicodynamics- Spectrum of undesired (toxic) effects- Interaction of chemicals- Tolerance- Dose response relationship- Developmental and reproductive toxicity- Mutagenicity- Toxicity testing.

Recommended books:

1. James, S. H. and Nordby, J. J.: Forensic Science: An Introduction to Scientific and Investigative Techniques, 2003.
2. Saferstein, R: Criminalistics - An Introduction to Forensic Science, Prentice Hall, 1995.
3. Sarkar, S: Fuels and Combustion, Orient Longman, 1990
4. Verma, R. M: Analytical Chemistry – Theory and Practice, CBS Pub., 1994
5. Svehla, G. Ed.: Vogel's Qualitative Inorganic Analysis, Longman, 1998.
6. Bassett: Vogel's Text Book of Quantitative Inorganic Analysis, Longman, 1978
7. Vogel, A. I: Text Book of Practical Organic Chemistry including Qualitative Organic Analysis, ELBS, 1971.
8. Narayanan, T. V: Modern Techniques of Bomb Detection and Disposal, R. A. Security System, 1995.
9. Almirall, J. R. and Furton, K. G: Analysis and Interpretation of Fire Scene Evidence, CRC Press, 2004.
10. Bogusz, M. J: Handbook of Analytical Separations : Vol. 2 ,Forensic Science, Elsevier, 2000.
11. Bureau of Indian Standards: Specifications and Methods of Analysis for Petroleum Products.
12. Wilson and Wilson's Comprehensive Analytical Chemistry Volumes
13. Standard Methods of Chemical Analysis
14. AOAC: Official Methods of Analysis
15. Daeid, N.N.: Fire Investigation: Theory and Practice, Taylor and Francis, 2003
16. Klaassen, C. D.,: Casarett and Doull's Toxicology: The Basic Science of Poisons, 5th ed, McGraw-Hill, 1995.
17. Moffat, A.C. : Osselton, D. M. Widdop, B. : Clarke's Analysis of Drugs and Poisons in Pharmaceuticals, body fluids and postmortem material, 3rd ed., Pharmaceutical Press 2004.
18. Bogusz, M. J.,: Hand Book of Analytical Separations, Vol. 2: Forensic Science, 1st ed., Elsevier Science ,2000.
19. Siegel, J.A., Saukko, P. J., Knupfer, G.,: Encyclopedia of Forensic Sciences (Vol3), Academic Press, 2000.
20. Paranjape, H.M., Bothara, G.K., Jain, M.M.: Fundamentals of Pharmacology, 1st ed., Nirali Prakashan, 1990.
21. Budhiraja, R.D.: Elementary Pharmacology and Toxicology, Popular Prakashan, 2nd ed., 1999.
22. Laboratory procedure Manual, Forensic Toxicology: DFS, 2005
23. Cravey, R.H; Baselt, R.C.: Introduction to Forensic Toxicology , Biochemical Publications, Davis, C.A. (1981)
24. Stolmen, A.; Progress in Chemical Toxicology: Academic Press, New York (1963)
25. Modi, Jaisingh, P.; Textbook of Medical Jurisprudence & Toxicology, M.M. Tripathi Publication (2001)
26. Eckert; An Introduction to Forensic Science, CRC Press

Elective-4A

Paper-IV CH (OC) 304T (CB3): Green chemistry and Organic materials

OC (CB3) -9: Principles of Green chemistry

OC (CB3) -10: Green Synthesis

OC (CB3) -11: Organic nanomaterials

OC (CB3) -12: Supramolecular chemistry

OC (CB3)-9: Principles of Green Chemistry

15 Hrs

Green chemistry: Introduction

Principles of Green Chemistry: Designing a Green Synthesis using these principles; Prevention of Waste/by-products; maximum incorporation of the starting materials used in the synthesis into the final products (Atom Economy); prevention/minimization of hazardous/toxic products; designing safer chemicals; selection of appropriate auxiliary substances - green solvents, ionic liquids and solvent-free synthesis: energy requirements for reactions - use of microwaves, ultrasonic energy in organic synthesis; prevention of unnecessary derivatization – careful use of protecting groups; use of catalytic reagents in preference to stoichiometric reagents; designing of biodegradable products; prevention of chemical accidents; strengthening/development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.

OC (CB3) -10: Green Synthesis

15Hrs

i) Microwave Assisted Organic Synthesis (MAOS): introduction, benefits and limitations

a) Microwave assisted reactions in organic solvents: Esterification, Fries rearrangement, Claisen rearrangement and Diels- Alder reaction.

b) Microwave assisted Solvent-free reactions: Deacetylation, saponification of esters, alkylation of reactive methylene compounds and synthesis of nitriles from aldehydes.

ii) Ultrasound Assisted Organic Synthesis: introduction, applications of ultrasound- Cannizaro reaction, Reformatsky reaction and Strecker synthesis.

iii) Organic Synthesis in Green Solvents: introduction

a) Aqueous Phase Reactions: Diels-Alder Reaction, Heck reaction, Hoffmann elimination, Claisen-Schmidt condensation hydrolysis and dihydroxylation reactions.

b) Organic Synthesis using Ionic liquids: Introduction, applications- Beckmann rearrangement Suzuki Cross-Coupling Reaction and Diels- Alder reaction.

iv) Green Catalysts in organic synthesis: introduction

a) Phase Transfer Catalysts in Organic Synthesis: Introduction, Williamson ether synthesis and Wittig reaction

b) Biocatalysts in Organic Synthesis: Biochemical (microbial) oxidations and reductions.

OC (CB3) -11: Organic Nanomaterials

15Hrs

Introduction: The 'top-down' approach, the 'bottom-up' approach and Nanomanipulation.

Molecular Devices: Photochemical devices, Liquid crystals, Molecular wires, Rectifiers, Molecular switches and Molecular Muscles.

New Carbon family: Types of Fullerenes, Types of Carbon nanotubes (Zig-Zag, Armchair and Chiral), Graphenes. Growth, Chemical Synthesis and optoelectronic properties of Fullerenes, CNTs (Zig Zag, Armchair and Chiral), singlewalled CNTs (SWCNTs) and multi walled MWCNTs) and Graphenes.

Structures of aromatics belts, nano car and molecular machines.

Optoelectronic molecules: OLEDs, Organic Solar Cells (Basic OLED mechanism and structures)

Natural Benzheterazoles and their synthetic modifications as optoelectronic molecules.

OC (CB3) -12: Supramolecular Chemistry

15Hrs

Introduction: Supramolecular interactions (ion-ion, ion-dipole, H-bonding, cation- π , anion- π , π - π and Van der Waals interactions), Ionophore and molecular receptors.

Host-Guest Chemistry: Lock and key analogy, Structures and applications of Cryptands, Spherands, Calixerenes, Cyclodextrins, Cyclophanes, Carcerands and hemicarcerands.

Self-assembly: Ladder, polygons, helices, rotaxanes, catenanes, Molecular necklace, dendrimers, self-assembly capsules their synthesis, properties and applications.

Enantioselective molecular recognition: Cyclodextrins, Crown ethers with chiral frame work, Chiral receptor from Kemp's triacid. Chiral receptors for tartaric acid.

Recommended books:

1. P.T. Anastas & J.K. Warner: Oxford Green Chemistry- Theory and Practical, University Press (1998).
2. A.S. Matlack: Introduction to Green Chemistry, Marcel Deckkar, (2001).
3. M.C. Cann & M.E. Connely: Real-World cases in Green Chemistry, American Chemical Society, Washington (2000).
4. M.A. Ryan & M. Tinnesand, Introduction to Green Chemistry, American Chemical Society, Washington (2002).
5. V.K. Ahluwalia & M.R. Kidwai: New Trends in Green Chemistry, Anamalya Publishers
6. Enantioselective organocatalysis, Peter I Dallco, Willey-VCH
7. Core Concepts in Supramolecular Chemistry and Nanochemistry by Jonathan W. Steed, David R. Turner and Karl J. Wallace; John-Wiley and Sons Publications
9. Supramolecular Chemistry by Jonathan W. Steed and Jerry L. Atwood, John-Wiley and Sons Publications
10. Supramolecular Chemistry-Concepts and Perspectives by J M. Lehn; Wiley-VCH (1995) Publications
11. Supramolecular Chemistry by P. D. Beer, P. A. Gale and D. K. Smith; Oxford University Press (1999)
12. Stereochemistry of organic compounds -Principles & Applications by D Nasipuri
13. Nanochemistry by G.B. Sergeev; Elsevier
14. Nanochemistry: A chemical approach to nano materials , G.A. Ozin& A.C. Arsenault; RSC publishers.

Elective-4B

Paper-IV CH (OC) 304T (CB4): Pesticides

OC(CB4)- 13:Introduction to pesticides

OC(CB4)- 14: Synthetic insecticides

OC(CB4)- 15:Natural insecticides& herbicides

OC(CB4)- 16:Fungicides, and Rodenticides

OC (CB4)-13: Introduction to pesticides

15 Hrs

i) **Defination** ,Classification and importance of pesticides

ii) **Pest control**: Different methods –chemical – insecticides, fungicides, herbicides, rodenticides, fumigants, chitin synthesis inhibitors and insect repellents.

a) **Biological**–pheromones: Definition and classification, synthesis of Disparlure, Exobrevicomin, Endobrevicomin, frontaline and grandiso pheromones, synthetic sex attractants.

b) Insect juvenile hormones: JH-A, JH-B,Synthesis of juvabione. Structural formula and importance of methopren.

c) Moultingharmones-structural formulae and mode of action of ecdysones

d) Antibiotics and secondary metabolites of microbial origin as insecticides and fungicides in agriculture. Structural formula and importance of Blasticidin-S, Kasugamycin, Avermectin-B, Invermectin, piericidins and phytoalexins.

iii) **Environmental pollution from pesticides**.iv) Integrated pest management.

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

OC (CB4)- 14: Synthetic insecticides

15 Hrs

i)**Organochlorine insecticides**- synthesis and mode of action of methoxychlor, perthane, Dicofol, Heptachlor, Dieldrin and Endosulfan.

ii) **Organophosphorous insecticides** –synthesis and mode action of Phosphoric acid derivatives, phosdrin, Dichlorophos, parathion, Zolone, Aninphomethyl, TEPP and Sachradan.

iii) **Carbamate insecticides**- synthesis and mode of action of carbaryl, Furadan, Baygon, Aldicarb and Zectron.

iv) Formulation and residue analysis of organochlorine, organophosphorous and carbamate insecticides.

OC (CB4)- 15: Natural insecticides and herbicides 15 Hrs

i) **Insecticides of plant origin** –synthesis and importance of pyrethrins (I and II), Rotenone and Nicotine. Main constituents Neem-structural formula of Azadirachtin. Synthesis of polygodial and warbunganol(Antifeedants).

ii)Synthesis of pyrethroids: synthesis of Allethrin, Bioallethrin, Cypermethrin, Fenvalerate, Decemethrin and pyrethrelone.

iii) **Concept of Bioinsecticides** – Bacillus thuringiensis.

iv) **Concept of pro-insecticides**-structure and mode of action of pro-pheromones and pre-pro-insecticides.

v) **Herbicides** – synthesis, applications and mode of action of the following

a) Aryloxyalkyl carboxylic acid derivative: 2,4-D, MCPA, 2,4,5-T and 2,4,5-TP. b) Carbamates- prophan and chloropham, c) Urea derivatives – Monouron and diuron, d) Aliphatic acids- Dalapon, TCA, e) Aromatic acids -2,3,6-TBA, Dicamba and Amiben, f) Nitrogen heterocyclic derivatives – Simazine, Atrazine, Amitrole, Maleic hydrazide Diquat and paraquat, g) Phenols- PCP and Dinoseb, h) Benzimidazole compounds

OC (CB4)-16: Fungicides, and Rodenticides**15 Hrs****i) Fungicides** –classification, synthesis, application and mode of action of the following classes:**a)** Carbamates **b)** Quinones-chloranil, Dichlorodimethyl p-tert-butylphenyl benzoate **c)** perchloromethylmercaptan derivative –captan, folpet, Difolatan and Mesulfan **d)** Benzimidazoles-carbendazim, Benomyl and Thiabendazole**ii) Rodenticides**, a) Anticoagulants-synthesis and application of warfarin, Coumatralol, Vacor, Coumatetralyl, Dicoumarol and Bromodiolen. **b)** Acute poisons- application of pindone, Ratindan, Sodium Fluoroacetate, Barium fluoroacetate, Antu, Tetramine, pindone and castrix.**Reference books:**

- 1) Naturally occurring insecticides: M. Jacobson and D.G. Crosby.
- 2) Insecticides for future: Jacobson
- 3) Insect juvenile hormone chemistry and action : J.J Mann and M. Beroza
- 4) Polygodial and warburganal. Terpenoid antifeedants part-II rec, Tran, chin 106
- 5) Insect antifeedants : S.V. Iley & P.L. Toogood, chemistry in Britain, Jan 1990 P.31
- 6) Synthesis of Insecticides : Metcalf
- 7) Fungicides-Freear
- 8) Fungicides-Nene
- 9) Residue reviews vol.36 : Melnikov
- 10) Safer insecticides : E. Hodgson
- 11) Crop protection agents from Nature: Leonard G Copping
- 12) Biofertilizers and Bioinsecticides : A.M. Deshmukh
- 13) Insecticides and Fungicides : U. Sriramulu.
- 14) Organo chlorine insecticides : persistent organic pollutants : F. Moriarty
- 15) Herbicides : P.C. Kearney & D.D. Kaufman
- 16) Analytical Method for pesticides : Z. Weig (Vol III)
- 17) Pesticide formulations : Van Valkenburg
- 18) Insecticides : A.S. Tahori
- 19) Herbicides, fungicides, formulation chemistry-A.S. Tahori
- 20) Environmental pollution by pesticides : C.A. Edwards
- 21) Pesticides management and insecticide resistance : Watson and Brown
- 22) Organo phosphorous pesticides M. eto

Laboratory courses:

Paper CH (O) 351P: Synthesis of organic molecules, isolation of natural products & TLC

(A) Laboratory synthesis of the following compounds:

2-Phenyl indole (Fischer indole synthesis), 7-hydroxy-3-methyl flavone (Baker-Venkatraman reaction), 2,5-Dihydroxy acetophenone (Fries reaction), 4-Chlorotoluene from p-toluidine (Sandmeyer reaction), Benzilic acid from benzoin (Benzilic acid rearrangement), Benzpinacol (photochemical reaction), 7-hydroxy coumarin (Pechman synthesis), Photo-dimerization of maleic anhydride, benzophenone (Friedel-Crafts reaction), Benzanilide (Beckmann rearrangement), Vanillyl alcohol from vanillin (NaBH₄ reduction), 2- and 4-nitrophenols (nitration and separation by steam distillation), Acridone from Phthalic anhydride.

(B) Isolation of the following natural products:

Caffeine from tea leaves (solvent extraction), Piperine from pepper (Soxhlet extraction), Eucalyptus oil from leaves (steam distillation), Lycopene from tomatoes.

(C) Thin layer chromatography: Thin layer chromatography: Determination of purity (All the above preparations), monitoring the progress of chemical reactions (any of the four above preparations), identification of unknown organic compounds by comparing the R_f values of known standards.

Paper CH (O) 352P: Separation and identification of organic compounds & Column chromatography

Separation of two component mixtures by chemical methods and their identification by chemical reactions — separation by using solvent ether, 5% aqueous sodium bicarbonate, 5% sodium hydroxide and dil hydrochloric acid, checking the purity of the two components by TLC, identification of the compounds by a systematic study of the physical characteristics (mp/bp), extra elements (nitrogen, halogens and sulfur), solubility, functional groups, preparation of crystalline derivatives and identification by referring to literature. A minimum of 09 mixtures should be separated and analyzed by these procedures.

Cannizzaro reaction: 4-Chloro benzaldehyde as substrate and separation of the resulting two component mixture

Separation of three component mixtures by chemical methods. A minimum of two mixtures should be separated and analyzed.

Column chromatography: Separation of a mixture of *ortho* and *para*-nitroanilines and any one of the two component mixture using silica gel as adsorbent and chloroform as the eluent. The column chromatography should be monitored by TLC.

Recommended Books:

1. Practical organic chemistry by Mann & Saunders
2. Text book of practical organic chemistry by Vogel
3. The systematic identification of organic compounds by Ralph L. Shriner, Christine K. F. Hermann, Terence C. Morrill and David Y. Curtin

M.Sc. ORGANIC CHEMISTRY SPECIALISATION
IV SEMESTER SYLLABUS
(For the batch admitted during the academic year 2016-2017)

Paper-1 CH (OC) 401T: Drug Design and Drug Discovery

- OC-17: Principles of Drug design and drug discovery
- OC-18: Lead modification and SAR Studies
- OC 19: QSAR studies and computer aided drug design
- OC-20: Combinatorial Synthesis

Paper-II CH (OC) 402T: Drug synthesis and mechanism of action

- OC-21: Drugs acting on metabolic process, cell wall and specific enzymes
- OC-22: Drugs acting on genetic material and immune system
- OC-23: Drugs acting on receptors and ion channels
- OC-24: Chiral drugs

Elective-3A Paper-III CH (OC)-403T (CB1): Advanced Heterocyclic Chemistry

- OC (CB1) 17: Non aromatic heterocyclics & aromaticity
- OC (CB1) 18: Five and six membered heterocyclics with two hetero atoms
- OC (CB1) 19: Heterocyclics with more than two hetero atoms
- OC (CB1) 20: Larger ring and other heterocycles

Elective-3B Paper-III CH (OC)-403T (CB2): Polymers, dyes and Pigments

- OC (CB2) 21: Polymers- I
- OC (CB2) 22: Polymers- II
- OC (CB2) 23: Dyes-I
- OC (CB2) 24: Dyes-II and pigments

Elective-4A Paper-IV CH (OC) 404(CB3)T: Advanced Natural Products

- OC(CB3)-25: Biosynthesis of natural products
- OC(CB3)-26: Structure determination of natural products -I
- OC(CB3)-27: Structure determination of natural products-II
- OC(CB3)--28: Total stereo selective synthesis of natural products.

Elective-4B Paper-IV CH (OC) 404(CB4)T: Biopharmaceutics and Pharmacodynamics

- OC(CB4)-29 : Pharmacokinetics
- OC(CB4)-30 : Pharmacodynamics
- OC(CB4)-31 : Principles of Therapeutics
- OC(CB4)-32: Drug Interactions

Laboratory courses

- Paper-VCH (OC) 451P: Spectroscopic identification of organic compounds & practice of chemistry software programmes**
- Paper-VI CH (OC) 452P: Synthesis and analysis of drugs**

M.Sc. CHEMISTRY (ORGANIC CHEMISTRY)

IV SEMESTER SYLLABUS

(For the batch admitted during the academic year 2016 -2017 under the CBCS pattern)

Paper-1 CH(OC) 401T: Drug Design and Drug Discovery

OC-17: Principles of Drug design and drug discovery

OC-18: Lead modification and SAR Studies

OC 19: QSAR studies and computer aided drug design

OC 20: Combinatorial Synthesis

OC- 17: Principles of Drug design and drug discovery **15 Hrs**

Introduction to drug discovery. Folklore drugs, stages involved in drug discovery- disease, drug targets, bioassay. Discovery of a lead- screening of natural products and synthetic compound libraries. Existing drugs as leads (me too drugs). Pharmacokinetics (ADME), pharmacodynamics. Nature of drug – receptor interactions and their theories – Occupancy theory, Induced – fit theory, Macromolecular perturbation theory and Two-state model of receptor activation. Natural products as lead structures in drug discovery – Pharmacophore - structure pruning technique e.g. morphine. Discovery of lead structure from natural hormones and neurotransmitters. Principles of design of agonists (e.g. Salbutamol), antagonists e.g. cimitidine) and enzyme inhibitors (e.g. captopril). Drug discovery without lead – serendipity- Penicillin and Librium as examples. Principles of prodrug design. Introduction to drug patents and Clinical trials.

OC-18: Lead modification and SAR Studies **15 Hrs**

SAR: Lead modification strategies, Bioisosterism, variation of alkyl substituents, chain homologation and branching, variation of aromatic substituents, extension of structure, ring expansion and ring contraction, ring variation, variation and position of hetero atoms, ring fusion, simplification of the lead, rigidification of lead. Discovery of oxaminquine, salbutamol, cimitidine and captopril Structure-Activity Relationship studies in sulfa drugs, benzodiazepines, and taxol analogs.

OC-19: QSAR studies and computer aided drug design **15Hrs**

QSAR: Introduction, physicochemical properties - pKa, electronic effects and Hammett constants (σ), lipophilicity constant (π), steric effects and Taft's constant, linear and nonlinear relationship between biological activity Lipophilicity Substituent constants. Lipinski rule of five. Hansch analysis, Craig's plot, Topliss scheme, Free Wilson approach, cluster significant analysis. Two case studies (QSAR study on pyranenamine and design of Crizotinib).

Computer aided drug design: Introduction, active site, allosteric binding site, use of grids in docking, rigid docking, flexible docking and induced fit docking of ligands. Basic principles and difference between structure and ligand based drug design, denovo drug design and utility to optimize the lead structure.

OC-20: Combinatorial Synthesis**15Hrs**

Introduction. Combinatorial approach. Combinatorial libraries, technologies. Solid phase synthesis, types of resins. Linkers. Reactants for solid phased synthesis. Methods of Parallel synthesis: Haughton's tea bag procedure. Automated parallel synthesis. Methods in Mixed combinatorial synthesis: general principles. Furkas mix and split combinatorial synthesis, Structure determination of active compounds-Deconvolution, Methods in deconvolution-recursive deconvolution, tagging and use of decoded sheets. Examples of Combinatorial Chemistry. Planning and designing of combinatorial synthesis, Spider like scaffolds, drug molecules. Automation in Combinatorial chemistry. High throughput screening.

Reference books

1. Burger's medicinal chemistry and drug discovery by Manfred E. Wolf.
2. Introduction to Medicinal chemistry by Patrick.
3. Introduction to drug design by R Silverman
4. Comprehensive medicinal chemistry. Vol 1-5 by Hanzsch.
5. Principles of medicinal chemistry. by William Foye
6. Biochemical approach to medicinal chemistry. by Thomas Nogrady.
7. Pharmaceutical Chemistry and Drug synthesis by Roth and Kleeman
8. Drug design by E.J.Arienes
9. Principles of Medicinal Chemistty Vol I & II by Kadam et al
10. Medicinal chemistry An introduction by Garreth Thomas
11. Organic and Pharmaceutical chemistry By Delgrado
12. Organic Pharmaceutical chemistry By Harikishansingh
13. Medicinal Chemistry By Ashtoshkar
14. Medicinal Chemistry By Chatwal
15. Organic Drug synthesis By Ledneicer Vol 1-6
16. Strategies for organic drug synthesis and design By Daniel Ledneicer.
17. Top Drugs: Top synthetic routes By John Saunders
18. Chirotechnoiogy By Roger A. Sheldon
19. Burger's Medicinal Chemistry and Drug Discovery: Principles and Practices. Vol. 1.
20. Medicinal Chemistry by G. Patricks.
21. Text book of Drug Design and Discovery, Edited by PovlKrogsgaard – Larsen Tommy Liljefors.
22. Structure Based Drug Design of Crizotinib (PF-02341066), a Potent and Selective Dual Inhibitor of Mesenchymal–Epithelial Transition Factor (c-MET) Kinase and Anaplastic Lymphoma Kinase (ALK) Martin P. Edwards, J. Med. Chem., 2011, 54 (18), pp 6342–6363.
http://www.pfizer.com/news/featured_stories/featured_stories_martin_edwards.jsp

Paper-II CH (OC) 402T: Drug synthesis and mechanism of action

OC-21: Drugs acting on metabolic process, cell wall and specific enzymes

OC-22: Drugs acting on genetic material and immune system

OC-23: Drugs acting on receptors and ion channels

OC-24: Chiral drugs

OC-21: Drugs acting on metabolic process, cell wall and specific enzymes

Basic concepts of mechanism of drug action: Introduction to macromolecular targets, carbohydrates, proteins, lipids and nucleic acids as possible drug targets. Classification of drugs. Enzyme inhibition and its types.

a) Drugs acting on metabolic process:

Antifolates –Discovery and mechanism of action of sulphonamides, Synthesis of sulfomethoxazole, sulfadoxine, sulfaguanidine and dapsone.

Diaminopyrimidines -trimethoprim, bacterial resistance to sulfonamides and drug synergism

b)Drugs acting on cell wall: Structure of bacterial cell wall, β -Lactam antibiotics – mechanism of action of penicillins and cephalosporins. Synthesis of penicillin-G and cephalosporin-C, cefalexin and cycloserine. Resistance to penicillins, broad spectrum penicillins – cloxacillin, methicillin, ampicillin, amoxicillin and carbenicillin. β -Lactamase inhibitors- Structural formulae and mode of action of clavulanic acid and sulbactam

c)Drugs acting on specific enzymes: H^+/K^+ -ATPase inhibitors- synthesis of Omeprazole and Carbonic anhydrase inhibitors-synthesis of Acetazolamide.

OC-22: Drugs acting on genetic material and immune system

Drugs acting on genetic material:Introduction, classification and mechanism of action.

a) DNA-intercalating agents-Anticancer and antimalarial agents. Structural formulae of Daunomycin, Adriamycin and Amsacrine. Synthesis of Amsacrine, Nitracrine, Quinacrine and Chloroquine.

b) DNA- Binding and nicking agents: Antiprotozoal drugs. Synthesis of Metronidazole, Dimetridazole and Tinidazole.

c) DNA-Alkylators: Synthesis of Cyclophosphamide and Bisulphan.

d) DNA-Polymerase inhibitors: Antiviral agents- Synthesis of Acyclovir and AZT.

e) DNA-Topoisomerase inhibitors: Anti bacterial agents.Synthesis of Ciprofloxacin and Norfloxacin. Structural formulae ofloxacin and Lomefloxacin.

f) Inhibitors of transcribing enzymes: Anti-TB and antileprosy agents-structural formulae of Rifamycins and partial synthesis of Rifampicin.

g) Drugs interfering with translation process: Antibacterial drugs- Structural formulae of Erythromycin, 5-Oxytetracycline and Streptomycin. Synthesis of Chloromycetin

Drugs acting on immune system: Introduction to immune system. Immunosuppressing agent-structural formula of Cyclosporin. Immunoenhancers-use of vaccines and structural formula of levamisol.

OC-23: Drugs acting on receptors and ion channels

Introduction to nervous system: structure of neuron, nerve transmission. Definition and examples of agonist, antagonist, neurotransmitters and receptors.

Drugs acting on receptors:

a)Adrenergic receptors - Introduction and classification. α -Adrenergic-receptor agonists and antagonists- Synthesis and biological activity of Nor-adrenaline, Methyl L dopa and Tetrazosin.

β -Adrenergic-receptor - agonists and antagonists – Synthesis and pharmacological activity of Salbutamol, Tetrabotalin, Propranolol and Atenolol.

b)Cholinergic-receptors: Introduction and classification.Cholinergic-receptor agonists and antagonists- Structural formulae of Nicotine, Atropine and Tubocurarine. Synthesis of Acetyl choline and Succinyl choline

c)Dopamine receptors: Introduction and classification.Dopamine- receptoragonists and antagonists- Biosynthesis of Dopamine. Synthesis of L-Dopa and Chlorpromazine.

d)Serotonin receptors: Introduction and classification.Serotonin receptoragonists and antagonists-synthesis and pharmacological activity of Serotonin and Metoclopramide.

e)Histamine receptors:Introduction and classification.Histamine receptor agonists and antagonists-synthesis and biological action of Histamine, Chloropheneramine, and Ranitidine.

f) Hormones and their receptors: Introduction to estrogen receptors, Structural formulae of Tamoxifen

Drugs acting on ion channels: Introduction to ion channels, drugs acting on Ca^{2+} , Na^+ and Cl^- channels and their mode of action. Structural formulae of Tetracaine and synthesis and of Nifedipine, Diltiazem, Tetracaine and 4-Aminopyridine.

OC-24: Chiral drugs

Introduction to chiral drugs. Three-point contact model, Eutomer, Distomer and eudesmic ratio. Pfeiffer's rule. Role of chirality on biological activity: Distomers – a) with no side effects b)with undesirable side effects c) both isomers having independent therapeutic value d)combination products having therapeutic advantages e) metabolic chirality inversion.

Synthesis and pharmacological activity of S-Ibuprofen, S- Metoprolol, Ininavir sulfate, Levocetrazine, 2S-Verapamil, S,S-Ethambutol, (+)Lomefloxacin, Fluvastatin, Dextropropoxyphen, (+)Ephedrine, (+)Griseofulvin, Dexormaplatin, R-Indacrinone, Nateglinide, Oxybutynin hydrochloride, S,S- Captopril and S,S,S- Enalaprilate.

Reference Books:

1. Burger's medicinal chemistry and drug discovery. By Manfred B. Wolf.
2. Introduction to Medicinal chemistry. By Graham Patrick.
3. Introduction to drug design. By R.B.Silverman
4. Comprehensive medicinal chemistry. Vol 1-5 by Hanzsch.
5. Principles of medicinal chemistry. By William O. Foyeetal.
6. Biochemical approach to medicinal chemistry. By Thomas Nogrady.
7. Pharmaceutical Chemistry and Drug synthesis By Roth and Kleeman
8. Drug design By E.J. Arienes
9. Principles of Medicinal Chemistry. Vols.1 & 2 By Kadam etal
10. Medicinal chemistry An introduction By Gareth Thomas
11. Wilson and Gisvold,s text book of Organic, Medicinal and Pharmaceutical chemistry By J.N.Delgado and W.A.Remers.
12. Organic Pharmaceutical chemistry By Harikishansingh.
13. Medicinal Chemistry By Ashutoshkar
14. Medicinal Chemistry By G.Chatwal
15. Organic Drug synthesis By Ledneiser Vol 1-6
16. Strategies for organic drug synthesis and design By Daniel Ledneiser
17. Top Drugs: Top synthetic routes By John Saunders
18. Chirotechnology By Roger A. Sheldon

Elective-3A

Paper-III CH (OC)-403T (CB1): Advanced Heterocyclic Chemistry

OC (CB1) 17: Non aromatic heterocyclics & aromaticity

OC (CB1) 18: Five and six membered heterocyclics with two hetero atoms

OC (CB1) 19: Heterocyclics with more than two hetero atoms

OC (CB1) 20: Larger ring and other heterocycles

OC (CB1) 17: Nonaromatic heterocyclics & Aromaticity 15 Hrs

Different types of strains, interactions and conformational aspects of nonaromatic heterocycles. Synthesis, reactivity and importance of the following ring systems. Azirines, Aziridines, Oxiranes, Thiiranes, Diazirenes, Diaziridines, Oxaziridines, Azetidines, Oxetanes and thietanes

Aromaticity: Introduction, Aromatic and anti aromatic compounds. Criteria for aromaticity. Huckel's $4n+2$ electron rule for benzene and non benzenoid aromatic compounds. Eg. Cyclopropenium ion, cyclopentadienyl ion, cycloheptatrienium ion, azulene and annulenes.

OC (CB1) 18: Five and six membered heterocyclics with two hetero atoms 15 Hrs

Synthesis, reactivity, aromatic character and importance of the following heterocycles: Pyrazole, Imidazole, Oxazole, Thiazole, Isoxazole, Isothiazole, Pyridazine, Pyrimidine. Pyrazine, Oxazine, thiazine, benzimidazole, benzoxazole and benzthiazole.

OC (CB1) 19: Heterocyclics with more than two hetero atoms 15 Hrs

Synthesis, reactivity, aromatic character and importance of the following Heterocycles: 1,2,3-triazoles, 1,2,4-triazoles, Tetrazoles, 1,2,4-oxadiazole, 1,3,4-oxadiazole, 1,2,5-oxadiazole, 1,2,3-thiadiazoles, 1,3,4-thiadiazoles, 1,2,5-thiadiazoles, 1,2,3-triazine, 1,2,4-triazine, 1,3,5-triazine, tetrazines. Synthesis and importance of purines and pteridines. Synthesis of Caffeine, theobromine and theophylline.

OC (CB1) 20: Larger ring and other Heterocycles 15 Hrs

Synthesis, structure, stability and reactivity of Azepines, Oxepines and Thiepinines. Synthesis of Diazepines rearrangements of 1,2-diazepines. Synthesis of Benzoazepines, Benzodiazepines, Benzooxepines, Benzothiepinines, Azocines and Azonines. Synthesis of selenophenes, Tellerophenes, Phospholes and Boroles.

Recommended Books:

1. Heterocyclic Chemistry, T. Gilchrist
2. An introduction to the Chemistry of heterocyclic compounds, R.M. Acheson
3. Heterocyclic Chemistry, J.A. Joule & K. Mills
4. Principles of Modern Heterocyclic Chemistry, A. Paquette
5. Heterocyclic Chemistry, J.A. Joule & Smith
6. Handbook of Heterocyclic Chemistry, A.R. Katritzky
7. The aromaticity III level, units 17-19 British open university volumes
8. Aromatic character and aromaticity by G.M. Badger
9. Non-benzenoid aromatic compounds by D. Ginsberg
10. Nonbenzenoid compounds by Lloy

Elective-3B

Paper-III CH (OC)-403T (CB2): Organic Polymers, Dyes and Pigments

OC (CB2) 21: Polymers- I

OC (CB2) 22: Polymers- II

OC (CB2) 23: Dyes-I

OC (CB2) 24: Dyes-II and pigments

OC (CB2) 21: Organic Polymers - 115 Hrs

Introduction, Classification of Polymers – according to origin, structure, intermolecular interactions. Types of polymerization – addition, condensation, radical, ionic and copolymerization with mechanism, Ziegler-Natta polymerization with mechanism. Stereochemistry of polymers, Plasticity – types of plastics. Molecular mass of polymers. Resins and plastics – Polystyrene and styrene copolymers, poly(vinyl chloride/vinyl acetate) and related polymers, acrylic polymers, polyesters, phenol-formaldehyde polymers, polyurethanes and epoxide polymers with examples. Natural and synthetic rubbers.

OC (CB2) 22: Organic Polymers - II

15 Hrs

a) Functional polymers :

i) Electrically conducting polymers: Introduction, basic principles. Brief description of polyanilines, polypyrroles, polyacetylenes, polythiophenes and their applications.

ii) Photoconductive polymers: Liquid crystal polymers, smectic, nematic and cholesteric structures, ion-exchange polymers – cationic, anionic exchange polymers and their uses.

iii) Smart materials: Uses in sensing device and communication networks.

iv) Biodegradable polymers: Definition, classification. Brief description polyhydroxyalkanoates, polycaprolactones, polyactic, polyvinyl alcohol and their applications.

b) Membranes: Filtration, micro, ultra, nano filtration. Separation of gases-Permeability and gas permeability representative polymers. Liquid separation-dialysis, electroosmosis and reverse osmosis.

c) Fire retarding polymers and photonic polymers.

Polymers in biomedical application, artificial organs and controlled drug delivery.

OC (CB2) 23: Dyes – I

15 Hrs

Synthetic and Natural dyes

Introduction, nomenclature and classification of synthetic dyes. Color and constitution - chromophores and auxochromes with suitable examples, Witt's theory, Armstrong's theory, Baeyer's theory, Nietzki's theory, Waston's theory, Modern theories, Valence Bond Theory and Molecular orbital theory. Chemistry and synthesis of triphenyl methane dyes [malachite green, rosaniline, para aniline blue, crystal violet methyl violet, hydroxytriphenyl methane dyes, Aurin, chrome violet], Azo dyes - types of azo dyes, synthesis of acidic and basic azo dyes, mono azo, di azo, tri azo and poly azo dyes. Chemistry and synthesis of cyanine dyes. Natural dyes – structure determination and synthesis of alizarine, Quinazarin and Indigo.

OC (CB2) 24: Dyes-II and Pigments

15 Hrs

a) Introduction to Fluorescence dyes

Interaction of organic molecules with electromagnetic radiation. Energy diagram. Activation and deactivation of organic molecules by light. Fluorescence and delayed fluorescence. Effect of molecular structure on fluorescence. General properties of fluorescent dyes and their requirements. Triplet-triplet absorption of organic molecules. Fluorescent quantum

yields and factors affecting them. Synthesis of Fluorescent aromatic hydrocarbons. and Fluorescent heteroaromatic compounds.

b) **Introduction to laser dyes.** Synthesis of Oligophenylenes. Oxazoles and benzoxzoles. Stilbenoid compounds Coumarin laser dyes, Rhodamine laser dyes.

c) **Pigments:** Introduction, Structures of Porphyrins , Bile pigments. Synthesis of Haemin and Chlorophyll. Synthetic pigments – preparation of phthalocyanines.

Reference Books

1. Organic polymer chemistry by K.J.Sanders
2. Polymer syntheses, Vol.I by S.R.Sandler and W.Karo
3. The elements of Polymer Science and Engineering by A.Rudin
4. Principles of Polymer Chemistry by A.Ravve
5. Polymer Science by V.R.Gowariker , N.V.Viswanathan and J.Sreedhar
6. Polymer Chemistry by C.E.Carraher , Jr.
7. A text book of polymers, Vol. I,II,III, M.S. Bhatnagar , S. Chand
8. Polymer Chemistry, B. Vollmert
9. Textbook of Polymer Science, F. W. Billmeyer Jr, John Wiley & sons
10. Organic Chemistry , Vol.1,2 by I.L.Finar
11. Color and constitution of organic molecules by J.Griffiths
12. Functional Dyes, Elsevier BV 2006,,,,,,S H.KIM
13. Colorants for non-textile Applications, Elsevier BV 2000 ...H S Freeman and A T Peters
14. Industrial Dyes-Chemistry, Properties, Applications. WILEY-VCH Verlag, 2003
Klaus Hunger
15. Introduction to Fluorescence Sensing, Springer 2009, by A P Demchenko
16. Natural Dyes and their Applications in Textiles by M. L. Gulrajani, IIT Delhi
17. Handbook on Natural Dyes for Industrial Applications by P. S. Vankar, National Institute of Industrial Research
18. Stereoelectronic Effects in Organic Chemistry by Pierre Deslongchams, Pergamon Press
19. Chemistry and Biochemistry of plant pigments, Vol. 2, by T.W.Goodwin
20. Contemporary Polymer Chemistry, H. R. Alcock& F. W. Lambe, Prentice Hall
21. Materials science and engineering an introduction by William D Callister, Jr. Wiley Publishers

Elective-4A(ID Paper)

Paper-IVCH (OC) 404(CB3)T: Advanced Natural Products

OC(CB3)-25: Biosynthesis of natural products

OC(CB3)-26: Structure determination of natural products-I

OC(CB3)-27: Structure determination of natural products-II

OC(CB3)-28: Total stereo selective synthesis of natural products.

OC(CB3)-25: Biosynthesis of natural products 15 Hrs

Biosynthesis of secondary metabolites: Introduction, Difference between Laboratory synthesis and biosynthesis. Methods for determination of biosynthetic mechanism. Isolation and identification of Biosynthetic precursors, Feeding experiments – use of radioisotopes Measurement of incorporation – absolute incorporation, specific incorporation. Identification of the position of labels in labeled natural products by chemical degradation and spectral methods. Major biosynthetic pathways: 1) Acetate-Malonate pathway: Biosynthesis of aromatic compounds, 2) Shikimic acid pathway ; Biosynthesis of essential amino acids – phenylalanine, tyrosine and tryptophan, carboxylic acid derivatives, flavonoids and morphine alkaloids. 3) Mevalonic acid pathway : Biosynthesis of terpenes – mono, sesqui, di, tri (β -amyrin) and carotenoids, steroids – cholesterol.

OC(CB3)-26: Structure determination of natural products-I 15 Hrs

Determination of structure and stereochemistry of morphine, reserpine, abietic acid, cholesterol and rotenone.

OC(CB3)-27: Structure determination of natural products-II 15 Hrs

Spectroscopic techniques IR, UV, ^1H nmr, ^{13}C nmr, COSY, HETEROCOSY, NOESY, 2D-INADEQUATE and MS in the structure elucidations of natural products, Examples, flavones, biflavones, flavanones, isoflavones, coumarins, quinolines, isoquinolines.

Study of the following solved problems: Mass, IR, ^1H , ^{13}C NMR, HOMOCOSY, HECTOR, DEPT, 2D-INADEQUATE and NOE of Geraniol, INEPT of **menthol**, APT of **aparricine**,

Heteronuclear 2D-J resolved spectrum of **stricticine**, NOESY of **buxaquamarine**, HETEROCOSY of **strictanol**, 2D-INADEQUATE of **α -picoline** and **β -methyl tetrahydran furan**.

OC(CB3)-28: Total stereoselective synthesis of natural products. 15 Hrs

Nicalou's synthesis of Dynemicin A , Corey's synthesis of prostaglandins (E2, F2 α) and paeoriflorin, Sharpless synthesis of L-hexoses, Nicolaous synthesis of taxol, Danishefsky synthesis of indolizomycin, Takasago synthesis of menthol, Hoffmann-LaRoche synthesis of Biotin.

Reference books:

1. Textbook of organic chemistry, Vol II by I L Finar
2. Chemistry of natural products, Vol 12, by Atta-Ur-Rahman
3. An introduction to the chemistry of terpenoids and steroids, by William templeton
4. Systematic identification of flavonoid compounds by Mabry & Markham
5. Steroids by Fieser and Fieser
6. Alkaloids by Manske
7. Alkaloids by Bentley
8. The chemistry of terpenes by A Pinder
9. The terpenes by Simenson
10. Terpenoids by Mayo
11. Alkaloids by Pelletier
12. Total synthesis of Natural Products by Apsimon Vol 1-5
13. Biosynthesis by Geismann
14. Principles of organic synthesis 3rd Ed. R O C Norman and J M Coxen
15. One and two dimensional nmr spectroscopy by Atta Ur Rahman
16. Classics in total synthesis K C Nicolaou and E J Sorenson
17. Spectrometric identification of organic compounds by Silverstein and Webster

Elective-4B(ID Paper)

Paper-IV CH (OC) 404(CB4)T: Biopharmaceutics and Pharmacodynamics

OC(CB4)-29 : Pharmacokinetics

OC(CB4)-30 : Pharmacodynamics

OC(CB4)-31 : Principles of Therapeutics

OC(CB4)-32: Drug Interactions

OC(CB4)-29: Pharmacokinetics.

Introduction and importance of ADME studies of drugs. Routes of administration .
i)Absorption: Definition, absorption of drugs across the membranes. Physico chemical factors affecting the drug absorption (emphasis on pH partition hypothesis and Drug Dissolution). Methods of determination of drug absorption. Bioavailability. ii)Distribution: Apparent volume of drug distribution. Factors affecting distribution, plasma protein binding. iii) Metabolism: Sites of drug metabolism, metabolic rate constant, bioactivation and biotransformation of drugs (phase I and phase II reactions) iv)Elimination: Types of elimination and overall apparent elimination rate constant and half-life, concept of clearance.

OC(CB4)-29: Pharmacodynamics.

Introduction, targets for drug action, receptor concept. Pharmacological binding terms. Two-statereceptor model, receptor families- structure and signal transduction mechanisms- channel linked proteins, gating mechanism, G-protein coupled receptors, G-protein and their role, Targets for G-proteins, Kinase linked receptors, receptors that regulate gene transcription. Theories of concentration -response relationship, dose-response curves.

OC(CB4)-30: Principles of Therapeutics

Plasma Drug concentration vs Time profile, Definition and explanation of various terms: MEC, MSC, MTC, AUC(graph). Peak plasma concentration, time of peak concentration. Therapeutic range. Steady state concentration, onset of action, onset of time, duration of action, intensity of action. LD50, ED50. Therapeutic objective. Dosage regimen, Design of dosage regimes: Dose size, dosing frequency, drug accumulation during multiple dosing, time to reach steady-state during multiple dosing, average concentration and body content on multiple dosing to steady state, loading dose, maintenance dose, maintenance of drug within the therapeutic range, design of dosage regimen from plasma concentration. Kinetics of fixed dose, fixed time interval regimes. Modification to dosage regime: Dosing of drugs in obese patients, dosing of drugs in Neonates, infants & children, dosing of drugs in geriatrics (elderly), dosing of drugs in Hepatic disease, dosing of drugs in renal disease.

OC(CB4)-31: Drug Interactions.

Introduction, classification, Mechanisms of drug interactions.– pharmacokinetic interactions(alteration of gastrointestinal absorption, complexation and adsorption, alteration of distribution, alteration of metabolism and alteration of excretion) & pharmacodynamic interactions (antagonistic effects, synergistic effects, alteration of electrolyte levels, interactions involving adrenergic system, alteration of receptor site interaction and antibiotic combinations). Influence of alcohol(Anti biotics, Anti coagulants, Anti histamines, Anti psychotic drugs, sedatives and Hypnotics), smoking(Theophylline, Diazepam, a Tri cyclic antidepressants), food (Bronchodilators, Diuretics, ACE Inhibitors, Anti coagulants, Tetracyclines) on drug action.

Reference books:

1. Pharmacokinetics. By Shobha Rani
2. Elements of Pharmacology. By Gandhi, Desani & Goyal.
3. Goodman & Gilman's "The pharmacological basis of therapeutics. By Gilman & Rali.
4. Pharmacology. By Rang.
5. Biopharmaceutics and pharmacokinetics By Brahmanikar
6. Pharmacology By Lippincot
7. Modern Pharmacology with Clinical Applications. By R. Craig.
8. Comprehensive pharmacy review by Leon Shargel
9. Hospital and clinical pharmacy
10. Burger's medicinal chemistry and drug discovery. By Manfred E. Wolf.
11. Introduction to Medicinal chemistry. By Patrick.
12. Comprehensive medicinal chemistry. Vol 1-5 By Hanzsch.
13. Principles of medicinal chemistry. By William Foye
14. Biochemical approach to medicinal chemistry. By Thomas Nogrady.

Laboratory courses

Paper CH (OC) 451P: Spectroscopic identification of organic compounds & practice of chemistry software programmes

1. Identification of unknown organic compounds by interpretation of IR, UV, ^1H -NMR, ^{13}C NMR, and mass spectral data(two examples with 2D-NMR). A minimum of 30 representative examples should be studied.

2. **Chemistry software programmes:** Chem Draw, analysis of IR and NMR using ACD/Id NMR processor. EXCEL: Drawing graphs, Molecular docking.

Paper CH (OC) 452P: Synthesis and analysis of drugs

(A) Laboratory Synthesis of the following drugs:

Paracetamol, Phenytoin, Benzocaine, 6-Methyluracil, Chloritone, Fluorescein,

4-Aminobenzene sulfonamide, antipyrine and phenothiazine

(B) Estimation of the following drugs:

Aspirin (titrimetry), Ibuprofen (titrimetry), Analgin (titrimetry), Chloride in Ringer's lactate (argentometry), ascorbic acid {titrimetry, Iodometry and Cerimetry}, colorimetry},

Isoniazid(Iodometry), Riboflavin(colorimetry), Zn ions in Bactracin Zinc,

Ca^{+2} ions in Calcium gluconate injection(complexometry), Riboflavin (UV-Visible Spectrophotometer).

Reference books:

1. Practical organic chemistry by Mann & Saunders
2. Text book of practical organic chemistry by Vogel
3. The systematic identification of organic compounds by Shriner et.al
4. Analytical chemistry by G N David Krupadanam et.al
5. Advanced practical medicinal chemistry by Ashutoshkar
6. Pharmaceutical drug analysis by Ashutoshkar
7. Quantitative analysis of drugs in pharmaceutical formulations by P D Sethi
8. Practical pharmaceutical chemistry part-1 and part-2 by A H Beckett and J B Stenlake
9. Spectroscopic identification of organic compounds by R M Silverstein and F X Webster

BOS Meeting Resolutions-2018-19, Department of Chemistry

The following resolutions were taken in the meeting.

1. Resolved to adopt the syllabus prescribed by Osmania University for M.Sc. I to VI Semesters without making any changes for the Academic year 2018-19 where as for B.Sc.(I to VI semesters) slight changes have been done.
2. The division and adoption of syllabus was discussed and decided to split the IV-units of 12 chapters in I to VI Semesters of B.Sc.
3. Resolved to adopt the same syllabus prescribed by the Osmania University for Skill Enhancement Course [SEC-I, SEC-II, SEC-III & SEC-IV] in the III, IV, V and VI semesters respectively and 2 credits are allotted for each SEC. In the V and VI semester the Generic General Elective papers [GE-I and GE-II] syllabus is same as Osmania University prescribed.
4. The pattern of evolution and examination was discussed with two internals in the each semester and average of two would be taken for the semester marks computation. The internals would be of the 30 marks and the semester exams would be 70 marks. The Skill Enhancement Course would be for 40 marks for External exam and 10 marks for Internal Assessment.
5. The practical examinations would be conducted at the end of the each semester

6. List of reference and prescribed books should mention for prescribing the students as recommended by Osmania University with few additions.
7. Question banks would be made for the students for the unit.
8. List of panel of examiner were enlisted for the purpose of evaluation of examinations.
9. Resolved to adopt the same syllabus prescribed by the Osmania University for Skill Enhancement Course [SEC-I, SEC-II, SEC-III & SEC-IV] in the III, IV, V and VI semesters respectively. In the V and VI semester the ~~General~~^{Special} Elective papers [GE-I and GE-II] syllabus is same as Osmania University prescribed.


Board of studies
 Chairman B0s

Members

1. Ch. Sarala Rao
2. P. Laxa
3. P. Venkatesh
20.7.15
4. B. Raju
5. Ch. Raju
6. Keerthi
7. K. Srinivas
8. T. S. S.
9. Ravi
S. S. S.

B.Sc. III year CHEMISTRY SEMESTER WISE SYLLABUS SEMESTER VI

Paper-VII Chemistry - VII

Unit-I (Inorganic Chemistry)

11 h

S6-I-1: Inorganic reaction mechanisms

4h

Labile and inert complexes, Thermodynamic and kinetic stability based on VBT & CFT: ligand substitution reactions – S_N1 and S_N2 in Octahedral complexes; substitution reactions of square planar complexes – Trans effect and applications of trans effect. Reactions of tetrahedral complexes - Hydrolysis of silicon halides and phosphorous oxides.

S6-I-2: Bioinorganic chemistry

5h

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride (Cl^-). Toxic metal ions As, Hg & Pb
Oxygen transport and storage – structure of hemoglobin, binding and transport of oxygen. Fixation of CO_2 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 (Z – scheme).

S6-I-3: Hard and soft acids bases (HSAB)

2h

Classification, Pearson's concept of hardness and softness, application of HSAB principles – Stability of compounds / complexes, predicting the feasibility of reaction

UNIT - II (Organic Chemistry)

11 h

S6-O-1: Carbohydrates

6h

Introduction: Classification and nomenclature – classification into mono, oligo and polysaccharides, into pentoses, hexoses *ETC.*, into aldoses and ketoses.

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 (Acetylation, reduction to n-hexane, cyanohydrin formation, reduction of Tollen's and Fehling's reagents and oxidation to gluconic and saccharic acids). Number of optically active, isomers possible for the structure, configuration of glucose based on D-glyceraldehyde as primary standard (No proof for configuration is required). Evidence for cyclic structure of glucose (some negative aldehyde tests and mutarotation). Cyclic structure of glucose: Proposition of cyclic structure (Pyranose structure, anomeric Carbon and anomers). Proof for the ring size (methylation, hydrolysis and oxidation reactions). Different ways of writing pyranose structure (Haworth formula and chair conformational formula). Structure of fructose: Evidence of 2 – ketohexose structure (formation of penta acetate, formation of cyanohydrin its hydrolysis and reduction by HI to give 2-Carboxy-n-hexane) Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure, Haworth formula).

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

S6-O-2Amino acids and proteins

5 h

acids into acidic, basic and neutral amino acids with examples. 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: L – configuration, irrespective of sign of rotation. Zwitter ion structure – salt like character, solubility, melting points, amphoteric 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 and proteins, peptide synthesis

Unit-III (Physical Chemistry)

11h

S6-P-1:Thermodynamics –I

11h

A brief review of - Energy, work and heat units, mechanical equivalent of heat, definition of system, surroundings. I law of thermodynamics statement- various forms mathematical expression. Thermodynamic quantities- extensive properties and intensive properties, state function, 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 I law. Heat changes at constant pressure and heat changes at constant volume. Enthalpy. Heat capacities at constant pressure and constant volume. Derivation $C_p - C_v = R$.

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 and Joule-Thompson coefficient. Adiabatic changes in ideal gas derivation of equation, $PV = \text{constant}$. P-V curves for isothermal and adiabatic processes.

Heat of a reaction at constant volume and at constant pressure, relation between ΔH and ΔV .

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

Unit-IV

12 h

S6-G-1: Proton Magnetic Resonance Spectroscopy

4h

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, representation of proton NMR spectrum – Integrations. H^1 NMR spectrum of – ethyl bromide, acetaldehyde, 1,1, 2-tribromo ethane, ethyl acetate and acetophenone. First order and Second order spectra and complex spectra, Nuclear Overhauser enhancement Effect (NOE). NMR Spectra of Fluxional molecules- Examples

S6-G-2: Mass Spectrometry

4 h

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 weight Mass spectrum of ethyl chloride, ethyl bromide and acetophenone.

S6-G-3: Thermodynamics- II

4 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 inert perfect gases. Free energy Gibb's function (G) and Helmholtz's function (A) as thermodynamic quantities. Concept of maximum work and net work ΔG as criteria for spontaneity. Derivation of equation $\Delta G = \Delta H - T\Delta S$. significance of the equation. Gibbs equations and the Maxwell relations. Variation of G with P, V and T.

References :

Unit- I

1. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd Wiley Publishers (2001).
2. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
3. Metal Ions In Reaction mechanisms, K.Veera Reddy. Galgotia Publications Pvt Ltd(2004)

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. 2nd Edition (2012)

Unit III

1. Principles of physical chemistry by Prutton and Marron. The Macmillan Company; 4th edition (1970)
2. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons.(2011)
3. Text Book of Physical Chemistry by Puri, Sharma and Pattania. Chand and Co.(2017)
4. Physical Chemistry by Atkins & De Paula, 8th Edition, **2009**
5. Text Book of Physical Chemistry by K. L. Kapoor. (2012)
6. Physical Chemistry through problems by S.K. Dogra. (2015)
7. Text Book of Physical Chemistry by R.P. Verma.
8. Elements of Physical Chemistry by Lewis Glasstone. Macmillan (1966)
9. Thermodynamics by Rajaram, [Vishal Publishing Co](#),(2013)

Unit IV

1. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd Wiley Publishers (2001).
2. Organic Spectroscopy, William Kemp Palgrave Macmillan; 2nd Revised edition edition (1 February 1987)
3. Principles of physical chemistry by Prutton and Marron.(The Macmillan Company; 4th edition (1970)
4. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons.(2011).
5. Text Book of Physical Chemistry by Puri,Sharmaand Pattania. chand and Co.(2017)
6. Thermodynamics by Rajaram. [Vishal Publishing Co](#).(2013)

Semester - VI

Laboratory Course

Paper VII

Qualitative and Spectral Analysis of Organic Compounds: 45hrs (3 h/w)

Qualitative analysis: Identification of an Organic compound through the functional group analysis, determination of melting points/boiling points, 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.

Spectral analysis Determination of structures from combined spectral data (IR, ¹H-NMR and Mass): Minimum of five problems.

B.Sc. Chemistry III Year

Semester-VI, Paper-VIII

Elective-A (3 Credits)

Medicinal Chemistry

45Hrs

Unit- I:Introduction and Terminology

11Hrs

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

Terminology in Medicinal Chemistry: Drug, 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. **ADME:**

- 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.

Unit-II: Enzymes and Receptors**11Hrs**

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, -NH₂ group, quaternary ammonium salts and double bond. Structure – activity relationships of drug molecules, explanation with sulfonamides.

Unit- III: Synthesis and Therapeutic Activity of Drugs**12Hrs**

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

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

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

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 Health Promoting Drugs**11Hrs**

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 .

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

Reference books

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

B.Sc. Chemistry III Year
Semester –VI, Paper-VIII
Elective-B (3 Credits)
Agricultural and Fuel Chemistry

45 Hrs

Unit I: – Pesticides

12Hrs

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, technical manufacture and uses of representative pesticides in the following classes: 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

11Hrs

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 fertilisers: Diaammonium 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, Azatobactor, 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

11Hrs.

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 bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification), Coal liquefaction and Solvent Refining.

Unit IV: Petroleum, Petrochemical Industry and Lubricants

11Hrs.

S6-E-B-IV: Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications.

Fractional Distillation - Principle and process, Cracking -Thermal and catalytic cracking, Reforming of Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from

biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene and their uses.

Lubricants: Classification of lubricants, Properties and functions of lubricants (viscosity index, cloud point, pour point) and their determination. Lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants.

Reference books

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

Semester - VI

Laboratory course

Experiments in Physical Chemistry-II

Paper VIII (Physical Chemistry)

45hrs (3 h/w)

1. Kinetics

- a) Determination of specific reaction rate of the hydrolysis of methyl acetate catalyzed by hydrogen ion at room temperature.
- b) Determination of rate of decomposition of hydrogen peroxide catalyzed by FeCl_3 .

2. Electrochemistry

A. Potentiometry:

- a) Determination of redox potential of $\text{Fe}^{2+}/\text{Fe}^{3+}$ by potentiometric titration of ferrous ammonium sulphate vs. potassium dichromate.
- b) Precipitation titration of KCl vs. AgNO_3 -Determination of given concentration of silver nitrate.

B. pH metry:

- a) pH metric titration of strong acid (HCl) vs. strong base- Determination of the concentration of the given acid.
- b) pH metric titration of weak acid(acetic acid) with strong base(NaOH).- Determination of acid dissociation constant (K_a) of weak acid.

3. Conductometry:

Determination of overall order: Saponification of ethyl acetate with NaOH by conductance measurements.

BOS Meeting-2019-20, Department of Chemistry
RESOLUTIONS

After discussion the following resolutions were adopted.

- 1) It was resolved to adopt the syllabus prescribed by Osmania University for B.Sc (Chemistry), & M.Sc(Organic Chemistry) (I and II Year) without making any major changes for the Academic year 2019-2020. This includes Course Structure, Course Objectives, Course Outcomes, credits, syllabus, and Instructional Hours under the reorganized CBCS.
- 2) It was resolved to follow the syllabus (for I to IV semesters) of Osmania University *in toto*. There will be 4 units and 5 credits(including theory and Practicals) for I to VI semesters of Chemistry for B.Sc. The students who are in the II & III year (III to VI semesters) will study the syllabus prescribed by the university last year (2018-19). The syllabus, question paper blue print for III and IV semesters will be followed as per the resolution taken in the last BoS meeting.
- 3) The question paper pattern will be followed as per the decision taken in the academic council. The pattern is 70:30. For B.Sc. I and II semester, there will be 2 sections, namely A and B. Section A consists of 8 questions, with choice of 6 questions by the student, each question carrying 5 marks. Section 'B' consists of 4 questions with internal choice, each question carrying 10 marks each. The blue print, scheme of examination submitted by the department of Chemistry was approved. Internal assessment consists of 5 multiple choice questions, 5 fill in the blanks (1 mark each) and 5 short answer questions (each question carries 2 marks).
- 4) For B.Sc. III, IV, V and VI semesters has also 70:30 pattern and there will be 3 sections, namely A, B and C. Section A consists of 8 questions, with choice of 4 questions by the student, each question carrying 2^{1/2} marks. Section B consists of 8 questions, with choice of 4 questions by the student, each question carrying 5 marks. Whereas section 'C' consists of 4 questions with internal choice, each question carrying 10 marks each. The blue print, scheme of examination submitted by the department of Chemistry was approved. Internal assessment consists of 5 multiple choice questions, 5 fill in the blanks (1 mark each) and 5 short answer questions (each question carries 2 marks).
- 5) It was resolved to approve the panel of examiners prepared by the department of Chemistry.
- 6) Practical Examination Pattern for both B.Sc. and M.Sc. will remain same as last year. Syllabus of M.Sc. (Organic Chemistry) is adopted *in toto*. Question paper pattern will be as per last academic year.

[Handwritten signature]

[Handwritten signature]
[Handwritten signature]
[Handwritten signature]

[Handwritten signature]
[Handwritten signature]

[Handwritten signature]

[Handwritten signature]

[Handwritten signature]
[Handwritten signature]

[Handwritten signature]

**Telangana State Council of Higher Education, Govt. of Telangana B.Sc., CBCS Common
Core Syllabi for all Universities in Telangana
PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
B.Sc., Chemistry from 2019-2020**

FIRST YEAR- SEMESTER I

CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS
BS 101	Ability Enhancement Compulsory Course AECC-1	ES	2	2
BS 102	English	CC-1A	4	4
BS 103	Second language	CC-2A	4	4
BS 104	Optional I	DSC-1A	4T+3P=7	4+1=5
BS 105	Optional II	DSC-2A	4T+3P=7	4+1=5
BS 106	Optional III- Chemistry - I	DSC-3A	4T } = 7 3P	4 } = 5 1
	Laboratory Course – I (Qualitative Analysis - Semi Micro Analysis of Mixtures)			
	Total Credits		31	25

FIRST YEAR- SEMSTER II

BS 201	Ability Enhancement Compulsory Course AECC-2	BCS	2	2
BS 202	English	CC-1B	4	4
BS 203	Second language	CC-2B	4	4
BS 204	Optional I	DSC-1B	4T+3P=7	4+1=5
BS 205	Optional II	DSC-2B	4T+3P=7	4+1=5
BS 206	Optional III- Chemistry - II	DSC-3B	4T } = 7 3P	4 } = 5 1
	Laboratory Course - II (Quantitative Analysis – Titrations)			
	Total Credits		31	25

SECOND YEAR- SEMSTER III

BS 301	i) Safety Rules in Chemistry Laboratory and Lab Reagents ii) Remedial methods for pollution, drinking water and Soil fertility	SEC-1 SEC-2	2 2	2 2
BS 302	English	CC-1C	3	3
BS 303	Second language	CC-2C	3	3
BS 304	Optional I	DSC-1C	4T+3P=7	4+1=5
BS 305	Optional II	DSC-2C	4T+3P=7	4+1=5
BS 306	Optional III- Chemistry - III	DSC-3C	4T } = 7 3P	4 } = 5 1
	Laboratory Course - III (Synthesis of Organic compounds)			
	Total Credits		31	25

SECOND YEAR- SEMSTER IV

BS 401	i) Materials and their Applications ii) Chemistry of Cosmetics and Food Processing	SEC-3 SEC-4	2 2	2 2
BS 402	English	CC-1D	3	3
BS 403	Second language	CC-2D	3	3
BS 404	Optional I	DSC-1D	4T+3P=7	4+1=5
BS 405	Optional II	DSC-2D	4T+3P=7	4+1=5
BS 406	Optional III- Chemistry - IV	DSC-3D	4T } = 7 3P	4 } = 5 1
	Laboratory Course - IV (Qualitative Analysis of Organic Compounds)			
	Total Credits		31	25

* AECC: Ability Enhancement Compulsory Course, SEC: Skill Enhancement Course, DSC: Discipline Specific Course, GE: Generic Elective, ES: Environmental Science , BCS : Basic computer skills.

B.Sc. I Yr CHEMISTRY
SEMESTER WISE SYLLABUS
SEMESTER I
Paper – I
Chemistry - I

Unit-I (Inorganic Chemistry) 15 h (1 hr/week)
S1- I-1. Chemical Bonding 8 h

Ionic solids- lattice and solvation energy, solubility of ionic solids, Fajan's rule, polarity and polarizability of ions. VSPER Theory - Common hybridization-sp, sp^2 , sp^3 , sp^3d , sp^3d^2 and sp^3d^3 , shapes of molecules. Molecular orbital theory: Shapes and sign convention of atomic orbitals. Modes of bonds. Criteria for orbital overlap. LCAO concept. π and σ overlapping. Concept of Types of molecular orbitals- bonding, antibonding and non bonding. MOED of homonuclear diatomics - H_2 , N_2 , O_2^- , O_2^{2-} , F_2 (unhybridized diagrams only) and heteronuclear diatomics CO , CN^- , NO , NO^+ and HF . Bond order, stability and magnetic properties.

S1-I-2. P-Block Elements 1 7 h

Group-13: Structure of diborane and higher Boranes (B_4H_{10} and B_5H_9), Boron nitrogen compounds ($B_3N_3H_6$ and BN), Lewis acid nature of BX_3 .
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 and interstitial. Reactivity - hydrolysis. Reactions of hydrazine, hydroxyl amine, phosphazenes.

Unit - II (Organic Chemistry) 15h(1 hr/week)

S1-O-1: Structural Theory in Organic Chemistry 5 h

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

S1-O-2: Acyclic Hydrocarbons 6 h

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_2O , HOX , H_2SO_4 with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition). Oxidation (cis - additions) - hydroxylation by $KMnO_4$, OsO_4 ,

anti addition- peracids (via epoxidation), hydroboration, ozonolysis – location of double bond. Dienes – Types of dienes, reactions of conjugated 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_2 , HX, H_2O (tautomerism), Oxidation (formation of enediol, 1,2 diones and carboxylic acids) and reduction (Metal-ammonia reduction, catalytic hydrogenation).

Aromatic Hydrocarbons

4h

Introduction to aromaticity: Huckel's rule – Benzene, Naphthalene and Anthracene. Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation and halogenation, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para, and meta directing groups. Ring activating and deactivating groups with examples. 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)

15h(1 hr/week)

S1-P-1: Atomic structure and elementary quantum mechanics

3 h

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.

S1-P-2: Gaseous State

5 h

Deviation of real gases from ideal behavior. van der Waals equation of state. Critical phenomenon. PV isotherms of real gases, continuity of state. Andrew's isotherms of CO_2 . The van der Waal's equation and critical state. Derivation of relationship between critical constants and van der Waal's 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.

S1-P-3: Liquid State and Solutions

4 h

Liquid State

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).

Solutions

3 h

Liquid - liquid mixtures, ideal liquid mixtures, Raoult's and Henry's laws. Non ideal systems. Azeotropes: HCl- H_2O and $C_2H_5OH - H_2O$ systems. Fractional distillation. Partially miscible liquids: Phenol – Water, Trimethyl amine – Water and Nicotine – Water systems.

Unit - IV (General Chemistry)

15h(1 hr/week)

S1-G-1. General Principles of Inorganic Qualitative Analysis

6 h

Anion analysis: Theory of sodium carbonate extract, classification and reactions of anions- CO_3^{2-} , Cl^- , Br^- , SO_4^{2-} , PO_4^{3-} , BO_3^{3-} , CH_3COO^- , 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 (Hg_2^{2+} , Ag^+ , 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 (Hg^{2+} , Pb^{2+} , Bi^{3+} , Cd^{2+} , Sb^{3+}), III (Al^{3+} , Fe^{3+}), IV (Mn^{2+} , Zn^{2+}) individual cations with flow chart and chemical equations. General discussion for the separation and identification of group V individual cations (Ba^{2+} , Sr^{2+} , Ca^{2+}) with flow chart and chemical equations. Theory of flame test. Identification of Group VI cations (Mg^{2+} , NH_4^+).

S1-G-2. Isomerism

5 h

Isomerism: Definition of isomers. Classification of isomers: Constitutional and Stereoisomers - definition and examples. Constitutional isomers: chain, functional and positional isomers. Stereoisomers: enantiomers and diastereomers – definitions and examples. Representation of stereoisomers – Wedge, Fischer 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- dichloroethane, 2-chloroethanol .Cyclic compounds: Baeyer's strain theory, Conformational analysis of cyclohexane

Cis-trans isomerism: E-Z-Nomenclature

S1-G-3: Solid state Chemistry

4 h

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 and CsCl (Bragg's method and Powder method).

References

General reference: B.Sc I Year Chemistry : Semester I, 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 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn
Wiley Publishers 2001. Chem.

- Inorganic Chemistry Principles of structure and reactivity by James E. Huhey, E.A. Keiter and R.L. Keiter 4th edn.
- Chemistry of the elements by N.N. Greenwood and A. Earnshaw Pergamon Press 1989.
- Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
- Textbook of Inorganic Chemistry by R Gopalan.

Unit- II

- Organic Chemistry by Morrison and Boyd.
- Organic Chemistry by Graham Solomons.
- Organic Chemistry by Bruce Yuranis Powla.
- Organic Chemistry by L. G. Wade Jr.
- Organic Chemistry by M. Jones, Jr
- Organic Chemistry by John McMurry.
- Organic Chemistry by Soni.
- General Organic chemistry by Sachin Kumar Ghosh.
- Organic Chemistry by C N Pillai

Unit III

- Principles of physical chemistry by Prutton and Marron.
- Text Book of Physical Chemistry by Soni and Dharmahara..
- Text Book of Physical Chemistry by Puri and Sharma.
- Text Book of Physical Chemistry by K. L. Kapoor.
- Physical Chemistry through problems by S.K. Dogra.
- Text Book of Physical Chemistry by R.P. Verma.
- Elements of Physical Chemistry by Lewis Glasstone.

Unit IV

- Qualitative analysis by Welcher and Hahn.
- Vogel's Qualitative Inorganic Analysis by Svehla.
- Text Book of Organic Chemistry by Morrison And Boyd.
- Text Book of Organic Chemistry by Graham Solomons.
- Text Book of Organic Chemistry by Bruce Yuranis Powla.
- Text Book of Organic Chemistry by Soni.
- Text Book of Physical Chemistry by Soni And Dharmahara..
- Text Book of Physical Chemistry by Puri And Sharma.
- Text Book of Physical Chemistry by K. L. Kapoor.

Laboratory Course

45h (3 h / week)

Paper I - Qualitative Analysis - Semi micro analysis of mixtures

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

Anions: CO_3^{2-} , SO_3^{2-} , S^{2-} , Cl^- , Br^- , I^- , CH_3COO^- , NO_3^- , PO_4^{3-} , BO_3^{3-} , SO_4^{2-} . .

Cations: Hg_2^{2+} , Ag^+ , Pb^{2+}

Hg^{2+} , Pb^{2+} , Bi^{3+} , Cd^{2+} , Cu^{2+} , $As^{3+/5+}$, $Sb^{3+/5+}$, $Sn^{2+/4+}$

Al^{3+} , Cr^{3+} , Fe^{3+}

Zn^{2+} , Ni^{2+} , Co^{2+} , Mn^{2+}

Ba^{2+} , Sr^{2+} , Ca^{2+}

Mg^{2+} , NH_4^+

B.Sc I Yr CHEMISTRY
SEMESTER WISE SYLLABUS
SEMESTER II
Paper – II
Chemistry – II

Unit-I (Inorganic Chemistry)

15 h (1 hr/week)

S2-I-1 P-block Elements -II

7 h

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, Cl and I. Redox properties of oxyacids of Nitrogen: HNO₂ (reaction with FeSO₄, KMnO₄, K₂Cr₂O₇), HNO₃ (reaction with H₂S, Cu), HNO₄ (reaction with KBr, Aniline), H₂N₂O₂ (reaction with KMnO₄). Redox properties of oxyacids of Phosphorus: H₃PO₂ (reaction with HgCl₂), H₃PO₃ (reaction with AgNO₃, CuSO₄). Redox properties of oxyacids of Sulphur: H₂SO₃ (reaction with KMnO₄, K₂Cr₂O₇), H₂SO₄ (reaction with Zn, Fe, Cu), H₂S₂O₃ (reaction with Cu, Au), H₂SO₅ (reaction with KI, FeSO₄), H₂S₂O₈ (reaction with FeSO₄, KI). Redox properties of oxy acids of Chlorine.

Interhalogens- Classification- general preparation- structures of AB, AB₃, AB₅ and AB₇ type and reactivity.

Poly halides- Definition and structure of ICl₂⁻, ICl₄⁻ and I₃.

Pseudohalogens: Comparison with halogens.

S2-I-2: Chemistry of Zero group elements

2 h

Isolation of noble gases, Structure, bonding and reactivity of Xenon compounds – Oxides, Halides and Oxy-halides. Clathrate compounds and Anomalous behavior of He (II)

S2-I-3: Chemistry of d-block elements

6 h

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 standard reduction potentials. 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)

15h(1 hr/week)

S2-O-1: Halogen compounds

4 h

Classification: alkyl (primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl. Chemical reactivity - reduction, formation of RMgX, Nucleophilic substitution reactions – classification into S_N1 and S_N2. Mechanism and energy profile diagrams of S_N1 and S_N2 reactions. Stereochemistry of S_N2 (Walden Inversion) 2-bromobutane, S_N1 (Racemisation) 1-bromo-1-phenylpropane Structure and reactivity – Ease of hydrolysis - comparison of alkyl, vinyl, allyl, aryl, and benzyl halides.

S2-O-2: Hydroxy compounds and ethers

6 h

Alcohols: Preparation: 1°, 2° and 3° alcohols using Grignard reagent, Reduction of Carbonyl compounds, carboxylic acids and esters. Physical properties: H-bonding, Boiling point and Solubility. Reactions with Sodium, HX/ZnCl₂ (Lucas reagent), esterification, oxidation with PCC, alk. KMnO₄, acidic dichromates, conc. HNO₃ and Oppenauer oxidation (Mechanism).

Phenols: Preparation: (i) from diazonium salts of anilines, (ii) from benzene sulphonic acids and (iii) Cumene hydroperoxide .

Properties: Acidic nature, formation of phenoxide and reaction with R-X, electrophilic substitution; halogenations, Reimer Tiemann reaction (Mechanism), Kolbe reaction (Mechanism), Gattermann-Koch reaction, Azo-coupling reaction, Schotten-Boumann reaction, Houben-Hoesch condensation, .

Ethers: Nomenclature, preparation by (a) Williamson's synthesis (b) from alkenes by the action of conc. H₂SO₄. Physical properties – Absence of Hydrogen bonding, insoluble in water, low boiling point. Chemical properties – inert nature, action of conc. H₂SO₄ and HI.

S2-O-3 Carbonyl compounds

5 h

Preparation of aldehydes & ketones from acid chloride, 1,3-dithianes, nitriles and from carboxylic acids. Special methods of preparing aromatic aldehydes and ketones by (a) Oxidation of arenes (b) Hydrolysis of benzal halides Physical properties – absence of Hydrogen bonding. Reactivity of the carbonyl groups in aldehydes and ketones. Chemical reactivity: Addition of (a) NaHSO₃ (b) HCN (c) RMgX (d) NH₃ (e) RNH₂ (f) NH₂OH (g) PhNHNH₂ (h) 2,4-DNP (Schiff bases). Addition of H₂O to form hydrate, chloral hydrate (stable), addition of alcohols - hemiacetal and acetal formation. Cannizzaro reaction. Oxidation reactions – KMnO₄ oxidation and auto oxidation, reduction – catalytic hydrogenation, mechanism of Clemmenson's reduction, Wolff-kishner reduction, Meerwein-Ponndorf Verly reduction. Reduction with LAH, NaBH₄.

Unit - III (Physical Chemistry)

15h(1 hr/week)

S2-P-1: Electrochemistry

15 h

Electrical transport – conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of specific and equivalent conductance with dilution. Migration of ions and Kohlrausch's law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law - its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf's method for attackable electrodes. Applications of conductivity measurements: Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Electrolytic and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells. Electro motive force (EMF) of a cell and its measurement. Computation of EMF. Types of reversible electrodes- the gas electrode, metal-metal ion, metal-insoluble

salt and redox electrodes. Electrode reactions, Nernst equation, cell EMF and Single electrode potential, Standard Hydrogen electrode – reference electrodes (calomel electrode) – standard electrode potential, sign conventions, electrochemical series and its significance. Applications of EMF measurements. Calculation of thermodynamic quantities of cell reactions (Gibbs free energy G, Helmholtz free energy and Equilibrium constant K). Determination of pH using hydrogen electrode, glass electrode and quinhydrone electrode. Solubility product of AgCl. Potentiometric titrations.

Unit – IV (General Chemistry)

15 h (1 hr/week)

S2-G-1: Theory of Quantitative Analysis

6 h

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. Theory of redox titrations - internal(KMnO₄) and external indicators – use of diphenylamine and ferroin indicators. Theory of complexometric titrations – use of EBT, Murexide and Fast sulphone black indicators. Role of pH in complexometric titrations. Precipitation titrations – theory of adsorption indicators.

Gravimetric analysis- Introduction, nucleation, precipitation, growth of precipitate, filtration and washing, drying and incineration of precipitate, coprecipitation and post precipitation. Determination of Ni²⁺

S2-G-2: Stereoisomerism

5 h

Optical activity: Definition, wave nature of light, plane polarised light, optical rotation and specific rotation, chiral centers. Chiral molecules: definition and criteria - absence of plane, center and S_n axis of symmetry – asymmetric and dissymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and dissymmetric molecules (trans-1,2-dichlorocyclopropane). Molecules with constitutionally symmetrical chiral carbons (Tartaric acid) Molecules with constitutionally unsymmetrical chiral carbons (2,3dibromopentane). D, L configuration – examples. R, S – configuration: Cahn-Ingold-Prelog rules, examples for asymmetric and dissymmetric molecules.

S2-G-3: Dilute Solutions & Colligative Properties

4 h

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.

References

General reference: B.Sc I Year Chemistry : Semester II, 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 3rd edn.
3. Basic Inorganic Chemistry by F.A. Cotton, G. Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001.
4. Chemistry of the elements by N.N. Greenwood and A. Earnshaw Pergamon Press 1989.
5. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
6. Inorganic Chemistry Principles of structure and reactivity by James E. Huhey, E.A. Keiter and R.L. Keiter 4th Edn.
7. Textbook of inorganic chemistry by R Gopalan.

Unit II

1. Organic Chemistry by Morrison and Boyd.
2. Organic Chemistry by Graham Solomons.
3. Organic Chemistry by Bruice Yuranis Powla.
4. Organic Chemistry by L. G. Wade Jr.
5. Organic Chemistry by M. Jones, Jr
6. Organic Chemistry by John McMurry.
7. Organic Chemistry by Soni.
8. General Organic chemistry by Sachin Kumar Ghosh.
9. Organic Chemistry by C N Pillai

Unit III

1. Physical chemistry by P W Atkins
2. Principles of physical chemistry by Prutton and Marron.
3. Text Book of Physical Chemistry by Soni and Dharmahara.
4. Text Book of Physical Chemistry by Puri and Sharma
5. Text Book of Physical Chemistry by K. L. Kapoor
6. Physical Chemistry through problems by S.K. Dogra.
7. Elements of Physical Chemistry by Lewis and Glasstone.
8. Material science by Kakani & Kakani

Unit IV

1. Vogel's Text Book of Quantitative Analysis by G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney 5th edn Addison Wesley Longman Inc. 1999.
2. Quantitative Analysis by Day and Underwood Prentice Hall (India) VI Edn..
3. Nano: The Essentials by T. Pradeep, McGraw-Hill Education.
4. Chemistry of nanomaterials: Synthesis, Properties and applications by CNR Rao et.al.
5. Nanostructured Materials and Nanotechnology, edited by Hari Singh Nalwa, Academic Press
6. Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati.

Laboratory Course

45hrs (3 h / week)

Paper II- Quantitative Analysis

Acid - Base titrations

1. Estimation of Carbonate in Washing Soda.
2. Estimation of Bicarbonate in Baking Soda.
3. Estimation of Carbonate and Bicarbonate in the Mixture.

4. Estimation of Alkali content in Antacid using HCl.

5. Estimation of NH_4^+ by back titration

Redox Titrations

1. Determination of Fe(II) using $K_2Cr_2O_7$

2. Determination of Fe(II) using $KMnO_4$ with sodium oxalate as primary standard.

3. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard

Complexometric Titrations

1. Estimation of Mg^{2+}

2. Estimation of Cu^{2+}

B.Sc II Yr CHEMISTRY
SEMESTER WISE SYLLABUS
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

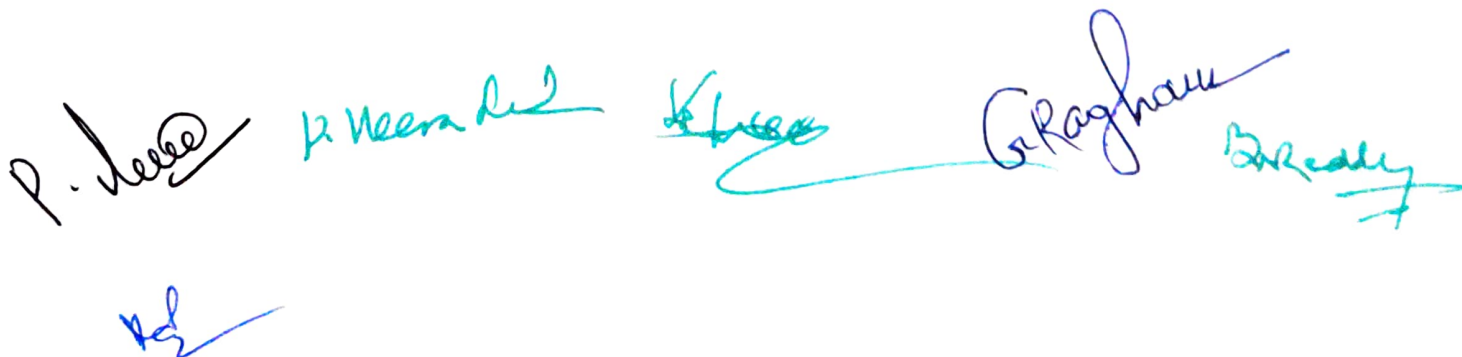
6 h

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 $[Ni(NH_3)_4]^{2+}$, $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ (b) Square planar complexes $[Ni(CN)_4]^{2-}$, $[Cu(NH_3)_4]^{2+}$, $[PtCl_4]^{2-}$ (c) Octahedral complexes $[Fe(CN)_6]^{4-}$, $[Fe(CN)_6]^{3-}$, $[FeF_6]^{4-}$, $[Co(NH_3)_6]^{3+}$, $[CoF_6]^{3-}$. Limitations of VBT. 3. Isomerism in coordination compounds, stereo isomerism – (a) geometrical isomerism in (i) square planar meta l complexes of the type $[MA_2B_2]$, $[MA_2BC]$, $[M(AB)_2]$, $[MABCD]$. (ii) Octahedral metal complexes of the type $[MA_4B_2]$, $[M(AA)_2B_2]$, $[MA_3B_3]$ using suitable examples, (b) Optical isomerism in (i). tetrahedral complexes $[MABCD]$, (ii). Octahedral complexes $[M(AA)_2B_2]$, $[M(AA)_3]$ using suitable examples. Structural isomerism: ionization, linkage, coordination ligand isomerism using suitable examples.

RESOLUTIONS

After discussion the following resolutions were adopted.

- 1) It was resolved to adopt the syllabus prescribed by Osmania University for B.Sc (Chemistry), & M.Sc(Organic Chemistry) (I and II Year) without making any major changes for the Academic year 2020-2021. This includes Course Structure, Course Objectives, Course Outcomes, credits, syllabus, and Instructional Hours under the reorganized CBCS.
- 2) It was resolved to follow the syllabus (for I to IV semesters) of Osmania University *in toto*. There will be 4 units and 5 credits(including theory and Practicals) for I to VI semesters of Chemistry for B.Sc. The students who are in the III year (V to VI semesters) will study the syllabus prescribed by the university for the academic year-2018-19. The syllabus, question paper blue print for VI and VI semesters will be followed as per the resolution taken in the last BoS meeting.
- 3) The question paper pattern will be followed as per the decision taken in the academic council. The pattern is 70:30. For B.Sc. I-VI semester, there will be 2 sections, namely A and B. Section A consists of 8 questions, with choice of 6 questions by the student, each question carrying 5 marks. Section 'B' consists of 4 questions with internal choice, each question carrying 10 marks each. The blue print, scheme of examination submitted by the department of Chemistry was approved. Internal assessment consists of 5 multiple choice questions, 5 fill in the blanks (1 mark each) and 5 short answer questions (each question carries 2 marks).
- 4) It was resolved to approve the panel of examiners prepared by the department of Chemistry.
- 5) Practical Examination Pattern for both B.Sc. and M.Sc. will remain same as last year. Syllabus of M.Sc. (Organic Chemistry) is adopted *in toto*. Question paper pattern will be as per last academic year.
- 6) In the present pandemic situation of COVID-19 any regulations and guidelines given by UGC, New Delhi, Higher education, Govt. of Telangana and Osmania University, Hyderabad will be adopted and implemented accordingly.

A series of handwritten signatures in blue ink, including names like P. Jeeva, K. Neeraj, K. Suresh, G. Raghava, and B. Reddy.

4. Estimation of Alkali content in Antacid using HCl.
5. Estimation of NH_4^+ by back titration

Redox Titrations

1. Determination of Fe(II) using $K_2Cr_2O_7$
2. Determination of Fe(II) using $KMnO_4$ with sodium oxalate as primary standard.
3. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard

Complexometric Titrations

1. Estimation of Mg^{2+}
2. Estimation of Cu^{2+}

B.Sc II Yr CHEMISTRY
SEMESTER WISE SYLLABUS
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 $[Ni(NH_3)_4]^{2+}$, $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ (b) Square planar complexes $[Ni(CN)_4]^{2-}$, $[Cu(NH_3)_4]^{2+}$, $[PtCl_4]^{2-}$ (c) Octahedral complexes $[Fe(CN)_6]^{4-}$, $[Fe(CN)_6]^{3-}$, $[FeF_6]^{4-}$, $[Co(NH_3)_6]^{3+}$, $[CoF_6]^{3-}$. Limitations of VBT. 3. Isomerism in coordination compounds, stereo isomerism – (a) geometrical isomerism in (i) square planar meta I complexes of the type $[MA_2B_2]$, $[MA_2BC]$, $[M(AB)_2]$, $[MABCD]$. (ii) Octahedral metal complexes of the type $[MA_4B_2]$, $[M(AA)_2B_2]$, $[MA_3B_3]$ using suitable examples, (b) Optical isomerism in (i). tetrahedral complexes $[MABCD]$, (ii). Octahedral complexes $[M(AA)_2B_2]$, $[M(AA)_3]$ using suitable examples. Structural isomerism: ionization, linkage, coordination ligand isomerism using suitable examples.

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 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^o, 2^o, 3^o 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^o, 2^o, 3^o (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration, oxidation of aryl and 3^o 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, NO₂, 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)

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 ΔH and ΔV .

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 ΔG 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 α -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.

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-H₂O 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 3rd edn Van Nostrand Reinhold Company(1977)
4. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
5. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
6. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
7. Inorganic Chemistry by Shriver and Atkins 3rd 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 Bruice 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; 4th 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)

2. Text book of organic chemistry by Graham solomons, Wiley(2015)
3. Text book of organic chemistry by Sony, Sultan Chand & Sons; 29th 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 β -Naphthol.

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

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 tetrahedral, tetrahedral, square planer 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⁻). Toxic metal ions As, Hg & Pb Oxygen transport and storage – structure of hemoglobin, binding and transport of oxygen. Fixation of CO₂ 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⁺ (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

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 – ketohexose 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 3rd edn. Van Nostrand Reinhold Company(1977)
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
4. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
5. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
6. Inorganic Chemistry by Shriver and Atkins 3rd 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; 4th 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 3rd edn. Van Nostrand Reinhold Company (1977)
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
4. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th 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.

B.Sc. Chemistry II Year Semester-III
Skill Enhancement Course- I (SEC-I) (2 Credits)
Rules in Chemistry Laboratory and Lab Reagents

Unit I: Laboratory Safety Rules and Regulations **15 h (1 hr/week)**

General rules and regulations for lab safety: Minimizing Risks of Hazards, Personal Protective Equipment (PPE) - Hair, Dressing for the Laboratory, Eye Protection, Eyewash fountain, Gloves, Laboratory Protocols, Labeling Chemicals, Careful reading of labels Prevention of Inhaling Harmful Chemicals, Guide to Chemical Hazards, Chemical Spills etc.,. Accidents use of fire extinguisher and first aid kit in the laboratory, safety symbols- Preparation of the charts by the students and display of charts in chemistry labs. Calibration of fractional weights, calibration of glass ware - burette, pipette, standard flask, Normality/Molarity and specific gravity of concentrated acids – Preparation of dilute solutions (Numerical problems). Precautions to be taken in the preparation of dilute acids and bases and bases. Preparation of stock solutions of salts with specific examples. Properties of primary standard salt and preparation of standard solution. Good laboratory practices-maintenance of observation book record.

UNIT 2: Preparation of Lab Reagents **15 h (1 hr/week)**

Preparation of indicators and use of indicators in volumetric analysis- acid base titrations, redox titrations, precipitation titrations and complexometric titrations. Role of an indicator in detecting end point (Phenolphthalein, Methyl orange, Methyl-red, Potassium Chromate, Diphenylamine, EBT, Murexide, etc). Preparation of buffers – pH 10 ammonical buffer and acetate buffer solutions. Preparation of commonly used reagents : Ammonium hydroxide solution, Ammonium molybdate reagent, Ammonium hydrogen phosphate solution, Bayer's reagent, Benedict's solution, Bromine water, Dimethyl glyoxime reagent, 2,4-Dinitrophenyl hydrazine reagent, Eriochrome black-T reagent Fehling solution, Ferric chloride solution, Ferrous sulphate solution, Iodine solution, Molisch's reagent, Nessler's reagent, Neutral FeCl_3 , Schiff's reagent, Silver nitrate solution, Sodium carbonate solution , Sodium hydroxide (Caustic soda) solution, Starch solution, Tollen's reagent. (reference work and submission of assignments). Charts preparation depicting course content.

RECOMMENDED BOOKS

1. Vogel's Text Book of Quantitative Chemical Analysis, 5th edition.
2. Vogel's Text Book of macro and semimicro qualitative inorganic analysis. G. Svehla, 5th edition.
3. Chemistry Reagent Manual Prepared by Chemistry Department, SGTB Khalsa College under DBT's Star College Scheme, University of Delhi (Available: online)
4. American Chemical Society Safety in Academic Chemistry Laboratories 8th edition.

[Course objectives (CO)]: To improve the skills of students in the application of theory and practical knowledge. To fill the gap between theory and practicals. To train the students in understanding laboratory safety rules and to improve the skills in preparation of laboratory reagents]

B.Sc. Chemistry II Year

Semester III

Skill Enhancement Course- II (SEC –II) (2 Credits)

REMEDIAL METHODS FOR POLLUTION, DRINKING WATER AND SOIL

FERTILITY STANDARDS

UNIT I: Remedial Methods for Pollution Prevention and control of air pollution

15 h (1 hr/week)

Ozone hole-causes and harm due to ozone depletion. The effect of CFC's in Ozone depletion and their replacements. Global Warming and Greenhouse Effect Precautions to control global warming. Deleterious effect of pollutants - Endangered Monuments- acid rain. Precautions to protect monuments. Sources of Radiation pollution - Chernobyl accident and its Consequences. Radiation effect by the usage of cell phones and protection tips. Deleterious effects of cell phone towers and health hazards.

Sources of water pollution-(i). Pollution due to pesticides and inorganic chemicals, (ii). Thermal pollution (iii). Ground water pollution (iv). Eutrophication.

Methods for control of water pollution and water recycling. Dumping of plastics in rivers & oceans and their effect on aquatic life. Determination of (i) Dissolved Oxygen and (ii) Chemical Oxygen Demand in polluted water - Illustration through charts (or) demonstration of experiments. Sources of soil pollution (i). Plastic bags, (ii). Industrial and (iii). Agricultural sources. Control of soil pollution. Environmental laws in India. Environmental benefits of planting trees.

UNIT II: Drinking Water and Soil Fertility Standards and Analysis

15 h (1 hr/week)

Water Quality and Common Treatments for Private Drinking Water Systems: Drinking Water Standards-Primary Drinking Water Standards : Inorganics, Organics and Volatile Organic Chemicals. Secondary Drinking Water Standards-Inorganics and Physical Problems. Water Testing, Mineral Analysis, Microbiological Tests, Pesticide and Other Organic Chemical Tests. Principle involved in Water Treatment Techniques. (i) Reverse osmosis (ii) Disinfection methods such as chlorination, ultraviolet light, ozonation etc (iii) Chemical oxidation and (iv) Ion exchange (water softeners). Visit to nearby drinking water plants and interaction at sites.

Introduction to Soil Chemistry- Basic Concepts. Effect of pH on nutrient availability. Macronutrients and their effect on plants -Carbon, Hydrogen, Oxygen, Nitrogen and Phosphorus other macronutrients-Calcium, Magnesium and Sulfur. Micronutrients and their effect on plants. Boron ($B_4O_7^{2-}$), Copper (Cu^{2+}), Iron (Fe^{2+} , Fe^{3+}) Manganese (Mn^{2+}) Molybdenum (MoO_4^{2-}) Zinc (Zn^{2+}) Cobalt (Co^{2+}) Chlorine (Cl^-) and Others. Determination of soil nitrogen by Kjeldahl method- Illustration through charts (Or) demonstration of experiment. Visit to nearby agricultural farms and interaction with farmers. Discussion with farmers on the use of Soil Analysis Kits.

References

1. A Text book for 'Remedial methods for pollution, drinking water and soil fertility standards', First Edition, Authors: Dr Mudvath Ravi, Gopu Srinivas, Putta Venkat Reddy, Vuradi Ravi Kumar, Battini Ushaiah, ISBN No. 978-93-5311-183-0.
2. Remedial methods for pollution, drinking water and soil fertility standards, Author: Dr G. Vanjatha.
3. Remedial methods for pollution, drinking water and soil fertility standards, Telugu version, Authors: Dr N. Yogi Babu, Dr. G. Vanajatha, M. Srilatha.
4. Environmental Pollution, download.nos.org/333courseE/10.pdf
5. CFC Replacements, butane.chem.uiuc.edu/pshapley/Environmental/L21/3.html
6. Effects of Acid Rain on Buildings www.air-quality.org.uk/12.php
7. Acid Rain Effects - Buildings - Chemistry chemistry.elmhurst.edu/vchembook/196buildings.html
8. How to protect national heritage - ways to protect monuments www.youthkiawaaz.com/2011/03/how-to-protect-national-heritage/.
9. Chernobyl nuclear power plant accident - NRC www.nrc.gov/reading-rm/doc-collections/fact-sheets/chernobyl-bg.pdf
10. Side-effects of harmful radiation from mobile phones and towers pib.nic.in/newsite/printrelease.aspx?relid=116304
11. Cell Phone Radiation Protection - Highly Effective Tips <https://www.electricsense.com/775/how-to-protect-yourself-from-cell-phone-radiation/>
12. Chemical Waste That Impact on Aquatic Life or Water Quality blog.idrenvironmental.com/chemical-waste-that-impact-on-aquatic-life-or-waterquality
13. Trees and Your Environment - Clean Air Gardening www.cleanairgardening.com/plantingtrees
14. water quality and common treatments for private drinking water . extension.uga.edu/publications/detail.html?number=b939
15. Soil chemistry <https://casfs.ucsc.edu/about/publications/Teaching-Organic-Farming/PDFdownloads/2.2-soil-chemistry.pdf>
16. Soil Analysis-Determination of Available Nitrogen ... - Amrita Virtual Lab vlab.amrita.edu/?sub=2&brch=294&sim=1551&cnt=1
17. Determination of dissolved oxygen (DO) www.cutm.ac.in/pdf/env%20engg%20lab%20manual.pdf
18. Determination of chemical oxygen demand of wastewater www.pharmaguideline.com › quality control › test

B.Sc. Chemistry II Year

Semester - IV

Skill Enhancement Course- III (SEC - III) (2 Credits)

Materials and their Applications

Unit – I: Types of Materials

15 h (1 hr/week)

Introduction: Materials and their importance. Classification of Materials, Advanced materials and their need. Types of Materials: Metals, ceramics, polymers and composites; Nature of bonding (Type of bond present). Types and applications of metal alloys: Classification- ferrous and non-ferrous alloys. Ferrous alloys -types and their applications. Non-ferrous alloys – Cu, Al, Ti alloys, their applications and super alloys.

Field Work- Collection of Metal Alloy Samples.

Types and Applications of Ceramics: Classification of Ceramics based on their application- glasses, clay products, refractories, abrasives, cements, and advanced ceramics. Glasses: Compositions and Characteristics of Some of the Common Commercial Glasses; Properties and applications of glass ceramics - preparation of charts depicting various types of glass and their use. Clay products: Structural clay products and the white wares. Refractories: Compositions of four Common Ceramic Refractory Materials, fireclay, silica, basic refractories ex. MgO and special refractories ex. Alumina and Zirconia Cements: Classification, preparation of cement and the setting process; quick setting cements; applications.

Field Work-Visit to industries and collection of samples of materials

Unit – II: Types of Polymers and Applications

15 h (1 hr/week)

Classification of Polymeric materials based on application: Coatings, adhesives, films, foams with examples Polymer Additives: Fillers, Plasticizers, Stabilizers, Colorants, Flame Retardants with examples.

Advanced Materials: Types of advanced materials - semiconductors, bio-compatible materials, smart materials, advanced polymeric materials and nano-engineered materials. Biocompatible materials: Definition. Materials used as biomaterials and their properties. Metals and alloys used in bone and joint replacement. Filling and restoration materials – dental cements, dental amalgams, dental adhesives.

Field Work- Visit to Dental Clinics and interaction with Doctors regarding materials used in Dental treatments.

Smart materials: Shape memory alloys- definition and examples (Ni-Ti alloys, Cu based alloys), applications. Conducting polymers: - Introduction, Electrically conducting polymers and their uses (polyaniline, polypyrrole, polyacetylene and polythiophene).

References

1. William D. Callister Materials Science and Engineering An Introduction, John Wiley & Sons, Inc, 2006.
2. Material science by Kakani and Kakani.
3. Sujata V., Bhat., —Biomaterials‡, Narosa Publication House, New Delhi, 2002.
4. M. V. Gandhi and B. S. Thompson, —Smart Materials and Structures‡, Chapman and Hall, London, First Edition, 1992.
5. Duerig, T. W., Melton, K. N, Stockel, D. and Wayman, C.M., —Engineering aspects of Shapememory Alloys‡, Butterworth – Heinemann, 1990.
6. Conducting Polymers, Fundamentals and Applications A Practical Approach Authors: Chandrasekhar, Prasanna Ashwin-Ushas Corp., Inc. Kluwer Academic Publishers. Boston

B.Sc. Chemistry II Year Semester IV
Skill Enhancement Course- IV (SEC - IV) (2 Credits)
Chemistry of Cosmetics and Food Processing

Unit-I: Chemistry of Cosmetics and Perfumes

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, sunscreen lotions, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours. Essential oils and their importance in cosmetic industries with reference to eugenol, geraniol, sandalwood oil, eucalyptus, 2-phenyl ethyl alcohol. Demonstration experiments or illustration of experimental procedures through charts for the preparation of talcum powder, shampoo and vanishing cream. Analysis of deodorants and antiperspirant - Aluminum, Zinc, Boric acid, Chloride and Sulphide.

Unit-II: Food Processing and Food Adulteration

Food processing: Introduction, methods for food processing, additives and preservatives. Food processing- impact on nutrition, analysis of calcium in milk by complexometric titration, spectrophotometric analysis of iron in foods, Spectrophotometric identification and determination of caffeine and benzoic acid in soft drinks. Field Work -Visit to Food Industries. Food adulteration: Adulterants in some common food items and their identification: Pulses, chilli powder, turmeric powder, milk, honey, spices, food grains and wheat flour, coffee powder, tea leaves, vegetable oil, ghee, ice creams, tomato sauce. Field Work-Collection of adulterated food samples, demonstration of a minimum of five experiments for testing adulterants in food items.

References

1. E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.
2. P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi
3. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).
4. Rameen Devi, Food Processing and Impact on Nutrition, Sc J Agric Vet Sci., AugSep 2015; 2(4A):304-311.
5. W.A. Poucher, Perfumes, Cosmetics and Soaps (1993).
6. Srilakshmi, Food Science. Edition: 3rd (2004). 7. Lillian Hoagland Meyer, Food chemistry (2008).
8. Handbook of Analysis and Quality Control for Fruit and Vegetable Products, S. Ranganna, Tata McGraw-Hill Education, 1986 – Food.
9. Fundamental concepts of applied chemistry J.C Ghosh, S. Chand and Co, Ltd, New Delhi.
10. Applied Chemistry K .Bhagavathi Sundhar, MJP publishers.

B.Sc. CBCS CHEMISTRY
Theory Model Question Paper
For
Semester I, II, III, IV

Time : 3 Hrs.

Max.Marks : 80

Note: Answer eight questions from Part-A and all questions from Part-B. Each question carries 4 marks in Part-A and 12 marks in Part-B.

Part-A

(8 x 4 = 32 Marks)

(Short Answer Type)

I. Write any **Eight questions of the following**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.

Part-B

(4 x 12 = 48 Marks)

(Essay Answer Type)

II. Answer all Questions

1 a)

(OR)

b)

2 a)

(OR)

b)

3 a)

(OR)

b)

4 a)

(OR)

b)

B.Sc. CBCS CHEMISTRY
Practical Model Question Paper
For
Semester I, II, III, IV

Time : 3 Hrs.

Max.Marks : 50

SEMESTER	External (Marks)	Internal (Marks)	Total (Marks)
I	40	10	50
II	40	10	50
III	40	10	50
IV	40	10	50

RESOLUTIONS

After discussion the following resolutions were adopted.

- 1) It was resolved to adopt the syllabus prescribed by Osmania University for M.Sc(Organic Chemistry) (I and II Year) without making any major changes for the Academic year 2021-2022. Whereas, for B.Sc.(Chemistry) a few changes have been made in Semester-II, IV and VI based on the local market needs and to impart employability among the students.
- 2) In the BSc Semester-II, **Water Chemistry** was introduced as there is a huge demand for Water Chemical Analysts owing to several packaged drinking water industries were located in Sangareddy region.
- 3) In the BSc Semester-IV, **Chemistry of Beverages** was introduced to bridge the skill gap and provide employability in Beverage industry as Global giants of Beverages like Pepsi and Cocacola are located in Sangareddy and Patancheru industrial corridor.
- 4) Sangareddy and Patancheru are well-known towns for pharmaceutical hub. The students hail from this area could get benefit of the paper **Drug Analysis**. In this regard, the paper has been introduced in BSc Semester-IV to make the students industry ready.
- 5) Course Structure, Course Objectives, Course Outcomes, credits, syllabus, and Instructional Hours under the reorganized CBCS pattern were also included.
- 6) It was resolved to follow the syllabus (for MSc(Organic Chemistry)-I to IV semesters) of Osmania University *in toto*. The syllabus, question paper blue print and credits pattern for I-IV semesters will be followed as per the resolution taken in the last BoS meeting.
- 7) There will be 4 units and 5 credits (including theory and Practicals) for I to VI semesters of Chemistry for B.Sc.
- 8) The question paper pattern will be followed as per the decision taken in the academic council. The pattern is 70:30. For B.Sc. I-VI semester, there will be 2 sections, namely A and B. Section A consists of 8 questions, with choice of 6 questions by the student, each question carrying 5 marks. Section 'B' consists of 4 questions with internal choice, each question carrying 10 marks each. The examination duration will be 2^{1/2} hours. The blue print, scheme of examination submitted by the department of Chemistry was

vii

approved. Internal assessment consists of 5 multiple choice questions, 5 fill in the blanks (1 mark each) and 5 short answer questions (each question carries 2 marks).

9) It was resolved to approve the list of panel of examiners prepared by the department of Chemistry.

10) Practical Examination Pattern for both B.Sc. and M.Sc. will remain same as last year. Syllabus of M.Sc. (Organic Chemistry) is adopted *in toto*. Question paper pattern will be as per last academic year. The question paper pattern will be followed as per the decision taken in the academic council. The pattern is 70:30. For M.Sc. I-IV semester, there will be 2 sections, namely A and B. Section A consists of 8 questions, with choice of 5 questions by the student, each question carrying 6 marks. Section 'B' consists of 4 questions with internal choice, each question carrying 10 marks each. The examination duration will be 2^{1/2} hours. The blue print, scheme of examination submitted by the department of Chemistry was approved. Internal assessment consists of 10 multiple choice questions and 10 fill in the blanks (1 mark each).

11) In the present pandemic situation of COVID-19 any regulations and guidelines given by UGC, New Delhi, Higher education, Govt. of Telangana and Osmania University, Hyderabad will be adopted and implemented accordingly. Meanwhile, the COVID-19 examination pattern has also been included. The pattern is 70:30. For B.Sc. I-VI semester, there are 2 sections, namely, Section A and B. Section A consists of 8 questions, with choice of 4 questions, each question carrying 2^{1/2} marks. Section 'B' consists of 8 questions with choice of 4 questions, each question carrying 15 marks. Internal assessment consists of 5 multiple choice questions, 5 fill in the blanks (1 mark each) and 5 short answer questions (each question carries 2 marks). The external examination duration is 2 hours. For MSc-Organic Chemistry, I-IV semesters, there will also be 2 sections, namely, Section A and B. Section A consists of 8 questions, with choice of 5 questions, each question carrying 5 marks. Section 'B' consists of 8 questions with choice of 3 questions, each question carrying 15 marks.

12) Certificate course in **“Concepts and Analytical techniques in Pharmaceutical chemistry and Organic Synthesis”** designed and approved for Employability and Skill Development based on the local market needs.

B.Sc., Chemistry, III Year, CBCS Syllabus

**Telangana State Council of Higher Education, Govt. of Telangana B.Sc, CBCS Common
Core Syllabi for all Universities in Telangana
PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
B.Sc., Chemistry (for the batch admitted in 2019-2020)**

THIRD YEAR- SEMESTER V				
CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS
BS 501	Chemistry of Cosmetics, Food Processing, Drugs and Pharmaceuticals	GE	4	4
BS 502	English	CC-1E	3	3
BS 503	Second language	CC-2E	3	3
BS 504	Optional- I A/B	DSE -1E	-----	4+1=5
BS 505	Optional- II A/B	DSE -2E	-----	4+1=5
BS 506	Optional- III A/B A. Spectroscopy and Chromatography (or) B. Metallurgy, Dyes and Catalysis	DSE -3E	$\left. \begin{array}{l} 4T \\ 3P \end{array} \right\} = 7$	$\left. \begin{array}{l} 4 \\ 1 \end{array} \right\} = 5$
	Laboratory Course -V Experiments in Physical Chemistry-I			
	TOTAL			25
THIRD YEAR- SEMESTER VI				
BS 601	Project in Chemistry/ Advanced Chemistry			4
BS 602	English	CC-1F	3	3
BS 603	Second language	CC-2F	3	3
BS 604	Optional- I A/B	DSE-1F	-----	4+1=5
BS 605	Optional- II A/B	DSE -2F	-----	4+1=5
BS 606	Optional- III A/B A. Medicinal Chemistry (or) B. Agricultural and Fuel Chemistry	DSE -3F	$\left. \begin{array}{l} 4T \\ 3P \end{array} \right\} = 7$	$\left. \begin{array}{l} 4 \\ 1 \end{array} \right\} = 5$
	Laboratory Course -VI Experiments in Physical Chemistry-II			
	TOTAL			25
	TOTAL Credits			150

Chh

K. H. K.

SP

Semester V
Generic Elective (GE) Course - I (4 Credits)
(for B.Sc. Non Chemistry/B.A/B.Com Students)
Chemistry of Cosmetics, Food Processing, Drugs and Pharmaceuticals 60Hrs

Unit-I: Chemistry of Cosmetics and Perfumes **15 Hrs**

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, sunscreen lotions, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours. Essential oils and their importance in cosmetic industries with reference to eugenol, geraniol, sandalwood oil, eucalyptus, 2-phenyl ethyl alcohol.

Demonstration experiments or illustration of experimental procedures through charts for the preparation of talcum powder, shampoo and vanishing cream. Chemistry and Applications of deodorants and antiperspirant - Aluminum, Zinc, Boric acid, Chloride and Sulphide.

Unit-II: Food Processing and Food Adulteration **15 Hrs**

Food processing: Introduction, methods for food processing, additives and preservatives. Food processing- impact on nutrition,

Food adulteration: Adulterants in some common food items and their identification: Pulses, chilli powder, turmeric powder, milk, honey, spices, food grains and wheat flour, coffee powder, tea leaves, vegetable oil, ghee, ice creams, tomato sauce.

Food Packaging: Definition and function of packaging-Classification of packaging materials-different types of packaging materials such as glass, wood, metal, paper, wood, plastic etc., - advantages and disadvantages of each packaging material. Packaging materials and systems: corrugated fibre board boxes, shrink bundles and reusable packages. Effect of packaging materials on nutritive values of food.

Food labelling: Introduction, need and importance.

Unit – III: General Characteristics of Drugs **15Hrs**

Introduction: Diseases – causes of diseases, Drug – definition and sources.

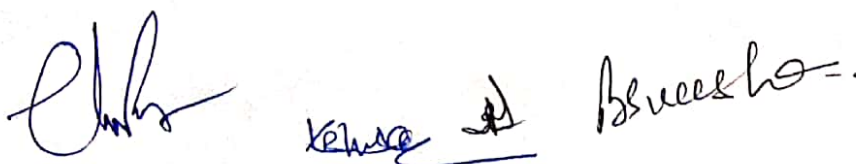
ADME of drugs (brief) – Absorption, distribution, drug metabolism (in liver), elimination (brief). Toxicity.

Examples (i) Zintac (Ranitidine, antacid) (ii) Paracetamol (antipyretic) (iii) Benadryl (Cough syrup). Characteristics of an ideal drug.

Nomenclature of Drugs: chemical name – generic name – trade name. Trade names for the given generic names – (i) Aspirin (ii) Amoxycillin (iii) Ciprofloxacin (iv) Paracetamol (v) Mebendazole

Drug formulations: Definition – need for conversion of drug into pharmaceutical (drug formulations) – Additives – diluents, binders, lubricants, antioxidants, flavourants, sweeteners, colourants, coating agents. Classification of Drug formulations: oral, parenterals and topical dosage forms – advantages and disadvantages.

(i) **Oral Dosage forms:** Tablets (Aspirin – analgesic; Ciprofloxacin - antibacterial). Capsules (Amoxycillin – antibiotic; Omeprazole-antacid). Syrups (B-complex syrup; Benadryl- Cough syrup).



- (ii) **Parenterals (Injection forms):** Propranolol (antihypertensive), Heparin (anticoagulant)
 (iii) **Topical dosage forms:** Creams and Ointments
 (iv) **Antiallergic:** Aclometasone (Aclovate), Betamethasone valerate(2%) Multiple purposes,
 (v) **Anti-itching:** Doxepin Zonalon), Antifungal: Miconazole (Dactarin, Neomicol), Ketoconazole, (Nizoral Cream), Fluconazole, Anesthetic- Lidocaine, (Lidocaine ointment) and Antiseptic: Boro Plus Cream, For burns -Iodine ointment

Unit – IV: Classification of Drugs

15Hrs

Classification of drugs based on therapeutic action-Chemotherapeutic agents, Pharmacodynamic agents and drugs acting on metabolic processes.

Brief explanation for the following:

(i) **Chemotherapeutic agents:** Antimalarials – Chloroquine; Antibiotic – Amoxicillin; Antitubercular drugs – isoniazide; Antiprotozoals – metronidazole.

(ii) Pharmacodynamic agents

(a) Drugs acting on CNS: Diazepam (CNS depressant), General anesthetic (thiopental sodium), antipyretic and analgesic (Ibuprofen)

(b) Drugs acting on PNS: local anaesthetics (Benzocaine)

(c) Drugs acting on cardiovascular system: Metoprolol (antihypertensive agents), Nifedipine (antianginal and antihypertensive agent)

(d) Drugs acting on renal system: Diuretics (Acetazolamide)

(iii) Drugs acting on metabolic processes

(a) Vitamins: Common name, source, deficiency, vitamin A, B2, B6, C, D, E and K – remedy

(b) Hormones: Function (brief) - deficiency of hormones (Insulin, Testosterone and Oestrogen)

Recommended Text Books and Reference Books

1. Industrial Chemistry, Vol -I, E. Stocchi, Ellis Horwood Ltd. UK.
2. Engineering Chemistry, P.C. Jain, M. Jain, Dhanpat Rai & Sons, Delhi.
3. Industrial Chemistry, Sharma, B.K. & Gaur, H. , Goel Publishing House, Meerut (1996).
4. Food Processing and Impact on Nutrition, Rameen Devi, Sc J Agric Vet Sci., Aug-Sep 2015; 2(4A):304-311.
5. Perfumes, Cosmetics and Soaps , W.A. Poucher, (1993).
6. A first course in food analysis by A Y Sathe
7. Food Science by N.Potter, CBS publishers
8. Food chemistry, Lillian Hoagland Meyer, (2008).
9. A Handbook of food packaging by F. A. Paine and H.Y. Paine.
10. Fundamental concepts of applied chemistry J.C Ghosh, S. Chand and Co, Ltd, New Delhi.
11. Applied Chemistry K .Bhagavathi Sundhar, MJP publishers.
12. Drugs by G.L.David Krupadanam, D.Vijaya Prasad, K.Varaprasad Rao, K.L.N.Reddy, C.Sudhakar , Universities Press (India) Limited 2007.
13. An Introduction to Medicinal Chemistry by Graham L. Patrick, Oxford University Press, New York. 1995

B.Sc. Chemistry III Year
Semester-V, Paper-V
Discipline Specific Elective- A (4 Credits)
Spectroscopy and Chromatography

60Hrs

Unit I: Molecular spectroscopy

15Hrs

S5-E-A-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 (No derivation), 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 antibonding molecular orbitals, electronic energy levels of molecules (σ , π , n), types of electronic transitions: σ - σ^* , n - σ^* , n - π^* , π - π^* with suitable examples. Selection rules, Terminology of chromophore, auxochrome, bathochromic and hypsochromic shifts. Absorption of characteristics of chromophones: diene, enone and aromatic chromophores. Representation of UV-visible spectra. General features of absorption – spectrometry, transmittance, absorbance, and molar absorptivity. Beer Lambert's law and its limitations.

Unit II: NMR and Mass Spectrometry

15Hrs

S5-E-A-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. ^1H 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 and fragment ions. Representation of mass spectrum, types of peaks (molecular ion peak, base peak and isotopic ion peaks). Determination of molecular formula. Mass spectrum of ethyl chloride, ethyl bromide and acetophenone.

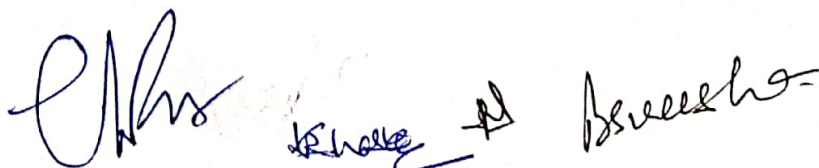
Unit III: Separation techniques - I

15Hrs

S5-E-A-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, visualizing agents, 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.

15Hrs

Unit IV: Separation techniques - II

S5-E-A-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), applications 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, Banwell & McCash
2. Organic spectroscopy, William Kemp, Palgrave Macmillan; 2nd Revised edition
3. Spectroscopy, B K Sharma Krishna Prakashan Media, 1981
4. Elements of Organic Spectroscopy, Y R Sharma.
5. Applications of Absorption Spectroscopy of Organic Compounds (English, Paperback, 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, Engage earning India Ed.
11. Fundamentals of Analytical Chemistry 6 th Ed., 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 Textbook of Quantitative Inorganic Analysis 7th 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. Chemistry III Year
Semester-V, Paper- V
Discipline Specific Elective-B (4 Credits)
Metallurgy, Dyes and Catalysis

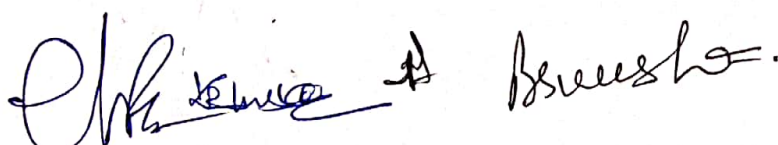
60 Hrs

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 15Hrs
S5-E-B-II: Dyes: Definition, Classification of dyes- Natural dyes, synthetic dyes; based on chemical constitution of dyes; Chemical nature of dyes; Applications of dyes.
Structures of natural dyes: Indigo, Tyrian purple, Alizarin, Indigotin.
Structures of Synthetic Dyes: Nitro dyes, Nitrosodyes, Azodyes (Mono azodyes, bisazodyes), diaryl methane dyes, triaryl methane dyes, Xanthene dyes, Phenolphthalein, Fluorocin, Acridine dyes.
Synthesis of dyes: Mono azodyes, bisazodyes (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 15Hrs
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.

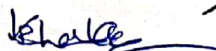
Unit IV: Catalysis II 15Hrs
S5-E-B-IV: Enzyme catalysis- Characteristics of enzyme catalysis, Examples: (i) Invertase in inversion of cane sugar (ii) Maltase in conversion of maltose to glucose (iii) Urease in decomposition of urea (iv) Zymase in conversion of glucose to ethanol (v) working of carbonic anhydrase and (vi) Mechanism of oxidation of 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 Kuraiacose, Published by Macmillan India Ltd.
13. Text book of Physical Chemistry, K.L. Kapoor, Macmillan, 1999.
14. Catalysis, J.C. Kuriacose, Macmillan Macmillan Publishers India Limited, 1980.
15. Phase Transfer Catalysis, Fundamentals, Applications and Industrial perspective, C. M. Stark, C. Liotta & M. Halpern, Academic Press
16. Phase Transfer Catalysis, E. V. Dehmlow & S. S. Dehmlow, Verlag Chemie, Weinheim



Semester - V
Laboratory Course
Paper V Experiments in Physical Chemistry-I

45 h (3 h / w)

1. Distribution law

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

2. Electrochemistry

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

3. Colorimetry

- a) Verification of Beer's law using $KMnO_4$
- b) Determination of the concentration of the given $KMnO_4$ solution.

4. Adsorption

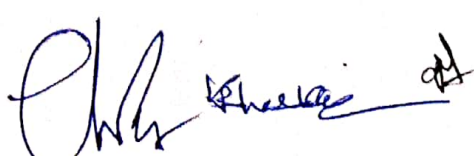
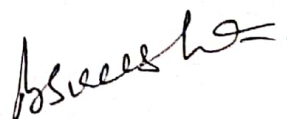
- b) Adsorption of acetic acid on animal charcoal - Verification of Freundlich adsorption isotherm.

5. Physical constants

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

Reference books:

1. Senior practical physical chemistry. B. D. Khosla, V.C. Garg, Adarsh Gulati Published by R. Chand & Co.
2. Practical Physical Chemistry: B. Vishwanathan and P.S. Raghavan. Viva Books
3. 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. Chemistry III Year
Semester –VI
Optional for Chemistry Stream
Advanced Chemistry

60Hrs

Unit-I (Inorganic Chemistry)

15 Hrs

S6-O-I-1: Inorganic reaction mechanisms

4h

Labile and inert complexes, Thermodynamic and kinetic stability based on VBT & CFT: ligand substitution reactions $-S_{N1}$ and S_{N2} in Octahedral complexes; substitution reactions of square planar complexes – Trans effect and applications of trans effect. Reactions of tetrahedral complexes - Hydrolysis of silicon halides and phosphorous oxides.

S6-O-I-2: Boranes and Carboranes

2 h

Definition of clusters. Structures of boranes and carboranes- Wade's rules, closo, nido, arachno boranes and carboranes

S6-O-I-3: Symmetry of molecules

5 h

Symmetry operations and symmetry elements in molecules. definition of axis of symmetry types of C_n , plane of symmetry (σ_h , σ_v , σ_d), center of symmetry and improper rotational axis of symmetry (S_n). Explanation with examples.

S6-O-I-4: Non – aqueous solvents

4 h

Classification and characteristics of a solvent. Reactions in liquid ammonia – physical properties, auto-ionisation, examples of ammono acids and ammono bases. Reactions in liquid ammonia – precipitation, neutralization, solvolysis, solvation - solutions of metals in ammonia, complex formation, redox reactions. Reactions in HF – autoionisation, reactions in HF – precipitation, acid – base reactions, protonation.

Unit-II (Organic Chemistry)

15 Hrs

S6-O-O-1: Pericyclic Reactions

5 h

Concerted reactions, Molecular orbitals of ethene, 1,3-butadiene and allyl radical. Symmetry properties, HOMO, LUMO, thermal and photochemical pericyclic reactions. Types of pericyclic reactions – electrocyclic, cycloaddition and sigmatropic reactions – one example each and their explanation by FMO theory.

S6-O-O-2: Synthetic Strategies

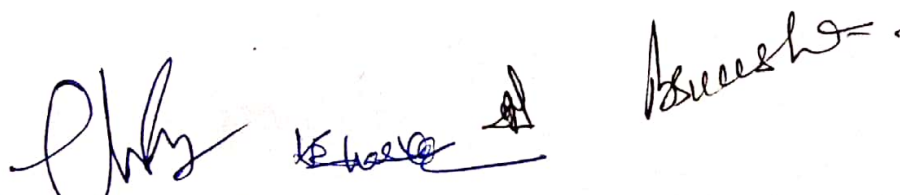
5 h

Terminology – Target molecule (TM), Disconnection approach – Retrosynthesis, Synthons, Synthetic equivalent (SE), Functional group interconversion (FGI), Linear, Convergent synthesis. Retrosynthetic analysis of the following molecules: 1) acetophenone 2) cyclohexene and 3) 2-phenylethanol.

S6-O-O-3: Asymmetric synthesis

5 h

Definition and classification of stereoselective reactions: substrate, product stereoselective reactions, enantio and diastereo selective reactions. Stereospecific reaction – definition –example – dehalogenation of 1,2-dibromides induced by iodide ion. Enantioselective reactions – definition – example –Reduction of Ethylacetoacetate by Yeast. Diastereoselective reaction- definition-



example: Acid catalysed dehydration of 1-phenylpropanal and Grignard addition to 2-phenylpropanal. Definition and explanation of enantiomeric excess and diastereomeric excess.

Unit III (Physical Chemistry)

15 Hrs

S6-O-P--1: Polymers

Definition of polymers – natural polymers and synthetic polymers examples classification as plastics, fibers, elastomers.

Thermosetting, thermoplastic polymers. Branched, cross-linked and co-polymers.

Definition of polymerization-addition and condensation polymerization with examples.

Explanation : chain polymerization, step polymerization, co-polymerization and co-ordination polymerization. Kinetics of free radical polymerization. Tacticity, atacticity, stereo specific synthesis- Zeigler- Natta catalyst.

Molecular weight definitions- number average, weight average molecular weight. Determination of molecular weight of polymers using viscosity method, Osmometric method. Problems.

Preparation and industrial applications of polyethylene, poly vinyl chloride (PVC), nylon –66, teflon, polyacrylonitrile and terelene.

Introduction to biodegradability and examples of biodegradable polymers.

Unit IV: (General Chemistry)

15 Hrs

S6-O-G--1: Electroanalytical methods

Types of Electroanalytical Methods.

I) Interfacial methods – a) Potentiometry: Principle, Electrochemical cell, Electrodes- (i) Indicator and (ii) Reference electrodes – Normal Hydrogen Electrode, Quinhydrone Electrode, Saturated Calomel Electrode. Numerical Problems. Application of Potentiometry – Assay of Sulphanilamide

b) Voltametry – three electrode assembly; Introduction to types of voltametric techniques, micro electrodes, Over potential and Polarization.

II) Bulk methods – Conductometry, Conductivity Cell, Specific Conductivity, Equivalent Conductivity. Numerical Problems. Applications of conductometry. Estimation of Cl – using AgNO₃. Determination of Aspirin with KOH.

Recommended Text Books and Reference books

1. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3 rd edn Wiley Publishers (2001).
2. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4 th edn. (2006)
3. Inorganic Chemistry by Shriver and Atkins 3 rd edn Oxford Press (1999).
4. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications (1996).
5. Symmetry and Spectroscopy of Molecules, K. Veera Reddy, Second Edition, New Age International (P) Limited Publishers
6. Textbook of Inorganic Chemistry by R Gopalan, Universities Press,(2012)
7. Text book of organic chemistry by Morrison and Boyd, Pearson Publishers (2009)
8. Text book of organic chemistry by Graham Solomons, Wiley(2015)

9. Fundamentals of organic synthesis and retrosynthetic analysis by Ratna Kumar Kar, NCBA,(2014)
10. Organic synthesis by Dr. Jagadamba Singh and Dr. L.D.S. Yadav, Pragati Prakashan, 2010
11. Stereochemistry of organic compounds by D. Nasipuri, New Academic Science Limited, 2012
12. Organic chemistry by Clayden, Greeves, Warren and Wothers, Oxford University Press, 2001
13. Fundamentals of Asymmetric Synthesis by G. L. David Krupadanam, Universities Press(2014)
14. Polymer Chemistry, M G Arora and M Singh
15. Introductory Polymer Chemistry by G S Misra
16. Textbook of Polymer Science, F. W. Billmeyer Jr, John Wiley & sons
17. Polymer Science, V. R. Gowarikar, N. V. Viswanathan & J. Sreedhar, Wiley Eastern
18. Contemporary Polymer Chemistry, H. R. Alcock & F. W. Lambe, Prentice Hall
19. Materials Science and Engineering An Introduction by William D. Callister, Jr. John Wiley & Sons, Inc.
20. Principles of Instrumental Analysis, D.A. Skoog, F.J. Holler, T.A. Nieman, Engage earning India Ed.
21. Fundamentals of Analytical Chemistry 6 th Ed., D. A. Skoog, D.M. West, F.J. Holler, Saunders College Publishing, Fort worth (1992).
22. Physical Chemistry by Atkins and De Paula, 8 th Edn.
23. Physical Chemistry by Puri, Sharma and Pattania, 2017

Chy khera

Basu

B.Sc. Chemistry III Year
Semester-VI, Paper-VI
Discipline Specific Elective-A (4 Credits)
Medicinal Chemistry

60Hrs

15Hrs

Unit- I: Introduction and Terminology

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 (API), 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

15Hrs

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, –NH₂ group, quaternary ammonium salts and double bond. Structure – activity relationships of drug molecules, explanation with sulfonamides.

Unit- III: Synthesis and Therapeutic Activity of Drugs

15Hrs

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

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

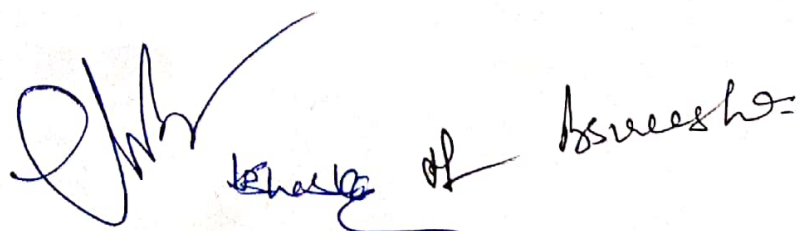
Drugs to treat metabolic disorders: Anti diabetic - Tolbutamide; Antiinflammatory – Ibuprofen; Cardiovascular- Glyceryl trinitrate; Antipyretic (paracetamol, aspirin) and Antacid- Omeprazole.

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

Unit- IV: Molecular Messengers, Vitamins and Micronutrients

15Hrs


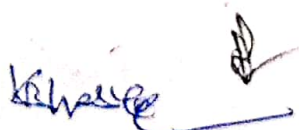
S6-E-A-IV: Molecular Messengers: Introduction to hormones and neurotransmitters, Thyroid hormones, Antithyroid drug-Carbimazol. Adrenaline: Adrenergic drugs- salbutamol, atenelol. Serotonin: SSRIs- fluoxetine. Dopamine: Antiparkinson drug- Levodopa .



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.



B.Sc. Chemistry III Year
Semester –VI, Paper-VI
Discipline Specific Elective-B (4 Credits)
Agricultural and Fuel Chemistry

60 Hrs

Unit I: – Pesticides

15Hrs

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, Azatobactor, 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.

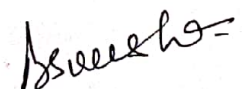
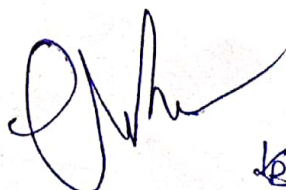
Unit IV: Petroleum and its products, petrochemicals and non petroleum fuels

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 antiknocking 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.

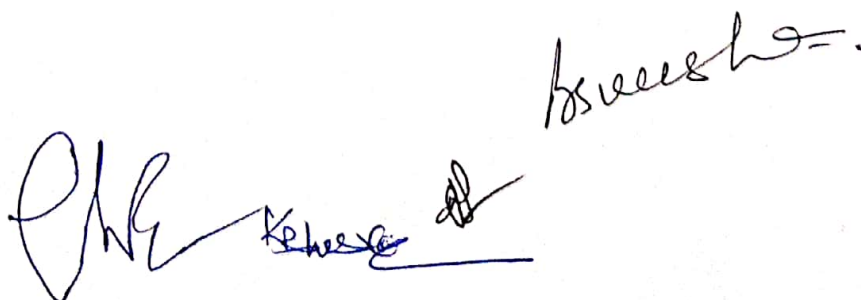
Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene and their uses.

Lubricants: Classification of lubricants- Solid, semisolid 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-H₂ gas, ethanol, Fuel from waste - bio-gas, Fuel from biomass –bio-ethanol, biodiesel, 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 Handbook, 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. and Jain, M. Engineering Chemistry Dhanpat Rai & Sons, Delhi.
9. Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Sons, Delhi.



Semester - VI
Laboratory course
Paper VI Experiments in Physical Chemistry-II

45h (3 h/w)

1. Kinetics

- a) Determination of specific reaction rate of the hydrolysis of methyl acetate catalyzed by hydrogen ion at room temperature.
- b) Determination of rate of decomposition of hydrogen peroxide catalyzed by FeCl_3 .

2. Electrochemistry

A. Potentiometry:

- a) Determination of redox potential of $\text{Fe}^{2+}/\text{Fe}^{3+}$ by potentiometric titration of ferrous ammonium sulphate vs. potassium dichromate.
- b) Precipitation titration of KCl vs. AgNO_3 -Determination of given concentration of silver nitrate.

B. pH metry:

- a) pH metric titration of strong acid (HCl) vs. strong base- Determination of the concentration of the given acid.
- b) pH metric titration of weak acid(acetic acid) with strong base(NaOH).- Determination of acid dissociation constant (K_a) of weak acid.

3. Conductometry:

- a) Determination of overall order: Saponification of ethyl acetate with NaOH by conductance measurements.

Reference books:

1. Senior practical physical chemistry. B. D. Khosla, V.C. Garg, Adarsh Gulati
2. Advanced Practical Physical chemistry: J.B.Yadav
3. Practical Physical Chemistry: B. Vishwanathan and P.S. Raghavan.
4. Practical in Physical Chemistry: P.S. Sindhu

Aswesh

Chy Khera

B.Sc. Chemistry III Year
SEMESTER-VI, PAPER-VI
Discipline Specific Elective-A
Medicinal Chemistry

Drug analysis: Concept, Drug stability, Chemical reactions that cause drug degradation, Analytical methods of Drug analysis: Spectrophotometric methods, Chromatographic methods, Quality assurance and quality control, Method validation and statistical interpretation of the analytical Method.

References:

8. Blass B. Basic Principles of Drug Discovery and Development. 1st ed. Amsterdam: Academic Press; 2015
9. Cairns D. Essentials of Pharmaceutical Chemistry. 3rd ed. UK: Pharmaceutical Press; 2008
10. Jeffery GH, Bassett J, Mendham J, Denney RC. Vogel's Textbook of Quantitative Chemical Analysis. 5th ed. England, UK: Longman Scientific and Technical; 1989

B.Sc. Chemistry II Year
SEMESTER-IVI, PAPER-IV

Chemistry of Beverages: Introduction of beverages, Types of beverages Carbonated, non-carbonated and alcoholic beverages, chemical constituents of beverages: Water, Acidulents, Flavourings, Colours, Preservatives, stabilizers, saponins, Sweetners, Antioxidants and Calcium disodium EDTA, Analysis of soft drinks and fruit juices

Reference:

Philip R. Ashurst, Chemistry and Technology of Soft Drinks & Fruit juices, 3rd ed. Wiley Blackwell, 2016.

B.Sc. Chemistry I Year
SEMESTER-II, PAPER-II

Water Chemistry: Elements, radicals, and compounds Chemical water analysis, pH calculations, Gas solubility, Alkalinity, Colloids and coagulation Organic compounds Organic matter in wastewater, Laboratory chemical analyses. Physico-Chemical parameters of water: Characteristics of drinking water, Chemical composition of Drinking water, Chemical quality of drinking water and water quality standards. Water pollution: Concept of water-pollution, potential water pollutants, impact of industrial effluents on water pollution. Water treatment: Domestic and municipal water treatments, RO-systems, natural methods of water treatments. Types of hardness, Boiler troubles and Boiler water treatment.

Reference:

Trivedi, P. K. and Goel, P. K., chemical and biological method for water pollution studies. Env. Publication, Karad (1986).

TARA GOVERNMENT COLLEGE (U.G. & P.G.)

(Autonomous)

Sangareddy, Medak District.

(Affiliated to Osmania University)

Re-Accredited with 'B' grade by NAAC

Department of Computer Science

Board of Studies meeting for the year 2016-17.

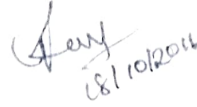
The board of studies meeting for the Department of Computer Science was held at 11:00 AM on 18th oct 2016

The following members present in the meeting are:

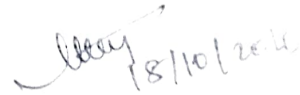
1. **Prof. Govardan**
University Nominee,
Osmania University, Hyderabad.



2. **Dr. G. Rajitha Devi**
Chairman, BOS,
Head, Department of Computer Science
Tara government College, Sangareddy.

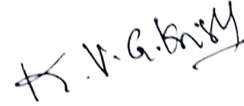


3. **Prof. M.V. Ramana Murthy**
Department of Computer Science
Osmania University, Hyderabad



4. **Prof. T. Anand rao**
Department of Computer Science
Osmania University, Hyderabad

5. **Dr. K. Venu Gopala Krishna**
Educationalist, Sangareddy



6. **Sri. D. Vivekananda**
Alumni Member, Junior Lecturer




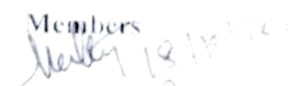

1. The following solutions were taken by the committee:

1. To adopt the syllabus prescribed by the State University for B.Sc. & B.A. and to provide for the course in Science & Computer Applications without making any changes for the Academic year 2016-17.

2. The decision and adoption of syllabus was discussed and decided to split the syllabus in to IV units in the I and II Semester of B.Sc. & B.A.
3. The pattern of evaluation and examination was discussed with two internals in the each semester and average of two would be taken for the semester marks computation. The internals would be of 30 marks and the semester exams would be 70 marks.
4. The practical examinations would be conducted at the end of every semester with no internal assessment.
5. List of reference books and prescribed books should be mentioned.
6. Question banks would be made for the ^{practicals} for the Practical Examinations.
7. List of panel of examiners were enlisted for the purpose of evaluation of examinations.
8. It is suggested to mention objectives and outcomes for every paper of B.A. and B.Sc. in every semester.


Board of Studies
Chairman


University Nominee
(Dr. S. Govardhan)

Members

(Prof. H. V. Ramesh)

(Prof. J. Anand)
13/10/2016
K. V. G. [Signature]
[Signature]

TARA GOVERNMENT COLLEGE (U.G & P.G.)
(Autonomous)

Sangareddy, Sangareddy District.
(Affiliated to Osmania University)
Re-Accredited with 'B' grade by NAAC

Department of Computer Science
Board of Studies meeting for the year 2017-18.

The board of studies meeting for the Department of Computer Science was held at
11:00AM on.13 - 16-2017

The following members present in the meeting are:

1. Dr.C.Goverdhan
BOS in Computer Science,
University Nominee,
Dept. of Mathematics,
Osmania University, Hyderabad.
2. Dr.G.Rajitha Devi
Chairman, BOS,
Head, Department of Computer Science
Tara Government College, Sangareddy.
3. Prof.J.Amandrao, *Head*
Department of Mathematics
Osmania University, Hyderabad
4. Dr.S.Hari Singh Naik
Department of Mathematics
Osmania University, Hyderabad
5. Dr. K.Venugopala Krishna
Educationalist, Sangareddy
6. Sri. D.Vivekananda
Alumni Member, Junior Lecturer



Dr. C. GOVERDHAN
CHAIRPERSON
Board of Studies in Computer Science,
Department of Mathematics,
Email : goverdan_c@yahoo.com

Chairman,
Dept. of Computer Applications
Tara Govt. College, Sangareddy, (R)

Head
Department of Mathematics
Osmania University,
Hyderabad - 500 007

Associate Professor
Dept of Maths O.U.,

CHAIRMAN
Board of Studies in Computer Science
Dept. of Mathematics
Osmania University, Hyd.

The following resolutions were taken in the meeting:

- Resolved to the adopt the syllabus prescribed by Osmania University for B.Sc (CS), III and IV Semester without making any changes for the Academic year 2017-18
1. The division and adoption of syllabus was discussed and decided to split the syllabus in to IV-units in the III and IV Semester of B.Sc (CS).
 2. The pattern of evaluation and examination was discussed with two internals in the each semester and average of two would be taken for the semester marks computation. The internals would be of 30 marks and the semester exams would be 70 marks.
 3. The practical examinations would be conducted at the end of every semester with no internal assessments.
 4. List of reference books and prescribed books should be mentioned.
 5. Question banks would be made available for the students for the Practical Examinations.
 6. List of panel of examiners were enlisted for the purpose of evaluation of examinations.
 7. It is suggested to mention objectives and outcomes for every paper of B.Sc and B.A in every semester.
 8. Include SEC's in III & IV SEM of B.Sc & B.A

Board of Studies

Chairman

Chairman,

Board of Studies

Dept. of Computer Applications
100 Govt. College, Ganapet, 5012 01.

University Nominee

Dr. C. GOVERDAN

CHAIRPERSON
Board of Studies in Computer Science



Department of Mathematics, OU
Email : goverdan_c@yahoo.com

Head

Department of Mathematics

Osmania University

Hyderabad - 500 007

Associate Professor

Dept of Maths (A):

6

Proceedings of the Principal, Tara Government College (A), Sangareddy

Present Smt. Dr Chandra Mukherji
Procs. Rc. No/12/Department of Computers/BOS/ Tara.GDC, SRD/2018. Dated :24-07-2018.

Sub: Constitution of the BOS in Computer Science and Application, for the term of 2018 - orders issued.

@@@@@@

ORDER:

As per the UGC Guidelines, the Board of Studies in the Department of Computer Science and Application is constituted for the term of 2018-2020 with the following members.

1. Smt.N. Shravani
Chairman, BOS,

Department of Computer Science & Applications
Tara Government College, Sangareddy


Chairperson


2. Dr.Chenna Krishna Reddy

University Nominee,
Osmania University, Hyderabad
Board of Studies in Computer Science
Dept. of Mathematics
Osmania University, Hyd.


CHAIRMAN
University Nominee

3. Dr. G.Rajitha Devi

Asst. Prof. in Computer Science
Department of Computer Science
GDC, Hayathnagar


Member

4. Sri. Ramarao

Asst. Prof. in Computer Application
Department of Computer Application
GDC, Hayathnagar


Member

5. Dr. K.Venu Gopala Krishna

Educationalist, Sangareddy

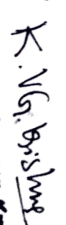

Member


6. Sri. G.Shivashankar

Alumni Member, Lecturer


Member

The tenure of BOS is 2 years only.


A. Venkatesh Krishna
Member


D. Venkatesh
Member


Principal

TARA GOVT. COLLEGE
AUTONOMOUS
SANGAREDDY-502 001.


The following resolutions are taken in the meeting:

1. It is resolved to the follow the syllabus prescribed by Osmania University and to adopt the same for B.Sc. (CS & CA), B.A (CA) I to VI Semester without making any changes for the Academic year 2018-19 and 2019-20.
2. The pattern of syllabus is kept unchanged for I to IV semesters for theory as well as practical. Each theory paper consists of four units
3. The Pattern of syllabus is minutely changed for V & VI semesters. The syllabus is divided into IV units which was III earlier. The practical pattern is kept unchanged.
4. It is resolved to allot 30 marks for internal examination, 70 marks for end semester examination and 25 marks for Practical examination in each paper. The internal examination marks shall be average of two internals for each semester. The distribution of internal exam shall be as follows.
 - a. Seminar presentation – 5 marks
 - b. Assignment - 5 marks
 - c. Internal Exam - 20 marks
5. There will be no internal assessments for practical examinations
6. It is discussed and decided to have 10 marks for internal and 40 marks for end semester exam in case of SEC (III to VI Semesters) and GE (V and VI Semesters) papers.
7. The model question paper prescribed for internal and end semester exams, the reference books and panel of examiners is approved
8. Other points that are not mentioned in this BoS but were approved in erstwhile BoS meetings shall remain same without change


Chairman,
Board of Studies

Dep't. of Computer Science
Tara Govt. College, Sangareddy-502 501.


Chairman,
Board of Studies,
Osmania University,
Dep't. of Computer Science

Members: 
Assistant Professor of
Govt. Degree College, Hayathnagar,
Ranga Reddy (T.S.)-501505.


A. Venk. Sankaran Krishna
CONVENER

Distric Consultant Information Centre
Medak District Sangareddy

Assistant Professor of
Govt. Degree College, Hayathnagar,
Ranga Reddy (T.S.)-501505.



Proceedings of the Principal, Tara Government College (A), Sangareddy

Present Dr. Chandra Mukherji

Proc.No. No 95 Department of Comp.Sci & Appl.BOS/Tara.GDC,SRD/2019 Dated:16-09-2019.

Sub: Constitution of the BOS in Computer Science & Applications, for the term of 2019 - orders issued.

ORDER:

As per the UGC Guidelines, the Board of Studies in the Department of Computer Science & Applications is constituted for the term of 2019-2020 with the following members.

S.No.	Name of the Faculty	Designation
1	Smt.N. Shrivani Chairman, BOS, Department of Chemistry Tara Government College (A), Sangareddy	Chairperson Chairman, Board of Studies
2	Prof.P.V.Sudha Head & Professor Department of Computer Science and Engineering University College of Engineering Osmania University, Hyderabad	Department of Computer Science Chairman, Board of Studies Tara Government College (A), Sangareddy
3	Dr.S.Nagaprasad Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member g.No. 2
4.	Sri. M.Krishna Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member M.Bant
5	Sri. Ch.Venkatesham Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member Applied
6	Smt. D.Stravana Keerthi Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member D. Keerthi
7	Smt. D.Nagasudha Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member D. Sudha
8	Prof.B. Vishnu Vardhan Vice-Principal & Professor Computer Science & Engineering JNTUH College of Engineering Manthani	External Member B. Vardhan
9	Mr. Joshi Shripad Associate Professor and Head Computer Science & Engineering JNTUH College of Engineering, Sultanpur	External Member Joshi Shripad S
10	Sri.M.Rambabu Alumni Member, Faculty of Chemistry Tara Government College (A), Sangareddy	Member M. Rambabu

The tenure of BOS is "1" (One) year only.

Principal

PRINCIPAL
TARA GOVT. COLLEGE
SANGAREDDY

SANGAREDDY, TS-502 001.

The following resolutions are taken in the meeting:

1. It is resolved to the follow the syllabus prescribed by Osmania University and to adopt the same for B.Sc. (CS & CA) and B.A. (CA) I to VI Semester without making any changes for the Academic year 2019-20.
2. The pattern of syllabus is kept unchanged for I to IV semesters for theory as well as practical. Each theory paper consists of four units for B.Sc Computer Science and B.A. Computer Applications.
3. The Pattern of syllabus is minutely changed for V & VI semesters. The syllabus is divided into IV units for B.Sc Computer Science and B.A. Computer Applications Which was III earlier. The practical pattern is kept unchanged.
4. It is resolved to allot 30 marks for internal examination, 70 marks for end semester examination and 25 marks for Practical examination in each paper. The internal examination marks shall be average of two internals for each semester. The distribution of internal exam shall be as follows:
 - a. Seminar presentation - 5 marks
 - b. Assignment - 5 marks
 - c. Internal Exam - 20 marks

5. There will be no internal assessments for practical examinations.

6. It is discussed and decided to have 10 marks for internal and 40 marks for end semester exam in case of SEC (III to VI Semesters) and GE (V and VI Semesters) papers.

7. The model question paper prescribed for internal and end semester exams, the reference books and panel of examiners is approved.

8. Other points that are not mentioned in this BOS but were approved in erstwhile BOS meetings shall remain same without change

Board of Studies,
Chaitanya

University of Osmania

H.No. 40

Department of Engineering

Computer Science & Engineering

College of Engineering, Osmania University

Dept. of Computer Science
Tara Govt. College Sangareddy-502 001.

Members:

Joshi
Joshi Shripad S
Associate Professor
Department of CSE
JNTUH College of Engineering Sullapur
Pulam (M), Sangareddy District,
T.S. India - 502 273

Vardian
D: B. VISHNU VARDIAN
Professor in CSE, III.Tech, Ph.D.
JNTUH COLLEGE OF ENGINEERING
Manjampally (M) Kondapally, Manjampally Dist. 501 107

P.V. Subbarao
P. V. Subbarao
Department of Engineering
College of Engineering, Osmania University

Proceedings of the Principal, Tara Government College (A), Sangareddy

Present Sri.P.Krishnamurthy

Procs.Re. No /Department of Comp.Sci &Appl.BOS/Tara.GDC.SRD/2021.Dated:-01-2021.

Sub: Constitution of the BOS in Computer Science & Applications, for the term of 2020 - 21 orders issued.

ORDER:

As per the UGC Guidelines, the Board of Studies in the Department of Computer Science & Applications is constituted for the term of 2020-2021 with the following members.

S.No.	Name of the Faculty	Designation
1	Smt.N. Shrivani Chairman, BOS, Department of Chemistry Tara Government College (A), Sangareddy	Chairperson <i>Shrivani</i> Chairman, Board of Studies Dept. of Computer Science Sangareddy College
2	Prof.P.V.Sudha Head & Professor Department of Computer Science and Engineering University College of Engineering Osmania University, Hyderabad	University Nominee <i>P.V.Sudha</i> College
3	Dr.S.Nagaprasad Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member <i>S.Nagaprasad</i> Dept. of Computer Science & Engineering Tara Government College (A), Sangareddy
4	Sri. M.Krishna Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member <i>M.Krishna</i> Tara Government College (A), Sangareddy
5	Prof.B.Vishnu Vardhan Vice-Principal & Professor Computer Science & Engineering JNTUH College of Engineering Manthani	External Member <i>B.Vishnu Vardhan</i> JNTUH
6	Dr. D. Lakshmi Padmaja Assoc. Professor, LMSTE, Academics Incharge, Dept. of Information Technology, Anurag Group of Institutions (CVSR) Ghatekesar(M), Medchal District, Hyderabad	External Member <i>D.Lakshmi Padmaja</i> Dept. of Information Technology Anurag Group of Institutions (CVSR) Ghatekesar(M), Medchal District, Hyderabad
7	Sri.M.Ramababu Alumni Member, Faculty of Chemistry Tara Government College (A), Sangareddy	Member <i>M.Ramababu</i> Tara Government College (A), Sangareddy

The tenure of BOS is "1(One) year only.

Principal

PRINCIPAL
TARA GOVT. COLLEGE
SANGAREDDY
SANGAREDDY-502 001

The following resolutions are taken in the meeting:

1. It is resolved to the follow the syllabus prescribed by Osmania University and to adopt the same for B.Sc.(CS & CA),BCOM (C.A.) and B.A (CA) fro VI Semester without making any changes for the Academic year 2020-21.

2. The pattern of syllabus is kept unchanged for I to IV semesters for theory as well as practical. Each theory paper consists of four units for B.SC and B.A. For BCOM (C.A.) Five Units.

3. The Pattern of syllabus is minutely changed for V & VI semesters. The syllabus is divided into IV units which was III earlier. The practical pattern is kept unchanged.

4. It is resolved to allot 30 marks for internal examination, 70 marks for end semester examination and 25 marks for Practical examination in each paper. The internal examination marks shall be average of two internals for each semester. The distribution of internal exam shall be as follows:

- a. Seminar presentation - 5 marks
- b. Assignment - 5 marks
- c. Internal Exam - 20 marks

5. There will be no internal assessments for practical examinations.

6. It is discussed and decided to have 10 marks for internal and 40 marks for end semester exam in case of SEC (III to VI Semesters) and GE (V and VI Semesters) papers.

7. The model question paper prescribed for internal and end semester exams, the reference books and panel of examiners is approved.

Other points that are not mentioned in this BOS but were approved in erstwhile BOS meetings shall remain same without change

Board of Studies, Chairman,

Chairman,

Board of Studies
Dept. of Computer Science
Osmania College of Engineering
Hydrabad - 502 004

F.N. Suman
University Nominee

Head

Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University
Hydrabad - 500 007.



TARA Government College (A), Sangareddy, Sangareddy District

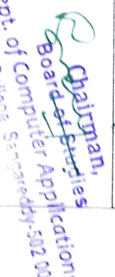
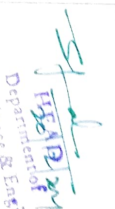
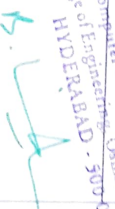




Re-Accredited with 'B' grade by NAAC



Department of Computer Science & Applications

Board of Studies meeting for the year 2021-22

The Board of Studies meeting for the Department of Computer Science and Applications is held at Tara GDC Sangareddy, on **18/12/2021** to discuss and finalize the syllabus and evaluation pattern for I to VI semesters of B.Sc (C.S), B.Com (C.A.) and B.A. (C.A.) in subject of computer science and computer applications for the academic year 2021-22.

The following members are present in the meeting:

S.No.	Name of the Faculty	Designation	Signature
1.	Smt. ShrivaniNethi Chairman, BOS, Department of Computer Science & Applications, Tara Government College (A), Sangareddy	Chairperson	 Chairman, Board of Studies Department of Computer Applications Tara Govt. College Sangareddy-502 001
2.	Prof.K.Shyamala Head & Professor of Computer Science Department of Computer Science and Engineering College of Science, Osmania University, Hyderabad	University Nominee	 Dept. of Computer Science Tara Govt. College Sangareddy-502 001 Department of Computer Science & Engineering Osmania University Hyderabad
3.	Prof.B. Vishnu Vardhan Vice-Principal & Professor Computer Science & Engineering JNTUH College of Engineering Manthani	External Member	 Computer Science & Engineering College of Engineering, Osmania University HYDERABAD - 500007.
4.	Dr. D. Lakshmi Padmaja Assoe. Professor, Dept. of IT, Anurag University, Hyderabad, Telangana.	External Member	 D Lakshmi Padmaja
5.	Dr.S. Nagaprasad Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	 S. NAGP
6.	Sri. M.Krishna Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	
7.	Ch. Venkatesham Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	

8	G. Shiva Shankar Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	
9	D. Nagasudha Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	
10	D. Sravana Keerthi Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	
11	C. Prathibha Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	
12	Shravya Priya Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	
13	P. Nilochana Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	
14	Nazimuddin Faculty of Computer Science and Applications Tara Government College (A), Sangareddy	Member	
15	G. Ramana Rao Group Manager Wipro Limited, Hyderabad, Telangana	Industrialist	
16	T. Sushumna Alumni Member, Faculty of Mathematics Tara Government College (A), Sangareddy	Member	

The tenure of BOS is "1"(One) year only.

Principal

The following resolutions are taken in the meeting:

1. It is resolved to follow the syllabus prescribed by Osmania University and to adopt the same for B.Sc.(CS & CA), B. Com (C.A.) and B.A (CA) I to VI Semester without making any changes for the Academic year 2021-22.

2. The pattern of syllabus is kept unchanged for I to IV semesters for theory as well as practical. Each theory paper consists of four units for B.Sc (C.S.) and B.A (C.A.) five units for B.Com (C.A.)

3. It is resolved to allot 30 marks for internal examination, 70 marks for end semester examination and 25 marks for Practical examination in each paper. The internal examination marks shall be average of two internals for each semester.

The distribution of internal exam shall be as follows:

A. Internal Exam - 20 marks

B. Assignment - 5 marks

C. Seminar presentation/ Quiz/ Group Discussion/ any other activity - 5 marks

4. The Pattern of Regular End Semester Examination for **B.A. (C.A.) & BSc (CS) for I to VI Semesters -Three Sections - 70 Marks.**

A. Very Short Questions & Answer: Four of Eight with 2^{1/2} Marks for each - 10 Marks

B. Short Questions & Answer: Four of Eight with 5 Marks for each - 20 Marks

C. Long Answer Questions: Four of Four (Internal Choice) with 10 Marks for each - 40 Marks

5. The Pattern of Regular End Semester Examination for **B.Com (C.A.) for I to VI Semesters -Two Sections - 70 Marks.**

A. Very Short Questions & Answer: Five out of Five with 4 Marks for each - 20 Marks

B. Long Answer Questions: Five out of Five (Internal Choice) with 10 Marks for each - 50 Marks

6. The pattern of semester practical examination - 25 marks.

a. Two questions from Lab Question Bank - 2 x 6 = 12 marks

b. Viva - 8 marks

c. Record - 5 marks

7. There will be no internal assessments for practical examinations.

8. It is discussed and decided to have 30 marks for internal and 70 marks for end semester exam in case of GE (V Semester) paper.

9. The model question paper prescribed for internal and end semester exams, the reference books and **panel of examiners** is approved.

10. Other points that are not mentioned in this BOS but were approved in erstwhile BOS meetings shall remain same without change.

11. Covid-19 pattern may be adopted for end semester theory exams in case of emergency on par with the parent university.

12. The Pattern of Covid End Semester Examination for **B.A. (C.A.) & BSc (CS) for I to VI**

Semesters - Two Sections - 70 Marks.

- A. Short Questions & Answer: Four out of Eight with 2^{1/2} Marks for each – 10 Marks
B. Long Answer Questions: Four out of Eight with 15 Marks for each – 60 Marks

The Pattern of Covid End Semester Examination for **B.Com (C.A.) for I to VI Semesters -**

Two Sections - 70 Marks.

- A. Short Questions & Answer: Two out of Five with 5 Marks for each – 10 Marks
B. Long Answer Questions: Four out of Ten with 15 Marks for each – 60 Marks

13. A Certificate Course on "**COMPUTER HARDWARE**" has been proposed to the students of B. Sc, B. Com & B.A. students for 2 credits, which is schedule for 30 hours (2 weeks - 2 Hours per day). The syllabus enclosed herewith is approved and certificate shall be considered valid for credit count.



H.T. Mohini

Department of
Computer Science & Engineering
College of Engineering, Osmania University
HYDERABAD - 500 007.


Board of Studies Chairman

Board of Studies
Dept. of Computer Applications
Osmania University
Hyderabad - 500 007.

Members:

1. 
2. 