



MAHARAJAH'S COLLEGE (AUTONOMOUS)



**R23 PROGRAMME FILE
B.Sc. Chemistry (Honors)**

(w.e.f. Academic Year: 2023-2024)



DEPARTMENT OF CHEMISTRY

INDEX

CONTENTS

1. NAME OF THE PROGRAMME
2. ELIGIBILITY
3. ABOUT DEPARTMENT
 - 3.1. HISTORY
 - 3.2. VISION AND MISSION
4. ABOUT THE PROGRAMME
 - 4.1. ABOUT THE COURSE
 - 4.2. PROGRAMME NATURE, EXTENT AND AIMS
 - 4.3. GRADUATE ATTRIBUTES (GAS)
5. PROGRAMME OUTCOMES (POS)
6. PROGRAMME SPECIFIC OUTCOMES (PSOS)
7. MAPPING OF PROGRAMME OUTCOMES WITH PROGRAMME SPECIFIC OUTCOMES
8. MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOMES
9. TEACHING AND LEARNING PROCESS
10. ASSESSMENT PROCESS
11. STRUCTURE OF THE PROGRAMME (INSTRUCTION & EXAMINATION)

1. NAME OF THE PROGRAMME: B.Sc Honors' (Chemistry)

2. ELIGIBILITY

B.Sc. Honors chemistry eligibility needs candidates to have secure minimum 50% marks in intermediate M.P.C or Bi.P.C from a recognized university

3. ABOUT DEPARTMENT

3.1 History

The Department of Chemistry at Maharajah's College, Vizianagaram was started as an under graduate program offering department in the year 1881. Later in years 2009 and 2010, Post Graduated courses in Organic Chemistry and Analytical Chemistry were commenced respectively. Department of Chemistry is one of the major departments in the College and run with UG It is one of the largest departments in terms of student strength and faculty. At present 28 staff members (both UG & PG are working in the Department. Department has been maintaining a separate departmental Library for catering to the needs of both teachers and students. There are 2750 books in the Library. The Department offers B. Sc. (Honors in Chemistry), M. Sc., Organic Chemistry and M. Sc., Analytical Chemistry. The Department consists of qualified, well experienced, dedicated faculty and well-established laboratories.

3.2 Vision and Mission Vision

The aim of the department is to provide quality education to the students. We not only aim on theoretical knowledge but also provide the practical skill and expose their knowledge to the developing society so that they can contribute in the development of the Nation and build their future in a better way.

Mission

- Imparting good quality Higher Education
- Hands on experience with various instruments
- Integrated Industrial training and curriculum
- Research & Development
- Non formal Education through community development programs
- Industry-Institute Partnership

Free Consultancy service to industries around the region

4. ABOUT THE PROGRAMME

4.1 About the Course

Chemistry is the science of matter and its transformations. It addresses fundamental questions about the observable matter, ranging from its components, structure, properties and inter-conversions. As a system of knowledge, Chemistry not only explains the existence and behavior

of matter around and within us, but also empowers us to manipulate the matter into new and improved forms for our use. From the ancient practices of Rasayan Vidya and alchemy, modern chemistry has grown over centuries into a formidable science that touches all aspects of human life. Humanity's progress in the last three centuries is pivoted on the contributions of chemistry, chemical industry and associated endeavors. The range of influence of chemistry in our life spans from essentials such as food (agrochemicals, preservatives), shelter (cement, metals, alloys, polymers) and health (drugs, cosmetics, soap, toothpaste), to advancements such as textiles (polymers, leather), beverages (flavoring and fermentation), crime fighting (forensics), weaponry (explosives), space travel (fuel) and cosmology (element detection). The list can go on endlessly. The most visible contribution of chemistry to civilization is achieved by the advancements in modern medicine that was felled by organic chemistry. This led to significant improvements in the living standards, extension of human average life span and fighting of dangerous diseases such as cancer and microbial infections.

Chemistry is placed centrally between the other two major branches of science, namely physics and biology. Therefore, it is often called the *central science*. It influences the developments in these two broad realms of science as much as it is influenced by the discoveries in them. The fundamental importance of chemistry and chemical industry in sustaining human civilization demands for a steady supply of trained and skilled manpower. Thus, it is unsurprising that it is an essential and integral department in higher education institutions. Education in chemistry not only imparts the technical know-how about structure, reactions and properties of matter, but also empowers the learner to raise fundamental questions about various natural phenomena, address local issues and come up with sustainable solutions, identify areas of life where intervention of chemistry can bring about progress and imbibe and spread the spirit of free enquiry and scientific temper.

4.2 Programme Nature, Extent and Aims

Chemistry is referred to as the science that systematically study the composition, properties, and reactivity of matter at atomic and molecular level. The scope of chemistry is very broad. The key areas of study of chemistry comprise Organic chemistry, Inorganic Chemistry, Physical Chemistry and Analytical Chemistry. Organic chemistry deals with study of substances containing carbon mostly; inorganic chemistry deals with study of all other elements/compounds/substances and their chemical properties. Physical chemistry deals with applications of concepts, laws to chemical phenomena. Analytical chemistry, in general, deals with identification and quantification of materials. Development of new interdisciplinary subjects like nano-materials, biomaterials, etc. and their applications from chemistry point of view added new dimension to materials chemistry. Thus, the degree

programme in chemistry also intended to cover overlapping areas of chemistry with physics, biology, environmental sciences. Further, a broad range of subjects such as materials chemistry, biomaterials, nanomaterials, environmental chemistry, etc., has also been introduced which can be helpful for students/faculty members to broaden the scope of their studies and hence applications from job prospective point of view. Therefore, as a part of efforts to enhance employability of graduates of chemistry, the curricula also include learning experience with industries and research laboratories as interns. In addition, industrial visits/industrial projects are encouraged and added to the curriculum in order to enhance better exposure to jobs/employment opportunities in industries, scientific projects and allied sectors. This modified syllabus has been drafted to enable the students to equip for national level competitive exams that they may attempt in future. To ensure implementation of a holistic pedagogical model, several allied disciplines are covered/introduced in this framework, including Physics, Mathematics, Biology and a number of generic, and ability enhancement electives. In addition, employability of B.Sc. Chemistry graduate is given due importance such that their core competency in the subject matter, both theoretical and practical, is ensured. To expand the employability of graduates, a number of skill development courses are also introduced in this framework.

The Post-Graduate Programme in Chemistry will impart advanced knowledge of basic and applied chemical sciences to the graduates. It will prepare the students for taking up challenging assignments in academia and industry and also empower them with skill and knowledge for generating employment for their own and others. The Programme introduces the students to advanced developments in chemical sciences as well as in the field of other allied sciences, by providing them multidisciplinary and interdisciplinary courses. The design of choice based curriculum can enrich students with analytical and problem-solving capabilities. It is designed to bring out the best of the abilities of each student, allow them to sharpen the scientific temper and be abreast with the contemporary developments in the area. The programme includes a balanced combination of Core, Electives and Skill based Courses. The courses are designed in such a way to cover the entire spectrum of chemical sciences from fundamentals (that will bring admitted students from various backgrounds to a common level) to most recent advancements in the field (that will make them ready to take up challenging assignments in the real world).

The M.Sc. (Chemistry) Programme is of two years duration which is divided into four semesters. The teaching and learning in the Programme will involve theory (lectures), practicals, tutorial and seminar-based classes. The curriculum will be taught through formal lectures with the aid of pre-made presentations, audio and video tools whenever necessary. Other teaching aids can also be used as and

when required. The additional requirements like industrial visits and project work are also incorporated into the curriculum.

4.3 GRADUATE ATTRIBUTES (GAs)

The Graduate Attributes (GAs) reflect particular qualities and abilities of an individual learner including knowledge, application of knowledge, professional and life skills, attitudes and human values that are required to be acquired by the graduates of Maharajah's College. The graduate attributes include capabilities to strengthen one's professional abilities for widening current knowledge and industry-ready skills, undertaking future studies for global and local application, performing creatively and professionally, in a chosen career and ultimately playing a constructive role as a socially responsible global citizen. The Graduate Attributes define the characteristics of learners and describe a set of competencies that are beyond the study of a particular area and programme.

The GAs

- ❖ Continue life-long learning as an autonomous learner
- ❖ Continuously strive for excellence in education
- ❖ Apply and nurture critical and creative thinking
- ❖ Promote sustainable development practices
- ❖ Promote co-operation over competition
- ❖ Balance rights with responsibilities
- ❖ Understand and respect diversity & difference
- ❖ Not be prejudiced by gender, age, caste, religion, or nationality.
- ❖ Use education as a tool for emancipation and empowerment of humanity

5. PROGRAMME OUTCOMES (POs) B.Sc. HONOURS (CHEMISTRY)

PO No.	Component	Outcomes
PO1	Basic Knowledge and Relevance of the Principles	To understand the basic knowledge of the discipline, fundamental principles, and the scientific theories related to various phenomena and their relevance in the day-to-day life.
PO2	Critical thinking and Problem-Solving abilities	Capable of analysing the results critically and applying acquired knowledge to solve the problems.

PO3	Creativity and Research aptitude for global competency	Ability to analyze scientific problems, develop innovative solutions, and apply research aptitude to address critical challenges across interdisciplinary fields globally.
PO4	Holistic, Multidisciplinary education and skill enhancement	Ability to acquire knowledge through a holistic, multidisciplinary approach and develop advanced skills to apply for the betterment of society.
PO5	Leadership and Teamwork abilities	Ability to learn and work in a group and capable of leading a team even.
PO6	Ethical thinking and Social awareness	Inculcate the professional and ethical attitude and ability to relate with social problems. Learn important aspects associated with environmental and human health. Ability to develop eco-friendly technologies.
PO7	lifelong learning skills and Entrepreneurship	Ability to learn lifelong learning skills which are important to provide better opportunities and improve quality of life. Capable to establish independent start-up/innovation center etc.

6. PROGRAMME SPECIFIC OUTCOMES

The graduates/Post graduates shall be able to realize the following specific outcomes by the end of the program studies:

PSO s	Programme Specific Outcomes
PSO -1	Gain the Knowledge on basic principles and their real-world applications in various concepts of chemistry through theory and practical experiments.
PSO -2	Understand the nomenclature, stereochemistry, structures, and mechanisms of chemical reactions, as well as identify chemical formulas and solve numerical problems.
PSO -3	Comprehensive training in scientific communication, both verbal and written, while also developing research skills.
PSO -4	Understand good laboratory practices, safety and aware in handling the sophisticated instruments

7. MAPPING OF PROGRAMME OUTCOMES WITH PROGRAMME SPECIFIC OUTCOMES

S. No.	 <u>PSOs</u>	<u>PSO1</u>	<u>PSO2</u>	<u>PSO3</u>	<u>PSO4</u>
	 <u>POs</u>				
1.	<u>PO1</u>				
2.	<u>PO2</u>				
3.	<u>PO3</u>				
4.	<u>PO4</u>				
5.	<u>PO5</u>				
6	<u>PO6</u>				
7	<u>PO7</u>				

8. MAPPING OF COURSE WITH PROGRAMME SPECIFIC OUTCOMES

S. No.	 <u>PSOs</u>	<u>PSO1</u>	<u>PSO2</u>	<u>PSO3</u>	<u>PSO4</u>
	 Name of the course				
1.	Essentials and applications of mathematics physical and chemical sciences	✓		✓	
2	Advances in mathematical physical chemical sciences	✓		✓	✓
3	Communication & soft skills	✓			
4	Sahiti sourabham	✓			✓
5	Analytical skills	✓			✓
6	Communication skills	✓			✓
7	Principles of psychology	✓			
8	General and inorganic Chemistry		✓	✓	✓
9	General and inorganic Chemistry lab		✓	✓	✓
10	Inorganic chemistry-I	✓	✓		✓
11	Inorganic chemistry lab	✓	✓		✓
12	Reading & writing skills	✓			

13	Srujanatmaka Rachana	✓			
14	Business writing	✓			
15	Digital literacy	✓			
16	Fundamentals in organic chemistry	✓	✓	✓	✓
17	Fundamentals in organic Chemistry lab	✓	✓	✓	✓
18	Halogen and oxygen organic compounds	✓	✓	✓	✓
19	Halogen and oxygen organic compounds lab	✓	✓	✓	✓
20	Physical chemistry-1	✓	✓	✓	✓
21	Physical chemistry-1 lab	✓	✓	✓	✓
22	Inorganic physical chemistry-1	✓	✓	✓	✓
23	Inorganic physical chemistry-1 lab	✓	✓	✓	✓
24	Information and communication technology	✓			
25	Introduction to public administration	✓			
26	Physical chemistry -2	✓	✓	✓	✓
27	Physical chemistry -2 lab	✓	✓	✓	✓
28	General and physical chemistry	✓	✓	✓	✓
29	General and physical chemistry lab	✓	✓	✓	✓
30	Nitrogen containing organic compound and spectroscopy	✓	✓	✓	✓
31	Nitrogen containing organic compound and spectroscopy lab	✓	✓	✓	✓
32	Indian philosophy	✓			
33	Cyber security	✓			
34	Analytical methods in chemistry -quantitative analysis	✓	✓	✓	✓
35	Analytical methods in chemistry -quantitative analysis lab	✓	✓	✓	✓
36	Chromatography and instrumental methods of analysis	✓	✓	✓	✓
37	Chromatography and instrumental methods of analysis lab	✓	✓	✓	✓
38	Synthetic Organic Chemistry.	✓	✓	✓	✓
39	Synthetic Organic Chemistry. Lab	✓	✓	✓	✓
40	Reaction mechanism, Stereochemistry & Analysis of Organic compounds	✓	✓	✓	✓

41	Reaction mechanism, Stereochemistry & Analysis of Organic compounds Lab	✓	✓	✓	✓
42	Environmental Education	✓			
43	Inorganic Chemistry: Advance Studies in Complexes and Group theory	✓	✓	✓	✓
44	Inorganic Chemistry: Advance Studies in Complexes and Group theory Lab	✓	✓	✓	✓
45	Spectroscopy of Organic compounds	✓	✓		
46	Spectroscopy of Organic compounds Lab	✓	✓		
47	Physical Chemistry: Thermodynamics, Electro chemistry and Chemical Kinetics.	✓	✓	✓	✓
48	Physical Chemistry: Thermodynamics, Electro chemistry and Chemical Kinetics. Lab	✓	✓	✓	✓
49	Green chemistry	✓			
50	Green Chemistry lab	✓			
51	Polymer chemistry	✓	✓		✓
52	Polymer chemistry lab	✓	✓		✓
53	OOTD				
54	IKS				
55	Inorganic chemistry metal cluster electronic spectra of complex compounds and bioinorganic chemistry	✓	✓	✓	
56	Inorganic chemistry metal cluster electronic spectra of complex compounds and bio-inorganic chemistry lab	✓	✓	✓	
57	Modern organic synthesis and natural products Modern		✓	✓	✓
58	Modern organic synthesis and natural products Modern lab		✓	✓	✓
59	Physical-chemistry: quantum and molecular spectroscopy		✓	✓	✓
60	Physical-chemistry: quantum and molecular spectroscopy lab and molecular spectroscopy lab	✓	✓	✓	
61	Pharmaceutical, Medicinal chemistry	✓	✓	✓	✓
62	Pharmaceutical, Medicinal chemistry lab	✓	✓	✓	
63	Corrosion And Its Prevention	✓	✓		✓
64	Corrosion And Its Prevention Lab	✓	✓		✓
65	OOTD				
66	IKS				

9. Teaching and Learning process

Pedagogical Approaches

Teaching learning techniques include

- (1) Lecture based teaching-learning
- (2) Group- teaching and learning
- (3) Individual learning/ self-study
- (4) Inquiry based learning;
- (5) kinesthetic learning
- (6) Game Based learning
- (7) Expeditionary learning
- (8) Technology based learning
- (9) Peer teaching
- (10) Learning through problem-solving

Lecture based teaching-learning: It is a traditional method involving direct instruction from a teacher to students.

Group teaching and learning: Students are divided into small groups to work together on learning activities.

Individual learning/self-study: It involves self-paced learning where students use resources like text books, online materials etc.

Inquiry-based learning: This is a student-centered teaching approach where learners ask questions, conduct investigations, and develop their own understanding of concepts. It emphasizes critical thinking.

Peer teaching: Students teach each other under the guidance of an instructor.

Learning through problem solving: It emphasizes critical thinking, creativity, and the application of knowledge to find solutions.

Blended Learning: Combining traditional face-to-face teaching with online resources for a holistic approach.

Flipped Classroom: Students review materials beforehand and class room time is used for interactive problem solving.

10.ASSESSMENT PROCESS

10.1 DISTRIBUTION AND WEIGHTAGE OF MARKS:

a). Theory:

All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end examination.

Internal Assessment:

Internal Assessment - 30 Marks
Assignments - 10Marks

- Two Internal Assessment shall be conducted. One on first 50% of the syllabus and second on remaining 50% of the syllabus.
- Each Internal Assessment consists Subjective test
- Each subjective test shall be conducted for 75 Minutes and assessed for 30 marks
- Assignments shall be assessed for 10 marks
- Final Internal Assessment marks can be calculated from the average of the two Internal Assessments.

Semester End Examinations:

- External examination is for 60 marks (150 min). Question paper contains Essay questions and short answer questions.

Assignments: The student has to submit 5 assignments (1 for each unit) and assessed for 10 marks. Each assignment shall consist of 2 questions 5 marks (2X5 = 10 marks). Average of 5 assignments shall be considered as final assignment marks.

b) Semester End Practical:

All Laboratory courses are assessed for 50 marks.

- Semester end practical examination shall include assessment of the student on
 - a) Knowledge of principles/concepts involved
 - b) Experimental design
 - c) Result interpretation and analysis
 - d) Experimental report
- Semester end examination is for 50 marks (150 min) conducted and assessed by both external and internal examiners.

10.2. ATTENDANCE REGULATIONS:

- I. A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
- II. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
- III. Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
- IV. Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

PROMOTION RULE (Based on attendance):

- A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement (75%) of current semester
- A Student shall be pay examination fee for one of semesters out two Semesters (one academic year)

10.3 MINIMUM ACADEMIC REQUIREMENTS (Theory/ Practical):

A student is deemed to have satisfied the minimum academic requirements for a course on securing minimum 40% of marks in the semester end exam and minimum 40% of marks in the sum total of the internal marks and semester end marks.

10.4 GRADING SYSTEM:

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses.

$$\text{SGPA} = \frac{\sum (\text{course credits earned} \times \text{Grade points})}{\sum (\text{Total course credits in the semester})}$$

$$\text{CGPA} = \frac{\sum (\text{course credits earned} \times \text{Grade points}) \text{ up to successfully completed semesters}}{\sum (\text{Total course credits up to successfully completed})}$$

The UGC recommends a 10-point grading system with the following letter grades as given

below:

GRADE	GRADE POINTS
O	10
A+	9
A	8
B+	7
B	6
C	5
P	4
F	0

iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Marks Range (Max – 100)	Letter Grade	Grade Point
90 and Above	O	10
80-89	A+	9
70-79	A	8
60-69	B+	7
50-59	B	6
45-49	C	5
40-44	P	4
Below 40	F	0

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit point (Credit X Grade)
Course 1	3	A	9	3 X 9 = 27
Course 2	3	B	8	3 X 8 =24
Course 3	2	D	6	2 X 6 =12
Course 4	2	O	10	2 X 10 =20
Course 5	5	C	7	5 X 7= 35
Course 6	5	E	5	5 X 5 = 25
Course 7	5	C	7	5 X 7 = 35
			Total	178

Thus, $SGPA = 178/25 = 7.12$

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credits 25	31	27	36	30	12
SGPA 7.9	7.8	7.6	8.0	8.3	8.6

Illustration for CGPA

Thus,

$$CGPA = \frac{25 \times 7.9 + 27 \times 7.8 + 27 \times 7.6 + 32 \times 8.0 + 30 \times 8.3 + 12 \times 8.6}{159} = 8.07$$

10.5 ELIGIBILITY FOR AWARD OF DEGREE:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

- 1) Successfully completes all the courses prescribed for the Program.
- 2) CGPA greater than or equal to 5.0 (Minimum requirement for Pass),

10.6 AWARD OF CLASS:

Eligible Candidates for the award of Degree shall be placed in one of the following Classes based on CGPA.

CLASS	CGPA
First Class	≥ 6.5
Second Class	≥ 5.5 to < 6.5
Pass Class	≥ 5.0 to < 5.5

10.7 INSTRUCTION DAYS:

A semester shall have a minimum of 90 clear instruction days (including internal examinations).

10.8 SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted for final year students of Vth & VIth semesters within 4 weeks from the date of announcement of results of regular examinations.

10.9 WITH HOLDING OF RESULTS: The result of a student shall be withheld

- If any case of pending disciplinary action.
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

11. STRUCTURE OF THE PROGRAMME (INSTRUCTION & EXAMINATION)

Semester-I

S. No	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1.	Essentials and Applications of Mathematical, Physical and Chemical Sciences	Theory	5	60	40	100	4
2.	Advances in Mathematical, Physical and Chemical Sciences	Theory	5	60	40	100	4
3.	Communication skills and soft skills	Theory	4	60	40	100	3
4.	Sahiti sourabham	Theory	4	60	40	100	3
5.	Analytical skills	Theory	2	30	20	50	2
6.	Communication skills	Theory	2	30	20	50	2
7.	Principles of Psychology	Theory	2	30	20	50	2
	TOTAL		24			550	20

Semester-II

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	General & Inorganic Chemistry	Theory	4	60	40	100	3
2	Inorganic Chemistry-I	Theory	4	60	40	100	3
3	General & Inorganic Chemistry	Lab	2	30	20	50	1
	Inorganic Chemistry-I	Lab	2	30	20	50	1
4	Reading & writing skills	Theory	4	60	40	100	3
5	Srujanatmaka Rachana	Theory	4	60	40	100	3
6	Business Writing	Theory	2	30	20	50	2
7	Digital Literacy	Theory	2	30	20	50	2
	TOTAL		24			600	18

CSP

S.No	Title	Total hours	Credits
1	Community Service Project	4 weeks	04

SEMESTER-III

S. No.	Paper Title	Coursetype	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	Fundamentals in Organic Chemistry	Theory	4	60	40	100	3
2	Organic Chemistry(Halogen & Oxygen Organic Compounds)	Theory	4	60	40	100	3
3	Physical Chemistry-I (Solutions & Electrochemistry)	Theory	4	60	40	100	3
4	Inorganic & Physical Chemistry	Theory	4	60	40	100	3

5	Fundamentals in Organic Chemistry	Lab	2	30	20	50	1
6	Organic chemistry (Halogen & Oxygen Organic Compounds)	Lab	2	30	20	50	1
7	Physical chemistry-I	Lab	2	30	20	50	1
8	Inorganic & Physical Chemistry	Lab	2	30	20	50	1
9	Information and Communication Technology	Theory	2	30	20	50	2
10.	Introduction to Public Administration	Theory	2	30	20	50	2
	TOTAL		28			700	20

SEMESTE-IV

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	Physical Chemistry-II (States of matter, Phase rule & Surface Chemistry)	Theory	4	60	40	100	3
2	General & Physical Chemistry	Theory	4	60	40	100	3
3	Nitrogen containing Organic Compounds & Spectroscopy	Theory	4	60	40	100	3
4	Physical Chemistry-II (States of matter, Phase rule & Surface Chemistry)	Lab	2	30	20	50	1
5	General & Physical Chemistry	Lab	2	30	20	50	1
6	Nitrogen containing Organic Compounds & Spectroscopy	Lab	2	30	20	50	1
7	Indian Philosophy	Theory	2	30	20	50	2
8	Cybersecurity	Theory	2	30	20	50	2
	TOTAL		22			550	16

S.No	Title	Total hours	Credits
1	Short-Term Intern ship	6 weeks	04

Semester-V

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	Analytical Methods in Chemistry-Quantitative Analysis	Theory	4	60	40	100	3
2	Chromatography & Instrumental methods of Analysis	Theory	4	60	40	100	3
3	Synthetic organic chemistry	Theory	4	60	40	100	3
4	Reaction mechanism Stereo chemistry & analysis of organic compounds.	Theory	4	60	40	100	3
5	Analytical Methods in Chemistry-Quantitative Analysis	Lab	2	30	20	50	1
6	Chromatography & Instrumental methods of Analysis	Lab	2	30	20	50	1
7	Synthetic organic chemistry	Lab	2	30	20	50	1
8	Reaction mechanism Stereo chemistry & analysis of organic compounds.	Lab	2	30	20	50	1
9	Environmental Education	Theory	2	30	20	50	2
	TOTAL		26			650	18

SEMESTER-VI

Long-term Internship (4Months) INTERNSHIP FOR A PERIOD OF 16 WEEKS FOR 12 CREDITS

S.NO	Paper title	Course type	Instruction periods per week	External Marks	Internal Marks	Total Marks	Credits
1	Long term internship	-	16	150	50	200	12

SEMESTER-VII

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	Inorganic Chemistry: Advance Studies in Complexes and Group theory	Theory	4	60	40	100	3
2	Spectroscopy of Organic compounds	Theory	4	60	40	100	3
3	Physical Chemistry: Thermo dynamics, Electro chemistry and Chemical Kinetics.	Theory	4	60	40	100	3
4	Green Chemistry	Theory	4	60	40	100	3
5	Polymer Chemistry	Theory	4	60	40	100	3
6	Inorganic Chemistry: Advance Studies in Complexes and Group theory	Lab	2	30	20	50	1
7	Spectroscopy of Organic compounds	Lab	2	30	20	50	1
8	Physical Chemistry: Thermo dynamics, Electro chemistry and	Lab	2	30	20	50	1

	Chemical Kinetics.						
9	Green Chemistry	Lab	2	30	20	50	1
10	Polymer Chemistry	Lab	2	30	20	50	1
11	OOTD		----				2
12	IKS		2				0
	TOTAL		32			750	22

SEMESTER-VIII

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	Inorganic Chemistry: Metal Cluster, Electronic spectra of Complex compounds and Bio-inorganic chemistry	Theory	4	60	40	100	3
2	Modern Organic synthesis and Natural Products.	Theory	4	60	40	100	3
3	Physical Chemistry: Quantum And Molecular Spectroscopy	Theory	4	60	40	100	3
4	Pharmaceutical and Medicinal Chemistry	Theory	4	60	40	100	3
5	Corrosion and Its Prevention	Theory	4	60	40	100	3
6	Inorganic Chemistry: Metal Cluster, Electronic spectra of Complex compounds and Bio-inorganic chemistry	Lab	2	30	20	50	1
7	Modern Organic synthesis and Natural Products Modern	Lab	2	30	20	50	1
8	Physical Chemistry: Quantum And Molecular Spectroscopy	Lab	2	30	20	50	1

9	Pharmaceutical and Medicinal Chemistry	Lab	2	30	20	50	1
10	Corrosion and Its Prevention	Lab	2	30	20	50	1
11	OOTD		0				2
12	IKS		2				0
			32			750	22

B.Sc (Honours) with Single Major																								
Semester	Major* (4 Cr)			Minor (4 Cr)			AECC (3 Cr)			Multi Disney' (2 Cr)			Skill Enhancement Courses (2Cr)			OOTC			Env. Edn (2 Cr)			Total		
	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr
Sem 1	2*	10	8				2	8	6	1	2	2	2	4	4							7	24	20
Sem 2	2	6+4	8	1	3+2	4	2	8	6				2	4	4							7	27	22
Community Service Project of 180 hours with 4 Credits. Student is eligible for Exit Option-1 with the award of Certificate in respective discipline																								
Sem 3	4	12+8	16	1	3+2	4				1	2	2	1	2	2							7	29	24
Sem 4	3	9+6	12	2	6+4	8				1	2	2	1	2	2							7	29	24
Short-Term Internship/Apprenticeship/OJT of 180 hours with 4 Credits. Student is eligible for Exit Option-2 with the award of Diploma in respective major with minor																								
Sem 5	4	12+8	16	2	6+4	8													1	2	2	7	32	26
Sem 6	Semester Internship/Apprenticeship/OJT with 12 Credits. Student is eligible for Exit Option-3 with the award of Degree in respective major																							
IKS#																								
Sem 7	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22
Sem 8	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22
	21		84	6			24	4		12	3	6	6	10	32	28	2	4	4	2	4	0	47	160
20 Additional Credits for 10 month mandatory Internship/OJT/Apprenticeship																								
C Courses			H Hours			Cr Credits			OOTC Open Online Transdisciplinary															
IKS# Indian Knowledge Systems - Audit Course																								

B.A/B.Com/BBA (Honours) with Minor																								
Semester	Major* (4 Cr)			Minor (4 Cr)			Languages (3 Cr)			Multi Disney' (2 Cr)			Skill Enhancement Courses (2Cr)			OOTC			Env. Edn (2 Cr)			Total		
	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr
Sem 1*	2	8	8				2	8	6	1	2	2	2	4	4							7	22	20
Sem 2	2	8	8	1	4	4	2	8	6				2	4	4							7	24	22
Community Service Project of 180 hours with 4 Credits.																								
Sem 3	4	16	16	1	4	4				1	2	2	1	2	2							7	24	24
Sem 4	3	12	12	2	8	8				1	2	2	1	2	2							7	24	24
Short-Term Internship/Apprenticeship/OJT of 180 hours with 4 Credits.																								
Sem 5	4	16	16	2	8	8													1	2	2	7	26	26
Sem 6	Semester Internship/Apprenticeship/OJT with 12 Credits.																							
IKS#																								
Sem 7	3	12	12										2*	8	8	1	2	2	1	2	0	6	24	22
Sem 8	3	12	12										2*	8	8	1	2	2	1	2	0	6	24	22
	21		84	6			24	4		12	3	6	6	10	32	28	2	4	4	2	4	0	47	160
20 Additional Credits for 10 month mandatory Internship/OJT/Apprenticeship																								
C Courses			H Hours			Cr Credits			OOTC Open Online Transdisciplinary															
IKS# Indian Knowledge Systems - Audit Course																								

DETAILED COURSES

R 23	SEMESTER-I	L	P	T	C
	Course-1: Essentials and Applications of Mathematical, Physical and Chemical Sciences	5	--	--	4
TOTAL CONTACT HOURS – 70					

COURSE OBJECTIVES:

- The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences.
- The course aims to develop students' critical thinking, problem-solving
- Analytical skills in these areas,
- Enabling them to apply scientific principles to real-world situations

SYLLABUS

UNIT I: ESSENTIALS OF MATHEMATICS:

16hr

(a) Complex Numbers: Introduction of the new symbol i – General Form of a complex number – Modulus-Amplitude form and conversions Trigonometric Ratios: Trigonometric Ratios and their relations

(b) Problems on calculation of angles Vectors: Definition of vector addition – Cartesian form – Scalar and vector product and problems Statistical Measures: Mean, Median, Mode of a data and problems

UNIT II: ESSENTIALS OF PHYSICS:

15hr

(a) Definition and Scope of Physics- definitions of Measurements and Units - Motion of objects: Newton's three Laws and applications, Principles of relativistic mechanics on based on two postulates - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves-

(b) Electric and Magnetic fields and their interactions- Behavior of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Helios centric and Big bang Theories, understanding of universe

UNIT III: ESSENTIALS OF CHEMISTRY:

12hr

(a) Definition and Scope of Chemistry- Importance of Chemistry in daily life -Branches of chemistry and significance- Periodic Table-

(b) Electronic Configuration, chemical changes, classification of matter, Bimolecular-carbohydrates, proteins, fats and vitamins.

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY**14hr**

(a) (i) **Applications of Mathematics in Physics & Chemistry:** Calculus, Differential Equations & Complex Analysis

(ii) **Application of Chemistry in Industry and Technology:** Chemical Manufacturing, Pharmaceuticals and Drug Discovery, Materials Science, Food and Beverage Industry.

(b) **Application of Physics in Industry and Technology:** Aspects of Electronics and Semiconductor Industry, Components of Robotics, Benefits of Automation, Components and segments Automotive, segments of Aerospace Industry, Quality Control in Instrumentation, Environmental Monitoring and Sustainable Technologies

UNIT V: ESSENTIALS OF COMPUTER SCIENCE:**13hr**

(a) Milestones of computer evolution – Internet- history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications.

(b) WWW-web Applications, Web Terminologies, Web Browsers, URL- Components of URL, searching WWW- search Engines and examples

Reference Books:

1. Functions of one complex variable by John.B.Conway, Springer- Verlag.
2. Elementary Trigonometry by H.S.Hall and S.R.Knight
3. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd.
4. Basic Statistics by B.L.Agarwal, New age international Publishers
5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
6. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker
7. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway and John W. Jewett Jr.
8. Physics for Technology and Engineering" by John Bird
9. Chemistry in daily life by Kirpal Singh
10. Chemistry of bio molecules by S. P. Bhutan
11. Fundamentals of Computers by V. Raja Raman
12. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olso

Learning Outcomes: At the end of the course, the learners should be able to:

1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.
2. To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations
3. To explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to connect their knowledge of chemistry to daily life.
4. Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
5. 5 To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures

MAHARAJAH'S COLLEGE (AUTONOMOUS)::Vizianagaram.

I B.Sc. COURSE – 1, SEMESTER – I

MODEL QUESTIONPAPER

ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCE

I. CHOOSE THE CORRECT ANSWER

20 X 1 = 20M

1.What is the primary focus of chemistry? ()

- A) Study of astronomy B) understanding historical events
C) Analyzing economic systems D) Understanding the behavior of matter

2.The branch of chemistry deals with the study of different chemical apparatus utilization ()

- A) Organic chemistry B) Analytical chemistry C) Physical chemistry D) Inorganic chemistry
3.The Uncertainty principle proposed by _____ ()

- A) Schrodinger B) Hamiltonian C) Heisenberg D) de-Broglie

4.What is the type of the wave does sound wave belongs to : ()

- A) micro waves B) Longitudinal waves C) Electromagnetic waves D) Transverse waves

5.Which of the following equation is known as law of force? ()

- A) $F = - dP/dT$ B) $F = mc^2$ C) $a = F.m$ D) $F = ma+c^2$

6.Which of the following is a fundamental Unit.? ()

- A) Newton B) meter/sec² C) Kg/m³ D) grams

7. Given the data {8, 18, 36, 12, 30, 12, 24}, what is the mean, median? ()

- A) Mean: 17.5, Median: 18 B) Mean: 18, Median: 17.5
 C) Mean: 17, Median: 18 D) Mean: 18, Median: 17

8. If $A = 2i + 3j + k$ and $B = i + 2j + 3k$ then $3A + 2B =$ ()

9. A) $8i + 8j + 2k$ B) $8i + 12j + 8k$ C) $8i + 9j + 13k$ D) $8i + 13j + 9k$

10. $\tan^2 30 + \cot^2 30 =$ _____ ()

11. A) 15/3 B) 13/3 C) 10/3 D) 10/5

10. The additive inverse of $(7 - 4i)$ is _____ ()

- A) $7 + 4i$ B) $-7 + 4i$ C) $-7 - 4i$ D) $7 - 4i$

11. II group elements in Modern Periodic table are ()

- A) Inert Gases B) Actinides C) alkali earth metals D) Alkali metals

12. Electronic configuration of oxygen

()

- A) $1s^2 2s^2 2p^1$ B) $1s^2 2s^2 2p^2$ C) $1s^2 2s^2 2p^3$ D) $1s^2 2s^2 2p^4$

13. $(e^{i\theta}) =$ ()

- A) $(\cos \theta + i \sin \theta)$ B) $(\cos \theta + i \sin \theta)$
 C) $(\cos \theta - i \sin \theta)$ D) $(\cos \theta + i \sin \theta)$

14. $|a + ib| =$ _____ ()

- A) $a^2 + b^2$ B) $a^2 - b^2$ C) $a - ib$ D) $\sqrt{(a^2 + b^2)}$

15. If temperature is constant during a heat process is known as _____ ()

- A) Isothermal B) Iso baric C) isochoric D) adiabatic

16. Glucose is an example of ()

- A) oligo saccharide B) Di saccharide
C) Mono saccharide D) Poly saccharide

17. The key used to erase a letter or a word is ()

- A) Back space B) Space bar C) Escape D) Tab

18. ICs are used in _____ generation. ()

- A) IV B) III C) II D) I

19. FTP stands for ()

- A) File transfer programme B) File Traverse Programme
C) File Transfer Protocol D) File Transmitting Protocol

20. DNS stands for _____ ()

- A) Domain Name System B) Domain Name Service
C) Domain National Service D) Domain National System

FILL IN THE BLANK

10 X 1 = 10M

21. vector Product is also called as _____

22. Find the median of given set of numbers 2,18,6,12,4,10,17,19 is _____

23. The significance of the II law of thermodynamics is _____

24. Einstein's mass-energy equation is _____

25. The valance of fluorine in ground state is _____

26. NaOH is decomposed into _____
27. The green house gases are _____
28. The full form of RADAR is _____
29. ROM stands for _____
30. Wi-Fi means _____

II. VERY SHORT ANSWERS

10 X 1 = 10M

31. If $\cos 24^\circ = 0.913$, then find $\cos 72^\circ$
32. Define Mean and Median
33. state geocentric theory?
34. Explain Nuclear Fission.
35. Write any two applications of green chemistry?
36. What are the functions of vitamin K in our body?
37. Relation between torque and linear force?
38. write any three electric conducting elements.
39. Write any three search engines names.
40. Draw block diagram of CPU.

IV. MATCH THE FOLLOWING () A) $1S^22S^22P^63S^2$ **10 X 1 =10M**

41. GROUP – III

42. GROUP - I () B) $\nabla^2\Phi = 0$

43. $i^{-7} =$ () C) Charles babbage

44. $\frac{\cot 30}{\tan 45} =$ () D) $\nabla^2\Phi = -k^2\Phi$

45. Silicon (Si) () E) 0

46. Neon (Ne) () F) - i

47. Laplace's equation () G) Transition metals

48. Helmholtz equation () H) $1S^22S^22P^6$

49. www () I) Alkali metals

50. father of computer () J) i

K) $1S^22S^22P^63S^1$

L) Tim Berners-Lee

V. TRUE OR FALSE

10 X 1 = 10M

51. $Z = 2+3i$ then $|Z| = 13$ [True/False]

52. $A \times B = |A||B|\sin\theta$ [True/False]

53. charge of electron = charge of proton [True/False]

54. de Broglie hypothesis states that moving particle is associated with wave [True/False]

55. All inert gases are following octant rule. [True/False]

56. Vitamin A,D,E and K are soluble in water. [True/False]

- 57.** The solution of SHM is an application of differential equations [True/False]
- 58.** Solar photovoltaic cells working is an example for non- renewable energy [True/False]
- 59.** AI stands for artificial intelligence [True/False]
- 60.** ICs are used in I generation. [True/False]

	SEMESTER-I	L	P	T	C
R 23	Course-2: Advances in Mathematical, Physical and Chemical Sciences	5	0	--	4
TOTAL CONTACT HOURS – 70					

COURSE OBJECTIVES:

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences.

The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

SYLLABUS

UNIT I: ADVANCES IN BASICS MATHEMATICS (16)

Straight Lines: Different forms- Reduction of general equation into various forms --Point of intersection of two straight lines

Limits and Differentiation: Standard limits -- Derivative of a function- --Problems on product rule and quotient rule

Integration: Integration as a reverse process of differentiation -- Basic methods of integration

Matrices: Types of matrices -- Scalar multiple of a matrix -- Multiplication of matrices -- Transpose of a matrix and determinants

UNIT II: ADVANCES IN PHYSICS: (15)

Renewable energy: Generation, energy storage, and energy-efficient materials and devices.

Recent advances in the field of nanotechnology: Idea of Nano Science and Nano Technology, Nanometric systems, Quantum dots, Quantum Communication; *Nanotechnology in biophysics*; Recent advances in medical physics- *Radiation therapy advantages, Radiation protection and safety.*

UNIT III: ADVANCES IN CHEMISTRY: (12)

Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY (14)

Mathematical Modelling applications in physics and chemistry Application of Renewable energy: Grid Integration and Smart Grids,

Application of nanotechnology: Nanomedicine,

Application of biophysics: Biophysical Imaging, Biomechanics, Neuro-physics,

Application of medical physics: Radiation Therapy, Nuclear medicine

Solid waste management, Environmental remediation- Green Technology, Water treatment.

UNIT V: ADVANCED APPLICATIONS OF COMPUTER SCIENCE (13)

Number System-Binary, Octal, decimal, and Hexadecimal and their conversions, Signals-Analog, Digital, Modem, Multiplexing & De-Multiplexing, Transmission media- characteristics and types, Networking devices- Repeater, hub, bridge, switch, router, gateway (Qualitative).

REFERENCE BOOKS:

RB1. Coordinate Geometry by S.L.Lony, Arihant Publications

RB2. Calculus by Thomas and Finny, Pearson Publications

RB3. Matrices by A.R.Vasishtha and A.K.Vasishtha, Krishna Prakashan Media(P)Ltd.

RB4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle

RB5. "Energy Storage: A Nontechnical Guide" by Richard Baxter

RB6. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A. Bohara

RB7. "Biophysics: An Introduction" by Rodney Cotterill

RB8. "Medical Physics: Imaging" by James G. Webster

RB9. Nano materials and applications by M.N.Borah

RB10. Environmental Chemistry by Anil.K.D.E.

RB11. Digital Logic Design by Morris Mano

RB12. Data Communication & Networking by Bahrouz Forouzan.

LEARNING OUTCOMES:

On successful completion of this course, the student will be able to:

1. Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.

2. To explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to connect their knowledge of physics to everyday situations.
3. Understand the different sources of renewable energy and their generation processes and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.
4. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health.
5. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
6. Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics. Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite).

MAHARAJAH'S COLLEGE (A)

SUMMATIVE ASSESSMENT

Subject: Major II model paper

Paper: Advances in Mathematical, Physical and Chemical Sciences

I. CHOOSE THE CORRECT ANSWER

20 x 1 = 20M

1. The equation of straight line which is passing through origin .
()
a. $ax+by+c=0$ b. $y=mx+c$ c. $y=mx$ d. $x/a+y/b=1$
2. $\frac{d}{dx}(x^n) =$
()
a. nx^{n-1} b. nx^{n+1} c. x^{n-1}/n d. x^{n+1}/n
3. Condition for inverse matrix A^{-1} is
()
a. $\det A=0$ b. $\det A =1$ c. $\det A=2$ d. $\det A \neq 0$
4. $\lim_{x \rightarrow 0} (\sin x)/x =$
()
a. 0 b. ∞ c. 1 d. -1
5. Which of the following is commonly used Semiconductor material in photo catalytic dye removal. ()
a. Gold b. Titanium dioxide c. Sodium Chloride d. Hydrogen peroxide
6. What is the typical size range of nano particles used in nano sensors?
()
a. Micrometer b. Nanometer c. Millimeter d. Centimeter
7. CADD stands for
()
a. Computer Aided Drug design and Development
b. Creative Art work design and Development
c. Computer Analysis and design and Drafting
d. Computer Animated Drug drawing and Design
8. Principle of Solar cell is
()
a. Photovoltaic effect b. Chemical effect c. Physical effect d. Atmospheric effect
9. Which energy source contributes the most to the total primary energy production in India
()
a. Oil b. Natural gas c. Coal d. Hydro power
10. Which of the following are energy storage devices
()
a. Nano enhanced b. Hydrogen fuel cell c. Photo electric chemical cell d. All of the above

I. FILL IN THE BLANKS**10****x1 =10M**

21. $(A^T)^T =$ _____
 22. The slope of $y=5x+2$ is _____
 23. $f=asinwt$ then $df/dt =$ _____
 24. CADD simplifies the drug design process by minimizing _____ and _____
 25. Nano sensors play crucial role in _____ level
 26. Radiation unit is _____.
 27...In Medicinal robotics physics play a role in the design and control

2 28. Light emitting diodes and Lasers are _____

2 29. chemical formula for Sodium Benzoate _____

3 30. $(52)_{10} = (\text{_____})_2$.

III.MATCHING**10 x1****=10M**

- A) 31. $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$; $A^T =$ () a. molecular modeling
 32. $\lim_{x \rightarrow 0} (\sin x)/x =$ () b.A
 33. global warming () c.semiconductor material
 34. photo catalytic dye. () d.Rotational energy stored
 35. Flywheel energy storage () e.1

B)

36. CAN () a) Current.
 37. Analog signal () b) $J/(Kg^{\circ}c)$
 38. Specific Heat unit () c) $8.314J/Mol^{-1}\cdot K$.
 39. Universal Gas Constant () d) Campus Area Network.
 40. flow of electrons () e) sin waves.

IV. ANSWER THE FOLLOWING VERY SHORT ANSWER QUESTIONS**10 x1 = 10M**

41. Differentiate $(1 - \cos x) / (1 + \cos x)$
 42. $A = \int_{\log x}^x e^x$ then $dA/dx =$ _____
 43. what is virtual screening?
 44. What is QSAR in drug design?
 45. What is photo-electric effect?
 46. What type of elements are used as a Semiconductor Devices?
 47. Write any two Applications of Physics for Robotics?
 48. Convert $(186)_{10}$ into Octal Equivalent?
 49. What is a Modem?
 50. How does the choice of Semiconductor material impact the efficiency of photocatalysis in dye removal?

V. MENTION THE UNDER STATEMENTS TRUE OR FALSE**10 x1 = 10M**

51. If matrix $AB = 0$ then $A=0$ or $B=0$ or both A and B are null matrices (True / False)

52. $\int \log x \, dx = x(\log x + 1) + c$ (True / False)
53. Structure based drug design method is a direct approach (True / False)
54. Bio accumulation and bio magnification is same (True / False)
55. Green power project belongs to Non-Renewable energy source (True / False)
56. Ultrasound imaging is considered non-invasive and is safe for imaging during pregnancy. (True / False)
57. Binary system useful for computer systems (True / False)
58. MODEM Stands for “ Modulator- Demodulator” (True / False)
59. Nuclear Energy sources are Renewable energy sources. (True / False)
60. $(786)_{10}$ into Octal Equivalent $(1422)_8$. (True / False).

	SEMESTER – I	T	P	C
R -23	A COURSE IN COMMUNICATION AND SOFT SKILLS			
	<u>English Language Course-I</u> (w.e.f 2023 -24 Admitted Batch)	4	0	4

COURSE OBJECTIVES:

The objectives of this course is to make the students:

- Grasp the importance of listening and its types.
- Acquire the knowledge on phonetics with reference to sounds, accent, intonation and

rhythm.

- Learn the grammar topics i.e., concord, tenses, articles, prepositions and question tags.
- Enhance speaking skills with the help of Obama`s speech `Yes, We Can` and Kalam`s `A Leader Should Know How to Manage Failure`.
- To get an overview about soft skills i.e., attitude, E.I, T.E. and Interpersonal Skills.

SYLLABUS:

UNIT - I: Listening Skills

- a. Importance of Listening.
- b. Types of Listening.
- c. Barriers to Listening.
- d. Effective Listening.

UNIT - II: Speaking Skills

- a. Sounds of English: Vowels and Consonants.
- b. Syllable
- c. Word Stress
- d. Intonation

UNIT - III: Grammar

- a. Concord.
- b. Articles
- c. Prepositions
- d. Tenses
- e. Question Tags

UNIT - IV: Writing

- a. Greetings & Introduction

- b. Asking & Giving Information
- c. Yes, We Can – Barack Obama
- d. Agreeing & Disagreeing
- e. A Leader Should Know How to Manage Failure – Dr.A. P. J. Abdul Kalam

UNIT - V: Soft Skills

- a. SWOC.
- b. Attitude.
- c. Emotional Intelligence.
- d. Telephone Etiquette.
- e. Interpersonal Skills.

CO-CURRICULAR ACTIVITIES:

- Class Room Seminars.
- Group Discussions.
- Role Play.
- Assignments.

TEXT BOOKS:

- English Praxis Course-I by Maruthi Publications.
- English Praxis Course-I by A Course on Communication and Soft skills
---Vivanta Press.

REFERENCE BOOKS:

- A text book of English Phonetics for Indian Students by
T.Balasubramanian.
- Essentials of English Grammar by Raymond Murphy.
- Soft Skills Training – A work book to develop Skills for employment by
Frederick H. Wentz

1. Duolingo (<https://www.duolingo.com/>) - This is a language-learning platform that offers a fun and interactive way to learn English through games, exercises, and quizzes.
2. BBC Learning English (<https://www.bbc.co.uk/learningenglish/>) - The BBC offers a comprehensive range of resources for learners of English, including grammar, vocabulary, and pronunciation.
3. English Central (<https://www.englishcentral.com/>) - This website provides a platform for practicing your English listening and speaking skills through video lessons and interactive activities.
4. Busuu (<https://www.busuu.com/>) - Busuu is a language-learning platform that offers lessons in English grammar, vocabulary, and conversation practice.

Activities :

- Make the students to news excerpts.
- Watch interviews and speeches on You Tube.
- Role plays on formal and informal covesations.

LEARNING OUT COMES:

By the end of the course the learner will be able to:

- Understand the importance listening and practice effective listening.
- Use grammar effectively for accuracy in writing and speaking.
- Demonstrate the use of good vocabulary.
- Acquire ability to use Soft Skills in professional and daily life.
- Confidently use the tools of communication skills.

**MAHARAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
I B.A., B.Sc., B. Com & B.B.A. First Semester End Model Question
Paper**

Max. Time: 3Hrs.

ENGLISH

Max. Marks: 60M

PART - A

**I. Answer any FIVE of the following questions:
5X2 =10M**

1. What are the differences between Hearing and Listening?
2. What is syllable ? Give two any two examples.
3. Define Concord with an example.
4. Define asking for information and giving for information with one example each.
5. What is SWOT Analysis?
6. What is the difference between formal greetings and informal greetings?
7. Write a note on Diphthongs with examples.
8. You are invited your best friend to your birthday party. Develop a dialogue on agreeing or disagreeing to your Invitation. (Five Exchanges)

PART - B

II. Answer the following questions :

5X10=50M

9.a]What is the importance of listening of and write a note on different types of listening?

OR

B]What factors act as barriers to Listening ?

10.a]Write a note on Vowel Sounds, Diphthongs and Consonant sounds in brief?

OR

B] What is Intonation ? Write a note on Rising Tone and Falling Tone and Rhythm in English Language.

11. Answer the following:

A. Fill in the blanks with suitable articles :

a. I met -----on eyed beggar.

b. My brother is -----M.L.A.

B. Fill in the blanks with suitable prepositions:

a. She died ----- Cancer.

b. Mr., Sastri knows English ----- Telugu.

C. Supply the appropriate question tags to the following statements :

a.She cooked very well.

b. It will not rain tomorrow.

D. Fill in the blanks in the following sentences with suitable form of the verb given in the brackets :

a. The boys ----- (play) cricket since 11`o clock.

b. When we reached home, Rani ----- (Sweep) the floor.

c. Children ----- (like) chocolates.

d. My friend ----- (read) the novel yesterday.

OR

B]. What is the best way to manage failure according to Abdul Kalam?

12 a] How does Barack Obama say about his victory in the American Presidential election?

OR

B] What are the challenges ahead of America and Obama in the event of his victory?

OR

13. a]What is positive thinking and how to develop positive thinking?

OR

B]. What is the importance of emotional intelligence and write a note on enhancement of emotional intelligence in one`s career?

	Semester-I	L	P	T	C
R 23	POETRY, PROSE & GRAMMER -I	4	0	--	4
	SANSKRIT				
TOTAL CONTACT HOURS – 60					

Course 1: POETRY, PROSE & GRAMMER -I

Course Objectives

1. Develop proficiency in reading, writing, and speaking skills
2. Introduce students to classical Sanskrit literature, including epics, poetry, drama, and philosophical texts.

3. Enhance knowledge of Sanskrit grammar (Vyakarana).
4. Provide insights into Indian culture, philosophy, and heritage as reflected in Sanskrit texts.
5. Encourage the use of Sanskrit in modern contexts, including employability in education, research, and technology.

Course Outcomes;

1. Demonstrate proficiency in Sanskrit through effective communication, both oral and written.
2. Analyze and interpret classical texts and apply their teachings to contemporary life.
3. Exhibit a clear understanding of Sanskrit grammar and its application in constructing verses and prose.
4. Develop skills for translation and interpretation of Sanskrit texts into modern languages.
5. Identify career opportunities in areas like teaching, translation, research, and cultural tourism.

I Learning Outcomes:

1. H̄ è Ö × è Ó ĩ £
2. è Ö × è Ó ĩ £
3. à ĩ

**II Syllabus:
60)**

(Teaching Hours:

Unit - 1: Ĥ × (12h)

1. Ĥ [- Ĥ ġ Ö 67 [
2. Ĥ - Ĥ ů[32 Ú

Unit - 2: Ĥ × (12h)

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Unit - 3: Ĥ × (12h)

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Unit - 4: å (12h)

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Unit - 5: å (12h)

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III Skill Outcomes:

On successful completion of this course, student shall be able to:

1. Ö × , ö , ö ó ö
2. ã à

3. à £ Ĥ [ÚÚ Ĥ P

IV References:

1. Prescribed Sanskrit **Text Book IV**
Co-Curricular Activities: (Hours for Activity: 15h)
 1. Assignments
 2. Seminars, Group discussions, Quiz, Debates etc.
 3. Invited lectures and presentations on related topics by experts.

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MAHARAJAH'S COLLEGE (AUTONOMOUS)

B.A., B.Sc., & B.Com., (HONS) FIRST SEMESTER-END EXAMINATIONS-DEC, 2023.

SANSKRIT

(PAPER : POETRY, PROSE & GRAMMAR – I)

Time: 2 ½ Hours (2 P.M. To 4-30 P.M.) Date: 22-12-2023 Max. Marks: 60

SECTION-A

1. पंच प्रश्नाः समाधानानि लिखत । [5X2=10]
- a] भवामि b] पश्यतु c] कपीशः d] नवोदयः
e] इत्यत्र f] ग्रामगतः g] अधर्मः h] पापभयम्

SECTION -B

[5X10=50]

2. a.] रामेण कृतं धनुर्भंगं निरूपयत । [-10]

अथवा

b.] शरणागत रक्षणम् इति पाठ्यभागस्य सारांशम् लिखत ।

3. a.] उदधियान विधान वधानजं श्रवणोत्सवं निरूपयत । [-10]

अथवा

b.] रामकीर्तिः इति पाठ्यभागसारांशं लिखत ।

4. a.] खलोक्तिः इति पाठ्यभागस्य सारांशं लिखत । [-10]

अथवा

b.] कांग्रेस संस्थायां तिलकदलस्य आधिपत्यं कथं जातम् ?

5. चतुर्णां ससन्दर्भसहित वाक्यानि लिखत । [4x2½=10]

1. इदं धनुर्वरं राजन्पूजितं सर्वराजभिः ।
2. आरोपयत्स धर्मात्मा सलीलमिव तद्धनुः ।
3. यदि त्वमिह धर्मार्थं मामपि द्रष्टुमर्हसि ।
4. दाडिमाशोकपुष्पाक्ष मा त्रसस्वाभयं तव ।
5. मददेहेन जीवतु स्वामी ।
6. मतिर्डीलयते सत्यं सतामपि खलोक्तिभिः ।

6. द्वौ शब्दौ सविभक्तिकं लिखत । [2x5=10]

A] देव b] भानु c] पितृ d] रमा

COURSE INFORMATION SHEET

GENERAL INFORMATION

Program	: General Telugu
Year and Semester	: I Semester
Course	: Saahiti Sourabham ()
Course Name	: TELUGU
Course Coordinator	:
Total Number of hours	: 60
Internal Marks	: 40
External Marks	: 60

Lecture	Tutorial	Practical	No.of Hrs per week	Credits
4	0	0	4	4

Course Objectives ():

1. Develop proficiency in reading, writing, and speaking skills
2. Introduce students to classical Telugu literature, including epics, poetry, drama, and philosophical texts.
3. Enhance knowledge of Telugu grammar (Vyakaranam).
4. Provide insights into Indian culture, philosophy, and heritage as reflected in Telugu texts.
5. Encourage the use of Telugu in modern contexts, including employability in education, research, and technology.

Course Outcomes ():

1. Demonstrate proficiency in Telugu through effective communication, both oral and written.
2. Analyze and interpret classical texts and apply their teachings to contemporary life.

3. Exhibit a clear understanding of Telugu grammar and its application in constructing verses and prose.

4. Develop skills for translation and interpretation of Telugu texts into modern languages.

5. Identify career opportunities in areas like teaching, translation, research, and cultural tourism.

1 - :

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-II ()

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వ్యాకరణం

సంధులు: అత్వ, ఇత్వ, ఉత్వ, త్రిక,
సరళాదేశ, గసడదవాదేశ, ద్విరుక్త టకార,
సవర్ణ దీర్ఘ, గుణ, యణాదేశ,
వృద్ధి సంధులు.

సమాసాలు: అవ్యయిభావ, తత్పురుష,
కర్మధారయ, ద్వంద్వ, ద్విగు, బహువ్రీహి.

అర్థాలంకారాలు : ఉపమ, ఉత్ప్రేక్ష, రూపక,
స్వభావోక్తి, అర్థాంతర వ్యాస, అతిశయోక్తి, శ్లేష.

శబ్దాలంకారాలు: వృత్త్యనుప్రాస, ఛేకానుప్రాస,
లాటానుప్రాస, అంత్యానుప్రాస

వృత్తాలు: ఉత్పలమాల, చంపకమాల,

శార్దూలము, మత్తేభము

జాతులు : కందం, ద్విపద

ఉపజాతులు : ఆటవెలది, తేటగీతి, సీసం

ముత్యాలసరాలు

▪ ఆధార గ్రంథాలు:

1. శ్రీమదాంధ్ర మహాభారతము - సభాపర్వము-
తిరుమల తిరుపతి దేవస్థానం ప్రచురణ
2. గబ్బిలం - జాషువా
3. అలరాస పుట్టిళ్లు - కళ్యాణ సుందరీ జగన్నాథ్
4. అసమర్థుని జీవయాత్ర - త్రిపురనేని గోపీచంద్
5. మూడు వాఙ్మయ శిఖరాలు - తిరుమల
రామచంద్ర

▪ సూచించబడిన సహపాఠ్య కార్యక్రమాలు:

1. నన్నయ్య, తిక్కన, ఎఱ్ఱన మొదలైన ప్రసిద్ధ
కవుల పాఠ్యాంశేతర పద్యాలను ఇచ్చి,
విద్యార్థులచేత సమీక్షలు రాయించడం; ఆయా
పద్యాల్లోని యతిప్రాసాది ఛందోవిశేషాలను
గుర్తింపజేయడం.

Course Outcomes ();

1. Demonstrate proficiency in Telugu through effective communication, both oral and written.
2. Analyze and interpret classical texts and apply their teachings to contemporary life.
3. Exhibit a clear understanding of Telugu grammar and its application in constructing verses and prose.
4. Develop skills for translation and interpretation of Telugu texts into modern languages.

5. Identify career opportunities in areas like teaching, translation, research, and cultural tourism.

2. విద్యార్థులచేత పాఠ్యాంశాలకు సంబంధించిన వ్యాసాలు రాయించడం (సెమినార్/అసైన్మెంట్)
3. ప్రాచీన పాఠ్యాంశాలలోని సమకాలీనతను గూర్చిన బృంద చర్చ, ప్రాచీన సాహిత్యాన్ని నేటి సామాజిక దృష్టితో పునర్మూల్యాంకనం చేయించడం.
4. చారిత్రక, సాంస్కృతిక అంశాలకు సంబంధించిన పర్యాటక ప్రదేశాలను సందర్శించడం.
5. వ్యక్తిగత/బృంద ప్రాజెక్టులు చేయించడం.

▪ అభ్యసన ఫలితాలు

ఈ కోర్సు విజయవంతంగా ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. తెలుగు సాహిత్యం యొక్క ప్రాచీనతను, విశిష్టతను గుర్తిస్తారు. ఆదికవి నన్నయ కాలంనాటి భాషాసంస్కృతులను, ఇతిహాసకాలం నాటి రాజనీతి విషయాలపట్ల పరిజ్ఞానాన్ని సంపాదించగలరు. ప్రాచీన కావ్యభాషలోని వ్యాకరణాంశాలను అధ్యయనం చేయడం ద్వారా భాషాసామర్థ్యాన్ని, రచనలు మెళకువలను గ్రహించగలరు.
2. జాషువా కాలంనాటి మతపరిస్థితులను, గబ్బిలం కావ్య విశేషాలను గ్రహిస్తారు. తెలుగు నుడికారం,

సామెతలు, లోకోక్తులు మొదలైన భాషాంశాల పట్ల పరిజ్ఞానాన్ని పొందగలరు.

3. అలరాస పుట్టిళ్లు కథా సేవధ్యాన్ని, సంపన్న కుటుంబాలలోని పరిస్థితులను, ప్రేమ, పరువు వంటివి మనిషిని ఎలా నడిపిస్తాయో అవగాహన చేసుకోవడంతో పాటు కథా రచన ఎలా చేయాలో తెలుసుకుంటారు.

4. అసమర్థుని జీవయాత్ర రచనలో అప్పటి మన పల్లెటూళ్లు, మానవ సంబంధాలు, ఆస్తి అంతస్తులు వికృత రూపంలో ఎలా సాక్షాత్కరిస్తాయో, జమీందారీ వ్యవస్థ ఎలా బీటలు వారుతుందో, మన సమాజంలో పెట్టుబడిదారీ బీజాలు ఎలా నాటుకున్నాయో విద్యార్థి తెలుసుకుంటాడు. ఒక తరం జీవితాన్ని కళ్లకు కట్టి మనోవైజ్ఞానిక నవలగా పేరు పొందిన అసమర్థుని జీవయాత్ర విద్యార్థి వ్యక్తిత్వ వికాసానికి దోహదం చేస్తుంది.

5. వేటూరి ప్రభాకర శాస్త్రి, నిడదవోలు వేంకటరావు, మానవల్లి రామకృష్ణ కవి వంటి ప్రముఖుల జీవిత చరిత్రలను తిరుమల రామచంద్ర ఎలా రాశారో అధ్యయనం చేయడంతోపాటు జీవిత చరిత్ర ప్రక్రియను ఎలా రచించాలో తెలుసుకుంటారు.

6. ప్రాచీన కావ్యభాషలోని వ్యాకరణాంశాలను అధ్యయనం చేయడం ద్వారా భాషాసామర్థ్యం పెంపొందుతుంది.

మోడల్ పేపర్
తెలుగు
(పేపరు : సాహితీ సౌరభం)

Time : 2 ½ Hours (2 P.M. To 4-30 P.M.)

Date:

Max. Marks : 60

సెక్షన్ - ఎ

- (1) ఈ క్రింది వాటిలో ఐదంటికి (5) సంక్షిప్త సమాధానాలు వ్రాయండి. (5 × 2 = 10)
- ఎ) కృతము దలంచి ప్రాణములు విడుతురనిన్ -
ఈ వాక్యానికి సందర్భ వాక్యం, కవి, పాఠం పేరు ఎవరు ఎవరితో అన్నారు?
 - బి) ఉత్త్రేక్ష అలంకారము సోదాహరణంగా వివరించండి.
 - సి) సీతారామ రావు వంశ విశేషాలు వ్రాయండి.
 - డి) జర్నలిజం అంటే ఏమిటి?
 - ఇ) ప్రతిమల పెండ్లి సేయుటకు వందలు వేలు వ్యయించుఁగాని దుః -
గణ విభజన చేసి ఏ పద్యపదమో తెల్పండి.
 - ఎఫ్) ఉలికిపడు జబ్బు కలదు వీడున్న చోట -
ఈ వాక్యానికి సందర్భ వాక్యం, కవి, పాఠం పేరు ఎవరు ఎవరితో అన్నారు?
 - జి) సంపాదకుడు గురించి రెండు వాక్యాలలో తెల్పండి.
 - హచ్) “అలరాస పుట్టిల్లు” కథా నేపథ్యం వివరించండి.

సెక్షన్ - బి

- ఈ క్రింది అన్ని ప్రశ్నలకు సమాధానాలు వ్రాయండి. (5 × 10 = 50)
2. క్రింది పద్యాలలో ఒక దానికి ప్రతిపదార్థ తాత్పర్యం వ్రాయండి.
- ఎ) ఉత్తమమధ్యమాధ్యమనియోగ్యత బుద్ధి నెఱింగి వారి న
యుత్తమమధ్యమాధ్యమనియోగములన్ నియమించితే నరేం
ద్రోత్తమ! భృత్యుకోటికి ననూనముగాఁ దగు జీవితంబు లా
యత్తమ సేసి యితై దయ నయ్యయి కాలము దప్పకుండగన్
(లేదా)
 - బి) చిక్కిన కాసుచేఁ దనివిఁ జెందు నమాయకుఁ డెల్ల కష్టముల్
బొక్కెడు బువ్వతో మరచిపోవు క్షుధానల దగ్ధమూర్తి న
ల్లిక్కులుఁ గల్గు లోకమున దిక్కరియున్న యరుంధతీ సుతుం
డొక్కఁడు జన్మమెత్తె భరతోర్వరకుం బిడ్డఁడై
3. ఎ) ఉద్యోగుల నియామకంలో రాజులు ఎటువంటి జాగ్రత్తలు తీసుకోవాలి?
(లేదా)
- బి) పంచముని దుస్థితిని జాషువా “గబ్బిలం” కావ్యంలో వర్ణించిన విధమెట్టిది?
4. ఎ) “అలరాస పుట్టిల్లు” కథను సంగ్రహంగా తెల్పండి.
(లేదా)
- బి) పాత్రికేయ విద్య మరియు విలేఖరి గూర్చి రాయండి.
(లేదా)
5. ఎ) అసమర్థుడు సీతారామారావు నిరూపించండి.
(లేదా)
- బి) అసమర్థుని జీవయాత్రలో ప్రతిఫలించిన మానవ సంబంధాలను ఆవిష్కరించండి.
6. ఎ) గురజాడ రచనలు, సంస్కరణలు, ఉద్యమాలను వివరించండి.
(లేదా)
- బి) కందుకూరి వీరేశలింగం పంతులు సంస్కరణ, ఉద్యమాల గురించి వివరించండి.

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COURSE INFORMATION SHEET

GENERAL INFORMATION

Program	: General Telugu
Year and Semester	: II Semester
Course	: Srujanaatmaka Rachana ()
Course Name	: TELUGU
Course Coordinator	:
Total Number of hours	: 60
Internal Marks	: 40
External Marks	: 60

Lecture	Tutorial	Practical	No.of Hrs per week	Credits
4	0	0	4	4

Course Objectives ():

1. Develop proficiency in reading, writing, and speaking skills
2. Introduce students to classical Telugu literature, including epics, poetry, drama, and philosophical texts.
3. Enhance knowledge of Telugu grammar (Vyakaranam).
4. Provide insights into Indian culture, philosophy, and heritage as reflected in Telugu texts.
5. Encourage the use of Telugu in modern contexts, including employability in education, research, and technology.

Course Outcomes ():

1. Demonstrate proficiency in Telugu through effective communication, both oral and written.

2. Analyze and interpret classical texts and apply their teachings to contemporary life.
3. Exhibit a clear understanding of Telugu grammar and its application in constructing verses and prose.
4. Develop skills for translation and interpretation of Telugu texts into modern languages.
5. Identify career opportunities in areas like teaching, translation, research, and cultural tourism.

▪ అభ్యసన లక్ష్యాలు

1. తెలుగు సాహిత్య అభ్యసన నైపుణ్యాలను, సృజనాత్మక నైపుణ్యాలుగా మార్చడం
విద్యార్థులు భాషాతత్వాన్ని, భాష యొక్క ఆవశ్యకతను, భాష యొక్క ప్రాధాన్యాన్ని గుర్తింపజేయడం
మనిషి వ్యక్తిగత జీవనానికి, సామాజిక వ్యవస్థ పటిష్టతకు భాష ప్రధానమని తెలుసుకునేలా జేయడం
తెలుగుభాషలోని కీలకాంశాలైన వర్ణం, పదం, వాక్యాల ప్రాధాన్యాన్ని అవగాహన చేసుకోవడం
2. అనువాద రంగంలో నైపుణ్య సంపాదనను కలగజేయడం
3. సృజన రంగం, ప్రసార మాధ్యమ రంగాల్లో ఉపాధి అవకాశాలను అందిస్తున్నట్లుగా చేయడం
4. వ్యాస రచన ఎలా చేయాలో నేర్పించడం
5. సాంకేతికత రంగంలో తెలుగు ప్రాధాన్యతను గుర్తించేలా జేయడం

పాఠ్య ప్రణాళిక

I. వ్యక్తీకరణ నైపుణ్యాలు

భాష- నిర్వచనాలు, లక్షణాలు

భాష- ఆవశ్యకత, ప్రయోజనాలు

భాష - ఉత్పత్తి వాదాలు

వర్ణం - పదం - వాక్యం

II. అనువాద రచన

అనువాదం - నిర్వచనాలు, ఆవశ్యకత

అనువాద పద్ధతులు

అనువాద సమస్యలు - భౌగోళ, భాష, సాంస్కృతిక సమస్యలు.

- అభ్యాసం ఆంగ్లంనుంచి తెలుగుకు, తెలుగు నుంచి ఆంగ్లానికి ఒక 'పేరా' అనువాదం చేయడం

III. మాధ్యమాలకు రచన

పత్రికా రచన - వార్తారచన, సంపాదకీయం, సమీక్ష

శ్రవ్య మాధ్యమం - రేడియో రచన (కథ), podcast (డాక్యుమెంటరీ)

దృశ్య మాధ్యమం - టెలివిజన్ (కెమెరా) రచన [రూపకం (Skit), వాఖ్యానం (Anchoring)]

- ముద్రణా మాధ్యమ / శ్రవ్య మాధ్యమ / దృశ్య మాధ్యమ రచన విద్యార్థుల చేత చేయించడం

IV. తెలుగు వ్యాస రచన

తెలుగు వ్యాసం - నిర్వచనాలు, లక్షణాలు

సాక్షి వ్యాసం - స్వభాష

ఉపాధ్యాయ ఉవాచ - మునిమాణిక్యం నరసింహారావు

- విద్యార్థి చేత వ్యాస రచన చేయించడం

V. తెలుగు సాంకేతికత

తెలుగు లిపి పరిచయం - యూనికోడ్

తెలుగు వికీపీడియా

సామాజిక మాధ్యమాల్లో తెలుగు

(' ఇ' పత్రికలు, వెబ్సైట్లు, బ్లాగు)

- తెలుగు వికీపీడియాలో మార్పులు చేర్పులు విద్యార్థుల చేత చేయించడం/
- సామాజిక మాధ్యమాల్లో తెలుగు రచనలు చేయించడం

▪ ఆధార గ్రంథాలు/వ్యాసాలు

1. వ్యక్తీకరణ నైపుణ్యాలు - 1. ఆధునిక భాషాశాస్త్ర సిద్ధాంతాలు - ఆచార్య పి. ఎస్. సుబ్రహ్మణ్యం
2. తెలుగు భాషా చరిత్ర - (సం.) ఆచార్య భద్రిరాజు కృష్ణమూర్తి
3. తెలుగు వాక్యం - ఆచార్య చేకూరి రామారావు,
2. ఉత్తమ కవిత-లక్షణాలు - నవ్యకవితవ్ లక్షణములు - ఆచార్య సి. నారాయణరెడ్డి
ఆధునికాంధ్ర కవితవ్ము-సంప్రదాయములు, ప్రయోగములు, చతుర్థ ప్రకరణము.
3. ఉత్తమ కథ -లక్షణాలు - కథాశిల్పం-వల్లంపాటి వెంకటసుబ్బయ్య, పుటలు 11-17.
4. తెలుగు కథానిక - స్వరూప స్వభావాలు - పోరంకి దక్షిణామూర్తి
5. ఉత్తమ వ్యాసం లక్షణాలు - చదువు - సంస్కృతి (వ్యాసం) - కొడవటిగంటి కుటుంబరావు
6. తెలుగు వ్యాస పరిణామం - ఆచార్య కొలకూరి ఇనాక్
7. అనువాద రచన - 1. అనువాద సమస్యలు - రాచమల్లు రామచంద్రారెడ్డి (పుటలు 61-75, 85-94)
2. అనువాదన పద్ధతులు - ఆచరణ సమస్యలు-చేకూరి రామారావు.
"భాషాంతరంగం", తెలుగు విశ్వవిద్యాలయం ప్రచురణ. (పుటలు 130-146,)
8. ముద్రణా మాధ్యమం - మాధ్యమాలకు రచన (పుటలు 9-12)
డా॥ బి.ఆర్. అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
9. పత్రికా భాష - మాధ్యమాలకు రచన (పుటలు 67-74)

- డా॥ బి.ఆర్. అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
10. పత్రికా రచన - తెలుగు మౌలికాంశాలు (పుటలు 59-69)
- డా॥ బి.ఆర్. అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
11. ప్రసార మాధ్యమాలు - మాధ్యమాలకు రచన (పుటలు 3-10)
- డా॥ బి.ఆర్. అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
12. రేడియో రచన - మాధ్యమాలకు రచన (పుటలు 141-148)
- డా॥ బి.ఆర్. అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
- చూ. మాధ్యమాలకు రచన (పుటలు 141-148)
13. వ్యాఖ్యానం (యాంకరింగ్) - మాధ్యమాలకు రచన (పుటలు 178-181)
- డా॥ బి.ఆర్. అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
14. టెలివిజన్ రచన - మాధ్యమాలకు రచన (పుటలు 153 -160)
- డా॥ బి.ఆర్. అంబేద్కర్ విశ్వవిద్యాలయ ప్రచురణ
15. తెలుగు జర్నలిజం - డా॥ బూదరాజు రాధాకృష్ణ

సూచించబడిన సహపాఠ్య కార్యక్రమాలు

1. భాషాంశాలపై, వాక్య నిర్మాణంపై అసైన్మెంట్లు రాయించడం, పత్రికల్లోని సాహిత్య/భాషాంశాలను సేకరింపజేయడం.
2. విద్యార్థులచేత తెలుగు భాషా సాహిత్యాలపై ప్రసంగ వ్యాసం ఇప్పించడం (సెమినార్, అసైన్మెంట్)
3. వ్యాసరచన, లేఖారచన, స్వీయ కవితలు రాయించి తరగతిలో చదివింపజేయడం
4. వివిధ కార్యక్రమాల్లో విద్యార్థులచేత సదస్సు నిర్వహణ, వ్యాఖ్యానం (యాంకరింగ్) చేయించడం.
5. సమకాలీన భాషాసమస్యలపై / ఉద్యమాలపై/సాంఘిక సమస్యలపై 'బృందచర్చ' (Group Discussion)
6. తెలుగుభాషా దినోత్సవం/అంతర్జాతీయ మాతృభాషా దినోత్సవం మొదలైన రోజుల్లో జరిగే సాంస్కృతిక కార్యక్రమాలు విద్యార్థులచేత నిర్వహింపజేయడం, వాటిపై సమీక్షలు/పత్రికా ప్రకటనలు రాయించడం.
7. సమకాలీన సంఘటనలపై సామాజిక మాధ్యమాల్లో/ టి.వి.ల్లో జరిగే చర్చలను నమోదు చేసి సంకలనం చేయడం.
8. సాంస్కృతిక / చారిత్రక ప్రాశస్త్యం కలిగిన కట్టడాలు, దేవాలయాలు, కూనిలయాలను 'బృందపర్యటన/ క్షేత్ర పర్యటన' ద్వారా విద్యార్థులచేత సందర్శింపజేయడం.

▪ అభ్యసన ఫలితాలు

ఈ కోర్సు విజయవంతంగా ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. తెలుగు సాహిత్య అభ్యాసన ద్వారా నేర్చుకున్న నైపుణ్యాలను, సృజనాత్మక నైపుణ్యాలుగా మార్చుకోగలరు. విద్యార్థులు భాషాతత్వాన్ని, భాష యొక్క ఆవశ్యకతను, భాష యొక్క ప్రాధాన్యాన్ని గుర్తిస్తారు. మనిషి వ్యక్తిగత జీవనానికి, సామాజిక వ్యవస్థ పటిష్ఠతకు భాష ప్రధానమని తెలుసుకుంటారు. తెలుగుభాషలోని కీలకాంశాలైన వర్ణం, పదం, వాక్యాల ప్రాధాన్యాన్ని గుర్తిస్తూ వాగ్రూప, లిఖితరూప వ్యక్తీకరణ ద్వారా భాషానైపుణ్యాలను మెరుగుపరచుకోగలరు.
2. అనువాద ఆవశ్యకతను తెలుసుకుంటారు. అనువాద రంగంలో నైపుణ్యం పెరుగుతుంది.
3. సృజన రంగం, ప్రసార మాధ్యమ రంగాల్లో ఉపాధి అవకాశాలను అందిస్తున్నట్లుగా గలరు.
4. భాషానైపుణ్యాలను అలవరచుకోవడంతోపాటు వినియోగించడం నేర్చుకుంటారు. భాషానైపుణ్యాలను సృజనాత్మక రూపంలో వ్యక్తీకరించగలరు. మంచి వ్యాస రచనా నైపుణ్యాలను పెంపొందించుకోగలరు.
5. సాంకేతికత రంగంలో తెలుగు ప్రాధాన్యత గురించి అవగాహన పొందగలరు.

SEMESTER –I

I. Analytical Skills

COURSE OUTCOMES:

After successful completion of this course, the student will be able to;

CO1. Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.

CO2. Acquire competency in the use of verbal reasoning.

CO3. Apply the skills and competencies acquired in the related areas

CO4. Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.

CO-PO-PSO MATRIX															
CO NO.	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PSO 01	PSO 02	PSO 03	PSO 04	PSO 05

CO01															
CO02															
CO03															
CO04															

Course Content

UNIT – 1:

Arithmetic ability: Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF).

Verbal Reasoning: Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

UNIT – 2:

Quantitative aptitude: Averages, Ratio and proportion, Problems on ages, Time-distance – speed.

Business computations: Percentages, Profit & loss, Partnership, simple compound interest.

UNIT – 3:

Data Interpretation: Tabulation, Bar Graphs, Pie Charts, line Graphs. Venn diagrams.

Recommended Co-Curricular Activities

Surprise tests / Viva-Voice / Problem solving/Group discussion.

Text Book: Quantitative Aptitude for Competitive Examination by R.S. Agrawal, S.Chand Publications.

Websourses:

Reference Books

1. Analytical skills by Showick Thorpe, published by S Chand And Company Limited, Ramnagar, New Delhi-110055

2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.

3. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw Hill Publications.

R-23	SEMESTER – 1			T	P	C
	LIFE SKILLS COURSE					

	COURSE 4: COMMUNICATION SKILLS <u>SEMESTER I</u> (w.e.f 2023-24 Admitted Batch)	2	0	2
	Total Contact Hours - 20			

COURSE OBJECTIVES:

The objectives of the course are to make the student :

1. To know about the types interviews and how to face an interview.
2. To get an idea about communication and principles of communication, barriers to communication and effective communication.
3. To know about how to ask and give information, agreeing and disagreeing.
4. Acquire the knowledge about Speaking Skills with reference to Dialogue Building and Giving Instructions /Directions.
5. Apply the knowledge for debating, Descriptions and Role Play.

SYLLABUS:

I. UNIT BASICS OF COMMUNICATION SKILLS

1. Nature and Importance of Communication.
2. Process of communication.
3. Principles of Communication.
4. Barriers to Communication.
5. Strategies for Effective Communication.

II. UNIT PRESENTATION SKILLS

1. Preparation of a Good Presentation.
2. Verbal Communication in Presentation.
3. Non-Verbal Communication in Presentation.
4. Visual aids/Materials in Presentation.
5. Analyzing audience and Managing Questions.

III.UNIT INTERVIEW AND GROUP DISCUSSIONS

1. Interview types.
2. Before, during and after an interview.
3. Do`s and Don`ts in an interview.
4. Basic interview questions.
5. Structure and process of Group Discussions.
6. Role functions, Do`s and Don`ts.

Recommended Activities :

- Presenting seminar papers.
- Mock interviews.
- Using Power point presentation in seminars.

CO-CURRICULAR ACTIVITIES:

- Class Room Seminars.
- Elocution.
- Making a Presentation.

- Assignments.

TEXT BOOKS:

- EnglishPraxisCourse-III by Maruthi Publications.
- EnglishPraxisCourse-III by A Course in Conversational Skills by Vivanta Press.

REFERENCE BOOKS:

- [Working in English, Jones, Cambridge.](#)
- [Business Communication, Raman – Prakash, Oxford.](#)
- [Speaking Personally, Porter – Ladousse, Cambridge.](#)
- [Speaking Effectively, Jermy Comfort, et.al, Cambridge.](#)
- [Anjaneesethi&BhavanaAdhikari, Business Communication Tata McGraw Hill](#)
- [Jermy Comfort, Speaking Effectively,et.al, Cambridge.](#)

[Skills you need: communication skills](#)

- Information and resources to help develop information skills

Nonverbal Communication

[Principles of public speaking](#)

- Online course that aims to help you prepare and deliver effective oral presentations, with an emphasis on informative and persuasive public speaking

[33 Nonverbal Communication Tips, in 140 characters or less](#)

- Some short and succinct tips on improving your nonverbal communication skills

[Nonverbal communication: how body language & nonverbal cues are key](#)

- Article on nonverbal communication that includes some good tips on watching your body language during online video calls

[The power of nonverbal communication](#)

- TED talk from a body language expert

LEARNING OUTCOMES:

R 23	Paper	L	P	T	C
	PRINCIPLES OF PSYCHOLOGY	2	---	---	2
TOTAL CONTACT HOURS – 30					

By the end of the course the learner will be able to:

- Speak fluently in English.
- Participate confidently in any social interaction.
- Face any professional discourse.
- Demonstrate critical thinking.
- Enhance conversational skills by observing the professional interviews.

SEMESTER-I**LEARNING OBJECTIVES:**

- 1) To understand and apply psychological principles to real-world issues and problems.
- 2) To investigate the physiological, psychological, and social determinants of motivation.
- 3) To investigate the various types of memory, including short-term, long-term, and sensory memory.
- 4) To understand how personality traits impact an individual's behaviour and interactions with others.

LEARNING OUTCOMES:

- 1) Students able to improve mental health and well-being for individuals and communities through evidence-based interventions
- 2) The students able to enhance ability to motivate oneself and others to perform at their best.
- 3) The students able to improve academic and professional performance through better memory recall.
- 4) The students able to improve self-awareness and understanding of one's own personality traits.

SYLLABUS

UNIT - 1: INTRODUCTION

Definition, Origin of Psychology, Psychology as a scientific study of behaviour, Applied fields of Psychology, Biological bases of Behaviour. SENSORY AND PERCEPTUAL PROCESS: Structure and functions of visual and auditory senses; ATTENTION: selective, sustained and divided attention. PERCEPTION: Nature and determinants; Perceptual constancies.

UNIT - 2: EMOTION AND MOTIVATION:

Nature of Emotion, Components of Emotions. Theories of Emotion: James-Lange, Cannon - Bard and Schachter- singer. MOTIVATION: Nature and types of Motivation; Maslow's hierarchy model.

UNIT - 3: INDIVIDUAL DIFFERENCES:

Learning and Memory: Learning - Definition, Classical and Instrumental Conditioning, Principles of Classical Conditioning, Schedules of reinforcement, Memory Sensory, Short-term and Long term memory; Forgetting and its causes. PERSONALITY - Trait and type approaches; Assessment of Personality. INTELLIGENCE- Concept of IQ and Measurement

ACTIVITIES :

Group Discussions; Debates; Assignments; Essay writings;

Seminars, Workshops, PPT Presentations, Charts and Poster Presentations etc.,

REFERENCE BOOKS AND WEBSITES:

- 1) Aggarwal, J.C. (2014). Essentials of Educational Psychology (3rd Ed.). New Delhi: Vikas Publishing House Pvt.Ltd.
- 2) Bhartiya, H.R. (1968). Elements of Educational Psychology. Calcutta: Orient Longman.
- 3) Chauhan, S.S. (1984). Advanced Educational Psychology (7th Ed). New Delhi: Vikas Publishing House. Pvt. Ltd.
- 4) Mangal S.K. (2007) Advanced Educational Psychology (2nd Ed). New Delhi, Prentice Hall of India.

MAHARAJAH'S COLLEGE (AUTONOMOUS) - VIZIANAGARAM

MODEL QUESTION PAPER

SUBJECT/ PAPER: PRINCIPLES OF PSYCHOLOGY

PART-A

1. Answer any FIVE questions from the following. (3 x 2 = 6 M)

- a. Write the meaning and definition of the Psychology?
- b. What is Educational Psychology?
- c. Define the Perception.
- d. Draw the cycle of Motivation?
- e. What are the causes of Forgetting?

PART-B

II. Answer THREE of the following internal choice questions. (3 x 8 = 24 M)

2. a) Define the Attention and Explain the types of Attention?

(OR)

b) Compare between Pure Psychology and Applied Psychology?

3. a) Explain and illustrate the Maslow's Hierarchy Model?

(OR)

b) Discuss the Schedules of Reinforcement.

4. a) Explain the Classical Conditioning Theory?

(OR)

b) Summarize the assessment of Personality

**MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

	SEMESTER-II	L	P	T	C
R23	GENERAL & INORGANIC CHEMISTRY Course code –III (W.e.f.2023-2024 Batch) (Major & Minor)	3	2		3+1
TOTAL CONTACT HOURS – 45					

Course Objectives:

At the end of the course the student will be able to understand the structure of atom and the arrangement of elements in the periodic table.

- To Understand the nature and properties of ionic compounds.
- To Identify the structure of a given inorganic compound.
- To Explain the existence of special types of compounds through weak chemical forces.
- To Define acids and bases and predict the nature of salts

SYLLABUS

Unit I:

Atomic Structure and Periodic table.

(9

h)

Electronic configuration: Bohr theory, dual nature of electrons, Heisenberg uncertainty principle, the Schrodinger equation, significance of wave functions, normalization of wave function, radial and angular wave functions, Pauli's exclusion principle, Hund's rule, sequence of energy levels (Aufbau principle).

Periodicity: periodic law and arrangement of elements in the periodic table, IUPAC nomenclature and group number, horizontal, vertical, and diagonal relationships in the periodic table. 1.3 General properties of atoms: size of atoms and ions-atomic radii, ionic radii, covalent radii; trend in ionic radii, ionization potential, electron affinity; electronegativity - Pauling, Mulliken-Jaffe, Allred-Rochow definitions; oxidation states and variable valency; isoelectronic relationship; inert-pair effect;

UNIT 2:**Ionic bond.****(9****h)**

Properties of ionic compounds, factors favouring the formation of ionic compounds- ionization potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation of ionic compound and stability. Stability of ionic compounds in terms of ΔH_f and U_o . Solubility and thermal stability of ionic compounds. Covalent character in ionic compounds-polarization and Fajan's rules; effects of polarization-solubility, melting points, and thermal stability of typical ionic compounds.

UNIT 3:**The Covalent Bond****(9****h)**

Valence Bond theory-arrangement of electrons in molecules, hybridization of atomic orbitals and geometry of molecules- BeCl_2 , BF_3 , CH_4 , PCl_5 , SF_6 - VSEPR model effect of bonding and nonbonding electrons on the structure of molecules, effect of electronegativity, isoelectronic principle, illustration of structures by VESPR model- NH_3 , H_2O , SF_4 , $^{4-}$, $^{2-}$, XeF_4 , XeF_6

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

UNIT 4:**Metallic and Weak Bonds****(9 h)**

The Metallic bond: metallic properties, free electron theory, Valence Bond Theory, band theory of metals. Explanation of conductors, semiconductors and insulators.

Weak bonds: hydrogen bonding-intra- and intermolecular hydrogen bonding, influence on the physical properties of molecules, comparison of hydrogen bond strength and properties of hydrogen bonded N, O and F compounds; associated molecules-ethanol and acetic acid; Vanderwaals forces, ion dipole-dipole interactions.

UNIT 5:**Acids and Bases****(9****h)**

Theories of acids and bases: Arrhenius theory, Bronsted-Lowry theory, Lewis theory, the solvent system, Nonaqueous solvents: classification-protonic and aprotic

solvents, liquid ammonia as solvent-solutions of alkali and alkaline earth metals in ammonia.

Types of chemical reactions: acid-base, oxidation-reduction, calculation of oxidation number. Definition of pH, pK_a , pK_b . Types of salts, Salt hydrolysis.

Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations.

List of Reference Books:

1. J. D. Lee, Concise Inorganic Chemistry, 5th ed., Blackwell Science, London, 1996.
2. B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co., 1996.
3. D. F. Shriver and P. W. Atkins, Inorganic Chemistry, 3rd ed., W. H. Freeman and Co, London.

Course Outcomes:

At the end of the course the student will be able to understand the structure of atom and the arrangement of elements in the periodic table.

- Understand the nature and properties of ionic compounds.
- Identify the structure of a given inorganic compound.
- Explain the existence of special types of compounds through weak chemical forces.
- Define acids and bases and predict the nature of salts.

<https://nptel.ac.in/courses/104106096>

Practical- I

Course Objectives:

At the end of the course, the student will be able to;

- To Understand the basic concepts of qualitative analysis of inorganic simple salt.
- To Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
- To Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis.

Qualitative Analysis of Simple Salt :

Qualitative inorganic analysis (Minimum of Six simple salts should be analysed) 50 M

Syllabus:

Analysis of simple salt containing ONE anion and ONE cation from the following:

Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate. Cations : Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, Magnesium and Ammonium.

Co-curricular activities and Assessment Methods :

1. Continuous Evaluation: Monitoring the progress of student's learning.
2. Class Tests, Work sheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER

Reference books:

1. Vogel's Qualitative Inorganic Analysis, Seventh edition.

Course outcomes:

At the end of the course, the student will be able to;

- Understand the basic concepts of qualitative analysis of inorganic simple salt.
- Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
- Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis.

COURSE-III (MAJOR)
(PAPER- I : GENERAL & INORGANIC CHEMISTRY)

Time: 2 ½ Hr

Marks: 60M

SECTION-A

Answer any five questions from following. Each question carries 2 marks
5X2=10 M

1. Write Hund's rule.
2. Define ionization potential.
3. Write the factors favoring formation of ionic bonds.
4. Write the structure of NH₃ by VESPR model.
5. Define semiconductors. Write its types.
6. What are dipole-dipole interactions?
7. What is Lewis acid & Lewis base.
8. Define pH.

SECTION-B

Answer the following questions. Each question carries 10 marks
5X10=50 M

9. a) Explain Schrodinger wave equation and significance of wave function.

(or)

b) i) Write a short note on periodic law.

ii) Define electro negativity and inert pair effect.

10.

a) What is lattice energy. Explain factors effecting lattice energy.

(or)

b) i) Write short note on Born-Haber cycle.

ii) Explain Fajan's rules.

11.

a) Define hybridization. Explain hybridization and geometry of a) BeCl₂ , b) CH₄ , c) PCI₅ based on valance bond theory.

(or)

b) Draw the molecular orbital diagram of N₂ ,CO molecules.

12.

a) Explain Valence bond theory.

(or)

b) Define inter and intra molecular hydrogen bonding. Explain comparison of hydrogen bond strength of N, O & F.

13.

a) Explain Arrhenius theory of Acid-bases.

(or)

b) Explain HSAB principle and it's importance.

**MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

R23	SEMESTER-II CORUSE -IV	L	P	T	C
	INORGANIC CHEMISTRY (W.e.f.2023-2024 Batch)	3	2		3+1
TOTAL CONTACT HOURS – 45					

Course Objectives:

1. To Understand the basic concepts of p-block elements.
2. To Explain the concepts of d-block elements
3. To Distinguish lanthanides and actinides.
4. To Describe the importance of radioactivity.

SYLLABUS

UNIT –I

Chemistry of p-block elements – I

9 h

Group 13: Preparation & structure of Diborane, Borazine and (BN)_x Group14: Preparation, classification and uses of silicones and Silanes. Group 15: Preparation & structure of Phosphonitrilic Chloride P₃N₃Cl₆

Unit II

Chemistry of p-block elements – II

9 h

Group 16: Classification of Oxides, structures of oxides and Oxoacids of Sulphur

Group 17: Preparation and Structures of Interhalogen compounds.Pseudohalogens

UNIT-III

Chemistry of d-block elements: **9 h**

Characteristics of d-block elements with special reference to electronic configuration, variable valence, colour, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states of 3d series-Latimer diagrams.

UNIT-IV

Chemistry of f-block elements: **9 h**

Chemistry of lanthanides - electronic configuration, oxidation states, lanthanide contraction, consequences of lanthanide contraction, color, and magnetic properties. Separation of lanthanides by ion exchange method. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides

Unit – V

Radioactivity **9 h**

Definition, Isotopes, n/p ratio, binding energy, types of radioactivity, Soddy-Fajan's displacement law, Law of Radioactivity, Radioactive decay series, Nuclear Reactions-fission and fusion, Applications of radioactivity.

List of Reference books:

1. Basic Inorganic Chemistry by Cotton and Wilkinson
2. Advance Inorganic chemistry vol-I by Satya Prakash
3. Inorganic chemistry by Puri and Sharma
4. Concise Inorganic Chemistry by J D Lee
5. Nuclear Chemistry by Maheshwar Sharon, 2009

Course outcomes:

At the end of the course, the student will be able to;

1. Understand the basic concepts of p-block elements.
2. Explain the concepts of d-block elements
3. Distinguish lanthanides and actinides.
4. Describe the importance of radioactivity.

<https://nptel.ac.in/courses/104101090>

II SEMESTER

CourseCode4: INORGANIC CHEMISTRY-I

Credits:01

Course Objectives:

At the end of the course, the student will be able to:

1. To understand the basic concepts of inorganic preparations.
2. To Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
3. Apply the properties of various elements for the preparation of inorganic compounds.

Syllabus:

Preparation of Inorganic compounds:

1. Crystallization of compounds and determination of melting point.
2. Preparation of Cuprous chloride.
3. Preparation of Potash Alum.
4. Preparation of Chrome Alum.
5. Preparation of Ferrous oxalate
6. Preparation of Ferrous ammonium sulphate.

Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Work sheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions: Enhance critical thinking skills and personality
4. SEMESTER-End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER.

Reference books:

1. Vogel's Quantitative Inorganic Analysis, Seventh edition, Pearson.

Course Outcomes :

At the end of the course, the student will be able to:

1. Understand the basic concepts of inorganic preparations.
2. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
3. Apply the properties of various elements for the preparation of inorganic compound.

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM

Department of chemistry
Semester-II Course - 4 (Major) Inorganic Chemistry-1
MODEL PAPER (w.e.f. 2023-24 Admitted Batch)

Time: 2 1/2hrs

Max marks: 60 M

SECTION-A

Answer any FIVE questions from the following. Each question Carries 2 Marks. 5 X2 =10M

- 1) Discuss the structure of Inorganic Benzene.
- 2) Write the Preparation and Structure of $(\text{NPCl}_2)_3$.
- 3) What are Pseudo Halogens.
- 4) What are Transition Elements.
- 5) Write any Two Catalytic Properties of Transition Elements.
- 6) Write the Comparison of Lanthanides and Actinides.
- 7) What is the principle involved in Separation of Lanthanides by ion exchange method.
- 8) Define Soddy -Fajan'S Displacement Law.

SECTION-B

Answer All the following questions. Each question Carries 10 Marks

5X10=50M

- 9) (a) Write any Two Preparation Methods of Diborane and Explain The structure of Diborane.
(OR)
(b) What are Silicones? Explain The Preparation and Classification of Silicones.
- 10) (a) Explain the Structures of Oxides and Oxoacids of Sulphur.(OR)
(b) What are inter halogen Compounds and Explain the structures of Inter Halogen Compounds.
- 11) (a) Explain The following Properties of d-block elements.
 - i) Variable Oxidation States.
 - ii) Complex formation.

(OR)

(II) b) Explain The following Properties of d-block elements.

- i) Magnetic Properties.
- ii) Color Properties.

12) (a) What is Lanthanide Contraction? Explain the Consequences of Lanthanide Contraction.(OR)

(b) Explain the following Properties of Actinides.

- i) Electronic Configuration.
- ii) Magnetic Properties.

13) (a) Explain the following Nuclear Reactions.

- i) Nuclear fusion.
- ii) Nuclear fission.

(OR)

(b) Discuss the applications of Radioactivity.

COURSE INFORMATION SHEET

GENERAL INFORMATION

R23	Lecture	Tutorial	Practical	Credits
	4	0	0	4

Program : General Sanskrit
Year and Semester : II Semester
Course : POETRY, PROSE & GRAMMER -II
Course Name : SANSKRIT
Course Coordinator :
Total Number of hours : 60

Internal Marks : 40

External Marks : 60

Course 2: POETRY, PROSE & GRAMMER -II

Course Objectives

1. Develop proficiency in reading, writing, and speaking skills
2. Introduce students to classical Sanskrit literature, including epics, poetry, drama, and philosophical texts.
3. Enhance knowledge of Sanskrit grammar (Vyakarana).
4. Provide insights into Indian culture, philosophy, and heritage as reflected in Sanskrit texts.
5. Encourage the use of Sanskrit in modern contexts, including employability in education, research, and technology.

Course Outcomes;

1. Demonstrate proficiency in Sanskrit through effective communication, both oral and written.
2. Analyze and interpret classical texts and apply their teachings to contemporary life.
3. Exhibit a clear understanding of Sanskrit grammar and its application in constructing verses and prose.
4. Develop skills for translation and interpretation of Sanskrit texts into modern languages.
5. Identify career opportunities in areas like teaching, translation, research, and cultural tourism.

I. Learning Outcomes:

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II. Syllabus:

(Teaching Hours: 60)

Unit - 1: H f Ö × (12h)

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.Unit - 2: f Ö × (12h)

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Unit - 3: f Ő × (12h)

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Unit - 4: å (12h)

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Unit - 5: å (12h)

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III Skill Outcomes:

On successful completion of this course, student shall be able to:

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IV References:

1. Prescribed Sanskrit Text Book II

V. Co-Curricular Activities: (Hours for Activity: 15h)

1. Assignments
2. Seminars, Group discussions, Quiz, Debates etc.

3. Invited lectures and presentations on related topics by experts.

	SEMESTER – II	T	P	C
R -23	“A COURSE IN READING & WRITING SKILLS” <u>English Praxis Course-II</u> (w.e.f 2023 -24 Admitted Batch)	4	0	4
	Total Contact Hours - 40			

COURSE OBJECTIVES:

The objectives of this course isto make the students:

To get an overall idea about the topics from literature with reference to Tennyson, Robert Frost, AbrarMohsin, Ruskin Bond, A. J. Cronin, Nissim Ezekiel and R.K.Narayan.

- To Acquire with Vocabulary : Conversion of words, one word substitutes and collocations.
- To Familiarize with reading comprehension and Note making / taking.
- To Acquire the knowledge about preparation of Notices, AgendasandMinutes.
- To Learn how to write CurriculumVitaeandResume, Letters, E-Correspondence.

SYLLABUS:

UNIT – I:

Petry Skills : Ulysses – Alfred Lord Tennyson
 : 1.Vocabulary: ConversionofWords.
 2. OneWord Substitutes.
 3.Collolocations.

UNIT – II:

Prose : TheBest Investment I Ever Made –A.J. Cronin
Poetry : Odeto theWest Wind PBShelley.
Non-DetailedText : FlorenceNightingale AbrarMohsin.
Skills : SkimmingandScanning.

UNIT – III:

Prose	:1.TheNightTrain atDeoli	RuskinBond.
Poetry	:2.Stopping by Woods on a Snowy Evening	Robert Frost
Skills :	1. ReadingComprehension (Top Down, Bottom Up &Scheme Theory) :2. NoteMaking/Taking.	

UNIT – IV:

Poetry	:Night of the Scorpion	Nissim Ezekiel
Skills	:1.ExpansionofIdeas. :2.Notice, AgendasandMinutes.	

UNIT – V:

Non-DetailedText : AnAstrologer's Day RKNarayan.

Skills :	1.CurriculumVitaeandResume. 2. Letters. 3. E-Correspondence.
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CO-CURRICULAR ACTIVITIES:

- Class Room Seminars.
- Student Projects.
- JAM Sessions.
- Assignments.

TEXT BOOKS:

- EnglishPraxisCourse-II by Maruthi Publications.
- EnglishPraxisCourse-II by A Course on Communication and Soft skills by Vivanta Press.

REFERENCE BOOKS:

- Black book of English Vocabulary by Nikhil Gupta.
- Advanced Writing skills for Skill Builders by D.S.Paul.
- Improving Reading Comprehension and Speed, Skimming and scanning- Reading for Pleasure by Marcia J. Coman and Kanthy L. Heavers.

1. https://www.goodreads.com/author/show/1305302.R_K_Narayan

2. ESL Gold (<https://www.eslgold.com/>) - ESL Gold offers a range of resources for learners of English, including grammar lessons, vocabulary exercises, and conversation practice.

3. Breaking News English (<https://breakingnewsenglish.com/>) - Breaking News English offers news articles and related exercises for learners of English, with a focus on vocabulary and comprehension.

4. My Language Exchange (<https://www.mylanguageexchange.com/>) - My Language Exchange is a language exchange platform that allows you to connect with native English speakers for conversation practice.

5. <https://www.studocu.com/in/z/37601931?sid=01734585498> [proverbs]

Activities :

-- Asking the students to prepare a model resume.

-- Quiz on one word substitutes.

-- Pair activity on collocations.

-- Asking the students to read newss paper clippings and make notes.

LEARNING OUT COMES:

By the end of the course the learner will be able to:

- Use reading skills effectively.
- Comprehend different texts.
- Interpret different types of texts.
- Analyze what is being read.
- Build up a repository of active vocabulary.
- Use good writing strategies.
- Write well for any purpose.
- Improve writing skills independently for future needs.
- Enhance communicative competence through Reading and Writing Skills

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM

I B.A., B.Sc., B.COM.& B.B.A. SECOND SEMESTER END MODEL QUESTION PAPER

**Max. Time : 3 Hrs
60M**

ENGLISH

Max. Marks:

PART - A

Answer any FIVE of the following questions

5X2=10M

1. What is called conversion of words ? Explain with examples.
2. What are the differences between skimming and scanning?
3. What is note makin and what are the characteristics of a good notes?
4. Define Notice and Agenda and Minutes.
5. What is E-Correspondence?
6. How does Ruskin Bond describe the Deoli Station?
7. Why was Florence Nightingale called as `The Lady With the Lamp`?
8. Define Collocation and give any two examples.

PART - B

Answer the following questions

5X10 = 50 M

9. a]How would you analyze the character of Ulysses by Alfred Lord Tennyson?

OR

B]. Answer the following :

- A. What are the differences among various types of collocations?

B. Write one word substitutes for the following expressions :

- a. A System of government by one person with absolute power.
- b. One who feeds on human flesh.
- c. A person speaks more than one language.
- d. A diplomat of the highest rank representing his country abroad.

10.a] Explain the Morality of the story `The Best Investment I Ever Made.

OR

B]. Write a note on ` Florence Nightingale and the Crimean War` .

11 a]What is the central idea of the poem `Stopping by Woods on a Snowy Evening`?

OR

B]. Answer the following :

A. Read the following passage and prepare notes :

Verbs are important for English language. They are broadly of two types. They are main verbs and helping verbs. Helping Verbs are again subdivided into four categories. They are `Be` forms, `Do` forms, `Have` forms and `Modals`. Main verbs are at another level are of transitive, intransitive and ditransitive types.

B. Read the following passage carefully and answer the questions :

While I was walking along the road , one day I happened to see a small pink leather purse lying on the footpath. I picked it up and opened it up to see, if I could find out the owner`s name and address. There was nothing inside except some small change and a rather old photograph – a picture of a woman and a young girl about twelve years old, who looked like the woman`s daughter. I put the photograph back and took the purse to the police station, where I handed over it to the sergeant –in-charge. The sergeant made a note of my name and address in case the owner of the purse wanted to write and thank me.

Questions :

a.What did the narrator happen to see as he was walking along the road?

- b. Why did he open the purse?
- c. What did he find inside the purse?
- d. where did he go next with the purse ?
- e. Why did the sergeant make a note of the narrator`s name and address?

12.a] Write a note on critical appreciation of the poem ` Night of the Scorpion `

OR

B]. Answer the following :

A. Explain the proverb ` Slow and Steady Wins the Race ` with an illustration.

B. You are the secretary of Geetha Housing Society, Nehru Nagar, Vizianagaram.

Draft a note on stating that the monthly installment of maintenance charges payment before the due date.

13.a] Retell the story of ` An Astrologer`s Day ` from the view point of Guru Nayak.

OR

B]. Answer the following :

A. Prepare your own C.V / Resume.

B. Write a letter to the principal of your college with a request for the procurement of UG& PG

Text Books to your College Library.

R-23	SEMESTER – II LIFE SKILLS COURSE	T	P	C
	COURSE: BUSINESS WRITING (w.e.f 2023-24 Admitted Batch)	2	0	2

SYLLABUS

Unit 1.

Introduction to Business Writing: Importance and purpose of effective business writing; Characteristics of good business writing; Common challenges and misconceptions. Writing Clear and Concise Emails: Appropriate email etiquette in the professional environment, organizing email content and using effective subject lines, Understanding tone and formality in email communication.

Unit 2.

Memos and Interoffice Communication: Formatting and structure of memos, Writing memos for various purposes like updates, announcements, requests. Ensuring clarity and coherence in interoffice communication. Business Letters and Formal Correspondence: Structure and components of a business letter, writing persuasive and professional business letters, Responding to inquiries and complaints effectively.

Unit 3:

Business Proposals and Reports: Crafting business proposals for projects and initiatives, Formal report writing - format, sections, and organization, Analyzing data and presenting findings in reports. Writing for Digital Platforms: Business writing for websites, social media, and online communication, Leveraging technology for efficient and impactful

COURSE OUT COMES:

By the end of this course, students will be able to:

1. Understand the fundamentals of business writing, including style, tone, and language.
2. Produce well-structured and concise business documents, such as emails, memos, and reports.
3. Apply principles of effective communication in business letters and interoffice correspondence.
4. Craft persuasive and well-organized business proposals and formal reports.
5. Cultivate a professional and ethical approach to business writing.

Text Books:

1. Business Writing Basics by Jane Watson (Author) Publisher: Self Counsel Press Inc; 2nd edition (1 August 2002) ISBN-10: 1551803860 ISBN-13: 978-1551803869
2. Successful Business Writing - How to Write Business Letters, Emails, Reports, Minutes and for Social Media - Improve Your English Writing and Grammar: of Exercises and Free Downloadable Workbook by Heather Baker Publisher: Universe of Learning Ltd; Illustrated edition (1 March 2012) ISBN-10 : 1849370745 ISBN-13 : 978-1849370745
3. Business Correspondence and Report Writing, 6th Edition by R C Sharma, Krishna Mohan, Virendra Singh Nirban. Publisher: McGraw Hill Education (India) Private Limited. ISBN-10: 9390113008 ISBN-13: 978-9390113002

Reference Books:

1. "The Essential Business Handbook: The Nuts & Bolts of Getting Up and Running Fast" by John Storey and Amelia Storey (Indian Edition)
2. "The AMA Handbook of Business Writing: The Ultimate Guide to Style, Grammar, Punctuation, Usage, Construction, and Formatting" by Kevin Wilson and Jennifer Wauso

1. [Business communication for success](#)

- Free online textbook covering oral and written business communications

2. [Effective email communication](#)

- The University of North Carolina's Writing Center guide to help you communicate more effectively using e-mail.

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM

I B.A., B.Com., B.Sc., BBA (HONS) II SEMESTER END EXAMINATION

BUSINESS WRITING

**Time: 2 Hours.
30**

Marks:

Part – A

1. Answer the following questions

3 X 2 = 6M

- a. Business Writing
- b. Concise E Mail
- c. Memos
- d. Business Letter
- e. Website

Part – B

Answer the following questions

3 X 8 = 24 M

2(a) Write the purpose of Effective Business Writing

Or

R-23	SEMESTER-II	L	T	C
	DIGITAL LITERACY (SKILL COURSE)	2		2
	Total Contact Hours-30			

(b) Discuss about Appropriate Email etiquette in Professional Environment

3(a) Write about the Components of a Business Letter?

Or

(b) Discuss in Detail about formatting and structure of Memos?

4(a) Explain about Formal Report Writing in Business

Or

(a) Discuss in Detailed about Business Writing for Digital Platforms

CO1: Perform operations on the computer

CO2: Access the Internet and finding information of interest

CO3: Register for an E-mail account and operating it

CO4: Make bill payments and use other applications of Internet

CO5: Create, edit and format documents using a word processor Course

Unit-1: operate the elements of a computer and performing operations on the computer

Operate the elements of a computer including power cord, power switch, network connecting cable, USB ports, Mouse operations, Keyboard operations, interface icons, GUI elements, Editing options,

perform operations including switching on the computer, logging in, locating a file, opening a file, printing a document, storing a file with proper extension, creating a folder/ sub folder in a volume on hard disk and desktop, shifting files from one folder to another, shutting off the computer

Unit-2: Access the Internet to browse information and E-mail operation

Access the Internet, use a search engine, find information on the topic of interest, register for a web-based E-mail account, access E-mail with attachments, reply to an E-mail, forward an E-mail and delete an E-mail message

Unit-3: Make bill payments, other applications using Internet and word processing

Make utility bill payments, booking bus/train tickets, bank transactions, personal transactions, job search through employment portals, mobile/DTH recharge, word processing basics, creating, editing and formatting of text, saving and printing of word document

Prescribed readings:

1. Appreciation of Digital Literacy Handbook published by Department of Electronics & Information Technology, Ministry of Communications & Information Technology, Government of India

Web Resources:

1. https://youtu.be/b2X_j5Bz-VM
2. <https://youtu.be/jln3-P6L2ro>
3. <https://youtu.be/cfDisqUMIvw>
4. https://youtu.be/3h_PyURcdrc
5. <https://youtu.be/EqN0LBcydB>

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY

R23	SEMESTER -III	L	P	T	C
	COURSE-V (FUNDAMENTALS IN ORGANIC CHEMISTRY) (w.e.f. 2023-24 Batch)	3	2		4
	TOTAL CONTACT HOURS-45				

Course objectives:

1. To Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.
2. To Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
3. To Learn and identify many organic reaction mechanisms .
4. To Correlate and describe the stereo-chemical properties of organic compounds and reactions.

SYLLABUS

Unit 1

Structural theory in Organic Chemistry (9 h)

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents). Reaction intermediates – Carbocations, carbanions & free radicals. Bond polarization: Factors influencing the polarization of covalent bonds, inductive effect - Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes.

Unit II

Saturated Hydrocarbons (Alkanes and Cycloalkanes) (9 h)

General methods of preparation of alkanes- Wurtz and Wurtz Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane)

General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, Conformations of monosubstituted cyclohexane.

UNIT-III

Unsaturated Hydrocarbons (Alkenes and Alkynes) (9 h)

General methods of preparation, physical and chemical properties, Saytzeff and Hoffmann eliminations (with mechanism), Electrophilic Additions, (H₂, HX) mechanism (Markownikoff/Antimarkownikoff addition) with suitable examples-syn and anti-addition; addition of X₂, HX. Oxymercuration demercuration, ozonolysis, hydroxylation, Diels Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes. Reactions of alkynes; acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes.

UNIT-IV

Benzene and its reactivity (9 h)

Structure of Benzene – Preparation - polymerisation of acetylene and decarboxylation- Properties - mechanism of electrophilic aromatic substitution of Friedel- Craft's alkylation and acylation. halogenation and nitration,

UNIT-V

Orientation of aromatic substitution

(9 h)

Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropylium cation) Orientation of aromatic substitution - ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO₂ and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens.

COURSE OUT COMES

- Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.
- Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
- Learn and identify many organic reaction mechanisms .
- Correlate and describe the stereo-chemical properties of organic compounds and reaction.

List of Reference Books

- 1 Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Guide book to Mechanism in Organic Chemistry by Peter Sykes 6th edition, 1985.

<https://archive.nptel.ac.in/content/storage2/courses/104103071/pdf/mod3.pdf>

Course Code 5: Organic Qualitative analysis

Credits: 01

Organic Qualitative analysis

Course objectives:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Determine melting and boiling points of organic compounds
3. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

Syllabus:

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable derivatives. Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

Course outcomes:

At the end of the course, the student will be able to;

4. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
5. Determine melting and boiling points of organic compounds
6. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

Reference books:

- 1) Vogel A.I .Practical Organic Chemistry, Longman Group Ltd.
- 2) Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
- 3) Ahluwalia V. K. and Agarwal R. Comprehensive Practical Organic Chemistry, University press

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM

**Department of chemistry
Semester-III course-v (Major)
(Fundamentals in organic Chemistry)
MODEL PAPER (wef. 2023-24 Admitted Batch)**

Max marks : 60 M

Time: 2 1/2 hrs

SECTION - A

I. Answer any five questions from the following. Each question Carries 2Marks 5X2=10M

1. what is Bond fission?
2. What is Hyper Conjugation?
- 3 write the wurtz fitting Reaction.
4. what is Saytzeff's rule?
5. Define Diels-Alders reaction.
6. write the Preparation of Benzene.
7. what is Huckel's rule.
8. Is tropylium Cation is aromatic or not?

SECTION-B

Answer All the following questions. Each question Carries 10 Marks.

5X10 = 50M

9.a) what is inductive effect? Explain with applications.

[OR]

b) Explain Mesomeric effect. and write its applications.

10.a) write the General methods of Preparation of alkanes.

[OR]

b) Explain Baeyer strain theory of cyclo alkanes.

11.a) Explain the following

(a). Markownikoff rule

(b). Anti markownikoff rule

[OR]

b) write the chemical Properties of alkynes.

12.(a) Explain the structure and Preparation of benzene?

[OR]

b) write the reaction and mechanism of friedel-crafts alkylation and acylation in benzene.

13. a) what are Benzenoid and non Benzenoid compounds? Explain with examples.

[OR]

b) Explain ring activating and deactivating groups with examples

**MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

R23	SEMESTER –III, COURSE-VI	L	P	T	C
	Major (Halogen & Oxygen Organic Compounds) (W.E.F. 2023-24 Batch)	3	2		4
	TOTAL CONTACT HOURS-45				

Course objectives:

1. To understand the concept of SN1 and SN2 and SNi mechanisms.
2. To describe the reactivity of alcohols and phenols.
3. To achieve the skills required to propose various mechanisms
4. To apply the concepts for synthesizing various oxygen containing organic compounds
5. To interconvert the monosaccharide's

Syllabus:

Unit – I

Halogen compounds

(9 h)

Alkyl halides: Preparation of alkyl halides from i) alkanes, ii) alkenes and iii) alcohols. Properties - nucleophilic substitution reactions—SN1 and SN2 and SNi mechanisms with energy profile diagrams, stereochemical aspects and effect of solvent. Williamson's synthesis.

Aryl halides: Preparation i) from phenols ii) Sandmeyer's reaction, nucleophilic aromatic substitution (Benzyne mechanism); relative reactivity of alkyl, allyl, vinyl and benzyl, aryl halides towards nucleophilic substitution reactions.

Unit II

Alcohols and Phenols

(9 h)

Alcohols: Preparation of 1°, 2°, 3° alcohols from Grignard's reagent, Bouveault–Blanc Reduction; Chemical properties – substitution of –OH by using PCl5, PCl3, PBr3, SOCl2 and with HX / ZnCl2, Oxidation of alcohols with PCC, PDC; Oxidation of diols by HIO4 and Pb(OAc)4, Pinacol Pinacolone arrangement with mechanism, relative reactivity of 1°, 2°, 3° alcohols.

Phenols :Preparation from diazonium salt and Cumene. Reactions and mechanism—Reimer–Tiemann, Kolbe–Schmitt Reactions, Fries and Claisen rearrangements

Unit III

Carbonyl Compounds

(9 h)

Preparation from-Acid chlorides, 1,3-dithiane and nitriles; Structure and reactivity of carbonyl group, Nucleophilic addition reactions with HCN, NaHSO3 and alcohols. addition-elimination reactions with hydroxylamine, hydrazine, phenyl hydrazine, 2,4DNP, semicarbazide. Oxidations and reductions (Clemmensen's, Wolf–Kishner's, with LiAlH4 & NaBH4).

Reaction & Mechanism- Aldol condensation, Cannizzaro reaction, Perkin reaction, Benzoin condensation, Claisen-Schmidt reaction, Haloform reaction

Unit-IV

Carboxylic acid and Active methylene Compounds

(9h)

Carboxylic Acids: Preparation from Grignard reagent and hydrolysis of nitriles, Reactions of monocarboxylic acids- Reactions involving -H, -OH and -COOH groups, formation of salts, esters, acid chlorides, amides and anhydrides. Degradation of carboxylic acids by Huns- Diecker's reaction, decarboxylation by Schmidt reaction, Arndt-Eistert synthesis, halogenation by Hell- Volhard- Zelinsky reaction. Mechanisms of acidic and alkaline hydrolysis of esters, Reformatsky reactions, Curtius rearrangement.

Active methylene compounds: Keto enol tautomerism, preparation of Aceto Acetic Ester(AAE) by Claisen condensation with mechanism, synthetic applications of AAE in the preparation of mono carboxylic acids, di carboxylic acids, α,β -unsaturated acids and heterocyclic compounds.

Unit V : Carbohydrates

(9h)

Classification and their biological importance, Monosaccharides: Structural elucidation of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation; Disaccharides– Haworth structure of maltose, lactose and sucrose.

Course outcomes:

On the completion of the course, the student will be able to do the following:

- understand the concept of SN1 and SN2 and SNi mechanisms.
- describe the reactivity of alcohols and phenols.
- To achieve the skills required to propose various mechanisms
- To apply the concepts for synthesizing various oxygen containing organic compounds
- To interconvert the monosaccharide

List of Reference Books

- 1) Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- 2) Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- 3) Guide book to Mechanism in Organic Chemistry by Peter Sykes 6th edition, 1985.

<https://archive.nptel.ac.in/content/storage2/courses/104103071/pdf/mod6.pdf>

<https://youtu.be/-7W7VU6hST4?si=BE mnpr0D1ZKDs x8C>

III - SEMESTER

Course Code 6: Organic preparations

Credits: 01

Organic preparation

Course objectives:

1. To use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
2. To calculate limiting reagent, theoretical yield, and percent yield.
3. To perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.
4. To critically evaluate data collected to determine the identity, purity and percent yield of products and to summarize findings in writing in a clear and concise manner.

Syllabus :

Organic preparations

- i. Acetylation of β -naphthol, vanillin and salicylic acid by:
 - a) Using conventional method
 - b) Using green approach
- ii. Preparation of Nerolin

Course outcomes:

On the completion of the course, the student will be able to do the following:

1. How to use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
2. How to calculate limiting reagent, theoretical yield, and percent yield.
3. How to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.
4. How to critically evaluate data collected to determine the identity, purity and percent yield of products and to summarize findings in writing in a clear and concise manner.

Reference books:

1. Vogel A.I .Practical Organic Chemistry, Longman Group Ltd.

2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
3. Ahluwalia V. K. and Agarwal R. Comprehensive Practical Organic Chemistry, University press.

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
Department of chemistry
Semester -III Course -6 (major)
(Halogens and oxygen organic compounds)
MODEL PAPER (w.e.f. 2023-24 Admitted Batch)

Time: 21/2hrs

Max marks: 60 M

SECTION-A

5 X2 =10M

Answer any FIVE questions from the following. Each question Carries 2 Marks.

1. Write any one preparation method of alkyl halides
2. What is Sandmeyer's Reaction?
3. Write the preparation of phenol from cumene
4. Write the Clemmensen Reaction?
5. Write the Benzoin Condensation reaction
6. Write any one method of preparation of Carboxylic acids.
7. Discuss the keto- enol tautomerism?
8. Define Epimers and Anomers, give an example

SECTION-B

5X10=50M

Answer All the following questions. Each question Carries 10 Marks

9. (a) Explain the SN^1 , SN^2 Reactions with mechanism.
(or)
(b) Explain the Relative Reactivity of allyl, vinyl, benzyl, aryl halides with nucleophilic substitution reactions
10. a) Write preparation and properties of alcohols
(or)
b) Discuss the following Reactions with suitable mechanism.
i) Reimer-Tiemann reaction.
ii) Fries rearrangement
11. a) Write the any three nucleophilic addition reactions of carbonyl compounds
(or)
b) Explain the following reactions with mechanism
i) Aldol condensation ii) Perkin Reaction
12. a) Explain the following Reactions with mechanism
i) Huns - Diecker Reaction
ii) Arndt -Eistert synthesis.
(or)
b) Write the preparation and synthetic applications of Aceto Acetic Ester.
13. a) Explain the open chain structure of glucose
(or)
b) Explain the following
i) Killiani - Fischer synthesis ii) Ruff's-Degradation

**MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

	SEMESTER –III COURSE-VII	L	P	T	C
R23	COURSE-VII (Physical chemistry -I) (w.e.f. 2023-24 Batch) Course code :7 Major (Solutions & Electro chemistry)	3	2		4
TOTAL CONTACT HOURS-45					

Course objectives:

1. To Understand the ideal and non ideal behavior of solutions.
2. To Determine the molecular mass of non-volatile solutes.
3. To Discuss the basic concepts of Photochemistry.
4. To Apply the principles of electrical conductivity.
5. To Explain the importance of emf and its applications.

Syllabus

Unit I

Solutions

(9 h)

Classification - Miscible, Partially miscible and Immiscible - Raoult's Law - Azeotropes HCl-H₂O system and ethanol-water system. Partially miscible liquids-phenol- water system. Critical solution temperature (CST), Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

Unit II

Colligative Properties

(9 h)

Relative lowering of Vapor Pressure, Elevation in boiling point depression in freezing point and Osmotic pressure. Determination of molecular mass of non-volatile solute by Ostwald Walker method, Cottrell's method, Rast method and Barkeley-Hartley method. Abnormal colligative properties. Van't Hoff factor.

Unit III

Photochemistry

(9h)

Difference between thermal and photochemical processes, Laws of photochemistry- Grothus- Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, chemiluminescence - Photosensitized reactions- energy transfer processes (simple example), quenching, Photo stationary state.

Unit IV

Electrochemistry-I

(9 h)

Conductance, Specific conductance, equivalent conductance and molar conductance - effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel - Onsagar's equation for strong electrolytes (derivation excluded), Application of conductivity measurements- conductometric titrations.

Unit V

Electrochemistry-II

(9 h)

Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements -Potentiometric titrations. Fuel cells – Basic concepts, examples and applications.

Course outcomes:

At the end of the SEMESTER the student will be able to

1. Understand the ideal and non ideal behaviour of solutions
2. Determine the molecular mass of non-volatile solutes.
3. Discuss the basic concepts of Photochemistry.
4. Apply the principles of electrical conductivity.
5. Explain the importance of emf and its applications

List of Reference books

- 1) Principles of physical chemistry by Prutton and Marron
- 2) Solid State Chemistry and its applications by Anthony R. West
- 3) Text book of physical chemistry by K L Kapoor
- 4) Text book of physical chemistry by S Glass tone
- 5) Advanced physical chemistry by Bahl and Tuli
- 6) Advanced physical chemistry by Guru deep Raj
- 7) Principles of physical chemistry by Puri, Sharma and Pathani

<https://www.coursera.org/learn/physical-chemistry>

https://youtu.be/rHMZ1Dpk5Fc?si=1uq5T9k2RO8G3T_R

III - SEMESTER

Course Code 7: PHYSICAL CHEMISTRY -I

Credits: 01

PHYSICAL CHEMISTRY

Course Objectives:

1. To Use of glassware, equipment and chemicals and follow experimental procedures in the laboratory.
2. To Understand and apply the concepts of solutions practically.
3. To Apply concepts of electrochemistry in experiments.

Syllabus:

CST, Conductometric and Potentiometric Titrimetry

50 M

1. Determination of CST for Phenol-water system.
2. Effect of electrolyte on CST.
3. Conductometric titration - Determination of concentration of HCl solution using standard NaOH solution.
4. Conductometric titration – Determination of concentration of CH₃COOH Solution using standard NaOH solution.
5. Potentiometric titration-Determination of concentration of HCl using standard NaOH solution.

Course outcomes:

At the end of the course, the student will be able to:

1. Use of glassware, equipment and chemicals and follow experimental procedures in the laboratory.
2. Understand and apply the concepts of solutions practically.
3. Apply concepts of electrochemistry in experiments.

List of reference books:

- 1) A Text Book of Quantitative Inorganic Analysis(3rdEdition) –A.I.Vogel
- 2) Web related references suggested by teacher.

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
Department of chemistry
Semester-III
Physical chemistry -I Course code -7 Course –V major
Physical chemistry (Solutions & Electro chemistry)
MODEL PAPER (wef. 2023-24 Admitted Batch)

Max marks : 60 M

Time: 2 1/2hrs

SECTION - A

Answer any five questions from the following. Each question Carries 2 Marks 5X2=10M

1. Define Raoult's law
2. Define CST.
3. what is Van't Hoff factor
4. Define fluorescence.
5. what is quantum yield.
6. Define Specific conductance
7. write the Debye –Huckel –on sagars equation
8. Define Single electrode potential.

SECTION-B

Answer All the following questions. Each question Carries 10 Marks. 5X10 = 50M

9.a) what is Nernst distribution law and write its applications.

[OR]

b) What are Azeotropes and explain HCl-H₂O and ethanol- water system.

10.a) what is osmotic pressure? How is it Experimentally determined osmotic pressure by Berkeley-Hartley method .

[OR]

b) Describe Ostwald –Walker method for the determination of Lowering of vapour pressure

11.a) Explain about Jablonski diagram.

[OR]

b) Explain Photo chemical reaction and mechanism of H₂-Cl₂ and H₂-Br₂

12.(a) Define Transport number and calculate the transport number by using Hittorf's method

[OR]

(b) Explain Kohlrausch's law and its applications

13. a) Explain the potentiometric titrations.

[OR]

b) Explain Types of electrodes with examples

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM

DEPARTMENT OF CHEMISTRY

R23	SEMESTER –III COURSE CODE VIII	L	P	T	C
	COURSE: INORGANIC AND PHYSICAL CHEMISTRY (w.e.f. 2023-24 Batch)	3	2	0	4
	TOTAL CONTACT HOURS-45				

Course objectives:

1. To Apply IUPAC nomenclature for Coordination compounds
2. To Understand the various theories, structure and stereo chemistry of coordination compounds.
3. To Explain the reaction mechanism in complexes.
4. To Apply the 18 electron rule.
5. To Discuss the basic concepts of thermodynamics.

Syllabus

Unit I

Coordination Chemistry-I

(9 h)

IUPAC nomenclature of Coordination compounds, structural and stereo isomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory(VBT):Postulates- magnetic properties- Inner and outer orbital complexes. Limitations of VBT, CFT- Postulates

- Splitting in Octahedral, tetrahedral, tetragonal and square planar fields. Crystal field stabilization energy(CFSE), Crystal field effects for weak and strong fields. Factors affecting the magnitude of crystal field splitting energy, Spectro chemical series, Tetragonal distortion of octahedral geometry, Jahn-Teller distortion.

UNIT-II

Coordination Chemistry II

(9 h)

1.Inorganic molecular Reaction Mechanism: (6 h)

Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transitionstate, intermediate and activated complex. Labile and inert complexes, ligand substitution reactions – SN₁ and SN₂, Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications

2. Stability of metal complexes:

(9 h)

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

Unit III

Organo metallic compounds

(9 h)

Definition and classification of organo metallic Compounds on the basis of bond type, Metalcarbonyls: 18 electron rule, electron count of mononuclear, poly nuclear and substituted metal carbonyls of 3d series. General methods of preparation of mono and binuclear carbonyls of 3d series. π -acceptor behaviour of CO (MO diagram of CO to be discussed), synergic effect and use of IR data to explain extent of back bonding.

Unit IV

Thermodynamics- I

(9 h)

Concept of heat(q), work(w), internal energy(U), State function and Path function- statement of first law; enthalpy(H), relation between heat capacities, calculations of q , w , U and H for reversible, irreversible processes, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. Temperature dependence of enthalpy of formation- Kirchoff's equation.

Unit V

Thermodynamics II

(9 h)

Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes. Third law of thermodynamics, Nernst heat theorem, Spontaneous and non-spontaneous processes, Helmholtz and Gibbs equation - Criteria for spontaneity.

I. List of Reference Books:

- 1) Concise coordination chemistry by Gopalan and Ramalingam
- 2) Coordination Chemistry by Basalo and Johnson
- 3) Text book of physical chemistry by S Glasstone
- 4) Concise Inorganic Chemistry by J.D.Lee
- 5) Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
- 6) A Text Book of Physical Chemistry by K.L.Kapoor Vol 2, 6th edition, 2019.

1. Apply IUPAC nomenclature for Coordination compounds
2. Understand the various theories, structure and stereo chemistry of coordination compounds.
3. Explain the reaction mechanism in complexes.
4. Apply the 18 electron rule.
5. Discuss the basic concepts of thermodynamics.

<https://youtu.be/Bwbx8gspe58?si=zIYwbvMHg8zGI615>

COURSE CODE 8:
QUALITATIVE INORGANIC ANALYSIS
Credits: 01

Qualitative inorganic analysis (Minimum of Six mixtures should be analyzed)

Course outcomes:

At the end of the course, the student will be able to:

- 1) Understand the basic concepts of qualitative analysis of inorganic mixture.
- 2) Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
- 3) Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis.

Analysis of Mixture

50M

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following: Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate. Cations: Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, magnesium and Ammonium. Minimum of Six mixtures should be analyzed .

Course outcomes:

1. Apply IUPAC nomenclature for Coordination compounds
2. Understand the various theories, structure and stereo chemistry of coordination compounds.
3. Explain the reaction mechanism in complexes.
4. Apply the 18 electron rule.
5. Discuss the basic concepts of thermodynamics.

. List of Text books:

1. A textbook of qualitative inorganic analysis by A.I. Vogel

Semester-III COURSE VIII
Inorganic and Physical Chemistry
MODEL PAPER (wef. 2023-24 Admitted Batch)

Max marks : 60 M

Time: 2 1/2hrs

SECTION - A

I. Answer any five questions from the following. Each question Carries Two Marks 5X2=10M

1. Write any two factors of crystal field splitting energy?
2. Write the hydrated isomerism of coordination compound with one example ?
3. Define labile and inert complexes ?
4. Define chelate effect ?
5. What is 18 electron rule ?
6. Define state and path functions ?
7. Define joule Thomson effect ?
8. What is second law of thermodynamics ?

SECTION-B

Answer All the following questions. Each question Carries Ten Marks. 5X10 = 50M

9. (a) Explain the valence bond theory with inner and outer orbital complexes by taking one example ?

(or)

- (b) Write the important postulates of crystal field theory explain the splitting of d-orbital in Octahedral complexes?

10. (a) Define trans effect and write its applications ?

(or)

- (b) Explain the determination of chemical composition of metal complex by jobs method and mole ratio method ?

- 11.(a) Discuss the general methods of preparation of mono and binuclear carbonyls of 3d series?

(or)

- (b) What are organo metallic compounds discuss their classification on the basis of Bond type ?

12. (a) Calculate the work for isothermal reversible expansion of ideal gas ?

(or)

- (b) (i) Explain kirchoff's equation ?

- (ii) Explain the internal energy and Enthalpy .

13. (a) Derive an expression for the efficiency of heat engine through a carnot cycle ?

(or)

- (b) Explain the following

- (i) Entropy changes in spontaneous and equilibrium process

		SEMESTER III		L	T	P	C
R-23		Information & Communication Technology		2	2	0	2
		(w.e.f 2023-24 Admitted Batch)		Total Hrs.30			

OBJECTIVES:

This course aims at acquainting the students with basic ICT tools which help them in their day today and life as well as in office and research.

COURSE OUT COMES:

After completion of the course, student will be able to;

1. Understand the literature of social networks and their properties.
2. Explain which network is suitable for whom.
3. Develop skills to use various social networking sites like twitter, flickr, etc.
4. Learn few GOI digital initiatives in higher education.
5. Apply skills to use online forums, docs, spreadsheets, etc. for communication, Collaboration and research.
6. Get acquainted with internet threats and security mechanisms.

SYLLABUS:

UNIT-I: (08 hrs.)

Fundamentals of Internet: What is Internet? Internet applications, Internet Addressing – Entering a Web Site Address, URL–Components of URL, Searching the Internet, Browser –Types of Browsers, Introduction to Social Networking: Twitter, Tumblr, LinkedIn, Face book,

flickr, Skype, yahoo, YouTube, WhatsApp.

UNIT-II: (08 hrs.)

E-mail: Definition of E-mail -Advantages and Disadvantages –User Ids, Passwords, Email Addresses, Domain Names, Mailers, Message Components, Message Composition, Mail Management.

G-Suite: Google drive, Google documents, Google spread sheets, Google Slides and Google forms.

UNIT-III:(10 hrs.)

Overview of Internet security, E-mail threats and secure E-mail, Viruses and antivirus software, Firewalls, Cryptography, Digital signatures, Copyright issues.

What are GOI digital initiatives in higher education? (SWAYAM, SwayamPrabha, National

Academic Depository, National Digital Library of India, E-Sodh-Sindhu, Virtual labs, eacharya, e-Yantra and NPTEL).

RECOMMENDED CO-CURRICULAR ACTIVITIES: (04 hrs.)

(Co-curricular activities shall not promote copying from textbook or from others work and shall

Encourage self/independent and group learning)

1. Assignments (in writing and doing forms on the aspects of syllabus content

and outside the syllabus content. Shall be individual and challenging)

2. Student seminars (on topics of the syllabus and related aspects (individual activity))

1. Quiz and Group Discussion

3. Slip Test

4. Try to solve MCQ's available online.
5. Suggested student hands on activities:
 - a. Create your accounts for the above social networking sites and explore them,
Establish a video conference using Skype.
 - b. Create an Email account for yourself- Send an email with two attachments to
Another friend. Group the email addresses use address folder.
 - c. Register for one online course through any of the online learning platforms like
NPTEL, SWAYAM, Alison, Codecademy, Coursera. Create a registration form
for your college campus placement through Google forms.

Reference Books:

1. In-line/On-line : Fundamentals of the Internet and the World Wide Web, 2/e –by
Raymond Greenlaw and Ellen Hepp, Publishers: TMH
2. Internet technology and Web design, ISRD group, TMH.
3. Information Technology – The breaking wave, Dennis P.Curtin, Kim Foley,
KunaiSen and Cathleen Morin, TMH.

INFORMATION AND COMMUNICATION TECHNOLOGY

MODEL QUESTION PAPER

SECTION: A

Answer any **THREE** of the following:

3X2=6M

1. Define Internet?
2. What is Email ID?
3. Explain Google Drive.
4. Explain about SWAYAM and NTPEL?
5. What is a Browser?

SECTION-B

Answer the following questions:

3x8=24M

6 a. What is Browser? Explain different types of Browsers?

(or)

b. Write a short note on components of URL?

7 a. Define Email. What are the advantages and disadvantages of it?

(or)

b. What are the steps to create Google forms?

8 a. Explain a different types of computer viruses?

(or)

b. Write about SWAYAM Prabha, E-sodh-sindhu and NDLI?

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COURSE INFORMATION SHEET

GENERAL INFORMATION

Program : II B.Sc MULTI DISCIPLINARY COURSE

Year and Semester : III Semester

Course Name : INTRODUCTION TO PUBLIC

ADMINISTRATION

Course Coordinator :

Total Number of hours : 40

Internal Marks : 20

External Marks : 30

Lecture	Tutorial	Practical	Credits
2	0	0	2

Paper-

Course Objectives:

- 1. Understand the concept and scope and evolution of public administration.**
- 2. Understand the relationship between public administration and public policy.**
- 3. Develop critical thinking and analytical skills to evaluate public administration practices.**

Learning Outcomes:

Students at the successful completion of the course will be able to;

- 1.Awareness about the evolution and growth of the discipline of public administration.**
- 2.Familiarity with the constitutional framework on which Indian Administration is based.**
- 3.Understanding the in-built control mechanism over constitutional bodies and administration in general..**

MAHARAJAH'S COLLEGE (AUTONOMOUS)::VIZIANAGARAM

II B. Sc

MDC

III SEMESTER

PAPER: INTRODUCTION TO PUBLIC ADMINISTRATION

SYLLABUS

Unit: I

- 1. Introduction to public administration –Woodrow-Wilson-Definition and nature and scope of Public Administration –Significance – Distinction between public and private administration.**

Unit: II

All Indian Services- Central Services –State Services – Importance of All Services UPSC&SPSCs Powers and Functions –NITI Aayog

Unit: III

**Accountability of Administration in India –Legislative –Executive –Judiciary
Judicial Activism –e-Governance in India –Good Governance initiatives –
Functions and roles of Administrators.**

Activities:

- 1. Class participation and discussions**
- 2. Field trips to Government offices**
- 3. Individual or group assignments**
- 4. Student's projects – Individual and group**
- 5. Quizzes or Slip tests.**
- 6. Presentations**
- 7. Research papers**

References:

- 1. Public Administration by Awasthi & Maheswari**
- 2. Indian Administration by Maheswari**
- 3. Administration Theories by Mohit Bhattacharya**
- 4. Comparative Administration by i Mohit Bhattacharya**
- 5. Indian Government & Politics by B.L.Fadia**

M.R.COLLEGE (AUTONOMUS)

VIZIANAGARAM

MULTI DISCIPLINARY COURSE

SEMESTER-III

II B.Sc.

PAPER- : INTRODUCTION TO PUBLIC ADMINISTRATION

LESSON PLAN

S.No.	TOPIC	PERIODS	REFERENCE
	Unit: I		
01	Introduction to public administration –Woodrow-Wilson	03	R1
02	Definition and nature and scope of Public Administration	03	R1
03	–Significance – Distinction between public and private administration.	04	R2
	TOTAL	10	
	Unit: II		
01	All Indian Services- Central Services –State Services	03	R3
02	Importance of All Services UPSC&SPSCs Powers and Functions	04	R3
03	NITI Aayog	03	R4
	TOTAL	10	

	Unit: III .		
01	Accountability of Administration in India –	03	R4
02	Legislative –Executive –Judiciary Judicial Activism	03	R5
03	e-Governance in India –Good Governance initiatives –	02	R5
04	Functions and roles of Administrators	02	R5
	TOTAL	10	

M.R.COLLEGE (AUTONOMUS)

VIZIANAGARAM

MULTI DISCIPLINARY COURSE

SEMESTER- III MODEL QUESTION PAPER

2nd Year B.Sc

PAPER- : INTRODUCTION TO PUBLIC ADMINISTRATION
hours Max.Marks:30

Time: 1.30

SECTION-A

(3X2=06)

I. Answer any THREE questions from the following.

Each question carries 2 marks.

- a. Public Administration**
- b. POSDCORB**
- c. NITI Aayog**
- d. All Indian Services**
- e. E-Governance**

SECTION-B

(3X8=24)

II. Answer following questions internal choice.

Each question carries 8 marks.

2A. Explain the meaning and scope of Public Administration.

(OR)

.B. Differences between Public and Private Administration.

3A. Explain the Powers and Functions of UPSC.

(OR)

B. Describe the Functions of NITI Aayog.

4A.. Discuss various functions of Legislature?.

(OR)

B.. Discuss the varies components of E-Governance?.

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM

I B.Sc. Computer Science

Major LIFE SKILLS COURSES

R23 SEMESTER IV

L T P C SEC SC4-1-CYBER SECURITY 2 - - 2 (w.e.f. 2023-24 Admitted Batch) Total Hours – 30 Learning Outcomes: Upon successful completion of the course, the students will be able to • Develop an understanding of cybercrimes and various legal perspectives involved. • Develop a security model to handle mobile, wireless devices and related security issues of an organization. • Use the cybercrime tools and methods in solving real world problems UNIT – I 8 hrs Introduction to Cybercrime: Introduction, Cybercrime: Definition and origins of the word, Cybercrime and Information Security, who are cyber criminals? Classifications of cybercrimes, cybercrime: the legal perspectives, an Indian perspective, cybercrime and the Indian IT Act 2000, a Global perspective on Cybercrimes. UNIT – II 12 hrs Cybercrime-Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Authentication Service Security, Attacks on Mobile/Cell Phones. Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile Devices-Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptops. UNIT – III 10hrs Tools and Methods Used in Cybercrime: Password Cracking, key loggers and Spywares, virus and worms, Trojan Horses and Backdoors, Steganography, attacks on wireless networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft). Text Books: 1. Mark Rhodes, Ousley, Information Security, 1st Edition, MGH, 2013. 2. Nina Godbole and SunitBelpure – Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, 1st Edition Publication Wiley, 2011. Activities to be planned: 1. Identify a user of internet, label him as a cybercriminal or not. 2. Checklist for reporting cybercrime at Cybercrime Police Station. 3.

Checklist for reporting cybercrime online. 4. Reporting phishing emails. 5. Demonstration of email phishing attack and preventive measures. 6. Checklist for secure net banking. MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM II B.Sc. Computer Science Major SEMESTER IV – END EXAMINATIONS (W.e.f. 2023-24 Admitted Batch) MODELQUESTIONPAPER (SC 4-1- CYBER SECURITY) Time: 2Hrs. Max. Marks: 30 SECTION – A I. Answer all TEN questions: [10 X 1 = 10 M] 1. What is cybercrime? 2. What are the main categories of cybercrime? 3. What are some common examples of cybercrime? 4. Who are cybercriminals? 5. Mention some of the wireless devices. 6. What is mobile malware? 7. What is Bluetooth hacking? 8. What is a keylogger? 9. What is a DDoS attack? 10. What is cryptojacking? SECTION – B II. Answer any FIVE of the following questions: [5 X 4 = 20 M] 11. Explain the common cyber security threats faced by individuals and businesses today. 12. Describe the differences between antivirus, firewall, and intrusion detection systems in the context of cyber security. 13. Explain the concept of phishing and how individuals can protect themselves from phishing attacks. 14. How can users protect their mobile devices from malware? 15. What are rogue Wi-Fi networks, and how can they be dangerous? 16. What is a mobile ransom ware attack? Explain. 17. Explain about the Trojan Horses and Backdoors. 18. Explain the steganography technique. @@@ Guidelines to the paper setter: SECTION – A 1. Ten short answer type questions are to be given towards covering all topics; All Questions are to be answered. Each question carries 1 mark. SECTION – B 2. Eight essay type questions are to be given towards covering all topics; Five Questions are to be answered. Each question carries 4 marks. @@@ @@@

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY

SEMESTER -IV		L	P	T	C
R23	COURSE-IX MAJOR(States of Matter, phase rule, surface chemistry) (w.e.f. 2023-24 Batch)	3	2		4
TOTAL CONTACT HOURS-45					

I. Course objectives:

1. To explain the difference between solids liquids and gases in terms of intermolecular

Interactions

2. To understand Difference between ideal and real gase

3. To know the basic concepts of two component systems

4. To apply the concepts of adsorption.

5. To understand the basic concepts of crystallography.

SYLLABUS

Unit I

Gaseous state

(9 h)

Postulates of Kinetic theory of Gases (exclude derivation) – deduction of gas laws from kinetic gas equation-Vander Waal's equation of state. Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. Relationship between critical constants and vander Waal's constants. Law of corresponding states. Joule- Thomson effect. Inversion temperature.

Unit II

Liquid State

(9 h)

Physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Temperature variation of viscosity of liquids and comparison with that of gases. Qualitative discussion of structure of water. Liquid crystals, mesomorphic state. Differences between liquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic. Application of liquid crystals as LCD devices

UNIT-III

Solid state

(9h)

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

Unit IV

Phase Rule

(9 h)

The Concept of phase, components, degrees of freedom. Gibbs phase rule. Phase diagram of one component system – water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point, freezing mixtures

Unit V

Surface Chemistry

(9 h)

Definition and classification of Colloids- Coagulation of colloids- Hardy-Schulze rule. Stability of colloids, Protection of Colloids, Gold number. Adsorption - Physical and chemical adsorption, Freundlich and Langmuir adsorption isotherm, applications of adsorption.

List of Reference Books:

- 1) Solid State Chemistry and its applications by Anthony R. West
- 2) Text book of physical chemistry by K L Kapoor Vol.1
- 3) Text book of physical chemistry by S Glasstone
- 4) Advanced physical chemistry by Bahl and Tuli

Course out comes:

1. To explain the difference between solids liquids and gases in terms of intermolecular Interactions
2. To understand Difference between ideal and real gase
3. To know the basic concepts of two component systems
4. To apply the concepts of adsorption.
5. To understand the basic concepts of crystallography.

<https://nptel.ac.in/courses/112104248>

<https://youtu.be/Y1w64KEjXFA>

IV – SEMESTER

Course Code 9: Organic Preparations : Credits: 01

Course objectives:

- 1) To Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- 2) To Apply concepts of surface chemistry in experiments.
- 3) To Be familiar with the concepts & practical applications of Surface tension and viscosity of liquids.

Physical Chemistry Practical Syllabus:

1. Determination of surface tension of liquid by drop count method
2. Determination of surface tension of liquid by drop weight method
3. Determination of surface tension of mixture (liquid + detergent) using stalagmometer.
4. Determination of coefficient of viscosity of an organic liquid.
5. Determination of composition of a glycerol in glycerol + water mixture using viscometer
- . 6. Adsorption of acetic acid on animal charcoal, verification of Freundlich isother

Course outcomes:

At the end of the course, the student will be able to

- 1) Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- 2) Apply concepts of surface chemistry in experiments.
- 3) Be familiar with the concepts & practical applications of Surface tension and viscosity of liquids.

List of reference books:

- 1) A Text Book of Quantitative Inorganic Analysis(3rdEdition) –A.I.Vogel
- 2) Web related references suggested by teacher

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM

Department of chemistry

Semester - IV Course - 9(Major)

Physical Chemistry-II (states of matter, phase rule, surface chemistry)

MODEL

PAPER (wef. 2023-24 Admitted Batch)

Max marks : 60 M

Time: 2 1/2hrs

SECTION - A

Answer any FIVE questions from the following. Each question Carries 2 Marks. 5X2=10M

1. Define Joule Thomson effect?
2. What is coefficient of viscosity?

3. Write any two applications of liquid crystals?
4. Define unit cell ?
5. What are Miller indices ?
6. Define phase rule?
7. What is eutectic point ?
8. What is gold number ?

SECTION - B

Answer any five questions from the following

Marks :5X10=50M

9. (a) Derive the Vander waal's state equation of real gases?
(OR)
(b) Derive relationship between critical constants and Vander waal's constants ?
10. (a) Explain the process of determination of surface tension ?
(OR)
(b) What are liquid crystals? Explain the classification of liquid crystals?
- 11.(a) Describe the defects in crystals?
(OR)
(b) State and derive Bragg's equation and explain powder method?
- 12 (a) Explain the phase diagram of one component system with example?
(OR)
(b) Explain phase diagram of Pb-Ag system ?
- 13 (a) Explain the following (i)Hardy- Schulze rule (ii)stability of colloids ?
(OR)
(b) Explain Langmuir adsorption isotherm?

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY

SEMESTER -IV		L	P	T	C
R23	COURSE-X Major (General & Physical chemistry) (w.e.f. 2023-24 Batch)	3	2		4
TOTAL CONTACT HOURS-45					

Course objectives:

1. To correlate and describe the stereochemical properties of organic compounds.

2. To explain the biological significance of various elements present in the human body.
3. To apply the concepts of ionic equilibrium for the qualitative and quantitative analysis.
4. To determine the order of a chemical reaction.
5. To describe the basic concepts of enzyme catalysis.

SYLLABUS

UNIT-I

Stereo chemistry of carbon compounds (9 h)

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

Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation.

Chiral molecules- definition and criteria (Symmetry elements)- Definition of enantiomers and diastereomers

Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

Unit II

Bioinorganic Chemistry (9 h)

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals, Na / K- pump, carbonic anhydrase and carboxy peptidase.

Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cisplatin as an anti-cancer drug.

Iron and its application in bio-systems, Haemoglobin-transfer of oxygen, Myoglobin-Storage and transfer of iron.

Unit III

Ionic equilibrium (9 h)

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, Buffer solutions-Henderson's equation. Indicators-theories of acid – base Indicators, selection of Indicators, Common ion effect Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

Unit IV

Chemical Kinetics-I: (9 h)

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction.

Derivation of integrated rate equations for zero, first and second order reactions (similar and different reactants). Half-life of a reaction. General methods for determination of order of a reaction.

Unit V

Chemical Kinetics-II:

(9h)

Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Enzyme catalysis- Specificity, factors affecting enzyme catalysis, Inhibitors and Lock & key model. Michaelis-Menten equation- derivation, significance of Michaelis-Menten constant.

Reference books

- 1) Text book of physical chemistry by S Glasstone
- 2) Concise Inorganic Chemistry by J.D.Lee
- 3) Advanced physical chemistry by Gurudeep Raj
- 4) Advanced physical chemistry by Bahl and Tuli
- 5) Inorganic Chemistry by J.E.Huheey
- 6) Basic Inorganic Chemistry by Cotton and Wilkinson

Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Worksheets and Quizzes
3. Presentation, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality.
4. Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

Course outcomes:

At the end of the SEMESTER the student will be able to:

1. Correlate and describe the stereochemical properties of organic compounds.
2. Explain the biological significance of various elements present in the human body.
3. Apply the concepts of ionic equilibrium for the qualitative and quantitative analysis.
4. Determine the order of a chemical reaction.
5. Describe the basic concepts of enzyme catalysis

<https://youtu.be/FziKko-ZQww>

<https://youtu.be/AVDSQ0xaBJI>

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
Department of chemistry
Semester-IV Course - X (Major)
General and Physical Chemistry
MODEL PAPER (wef. 2023-24 Admitted Batch)

Max marks : 60 M

Time: 2 1/2hrs

SECTION - A

Answer any FIVE questions from the following. Each question Carries 2 Marks. 5X2=10M

- 1) Define Enantiomers?
- 2) Write any Four metal ions that are present in the human body?
- 3) What is meant by P^H ?
- 4) Define molecularity of a Reaction?
- 5) What is meant by Enzyme Catalysis?
- 6) What are Chiral molecules ?
- 7) What is the main function of Carboxypeptidase?
- 8) What is the activation energy?

SECTION-B

Answer All the following questions. Each question Carries 10 Marks.

5X10 = 50M

- 9) (a) Write a short note on Fisher projection and sawhorse projection?
(OR)
(b) What is optical isomerism? Discuss the optical activity of Alanine and Tartaric acid?
- 10) (a) Explain the toxic effects of Mercury, lead, cadmium and Arsinic?
(OR)
(b) Explain the functions of Hemoglobin and Myoglobin?
- 11) (a) Explain Ostwald theory and Quinonoid theory of acid base indicators?
(OR)
(b) Write a short note on the Common ion effect and solubility Product?
- 12) (a) Explain the factors that affect the rate of the reaction?
(OR)
(b) Derive an expression for the rate constant and half life period of First order reaction?
- 13) (a) Explain Collision theory and Activated Complex theory of bimolecular reactions ?
(OR)
(b) Derive Michaels - Menten equation? write the significance of Michaels- menten Constant?

IV - SEMESTER

Course Code 11:

Nitrogen containing Organic Compounds & Spectroscopy

Credits: 03

I. Course outcomes:

At the end of the SEMESTER the student will be able to:

1. Distinguish primary secondary and tertiary amines and their properties.
2. Describe the preparation and properties of amino acids.
3. Explain the reactivity of nitro hydrocarbons.
4. Discuss heterocyclic compounds with N, O and S.
5. Apply the concepts of UV and IR to ascertain the functional group in an organic compound.

SYLLABUS

Unit I

Amines: (9 h)

Classification, chirality in amines (pyramidal inversion), preparations – Gabriel synthesis, Hoffmann- Bromamide reaction (with mechanism), reduction of amides and Schmidt reaction. Distinction between Primary, secondary and tertiary amines using Hinsberg's method and nitrous acid. Discussion of the following reactions with emphasis on the mechanistic pathway: Carbylamine reaction, Hoffmann's exhaustive methylation, Hofmann and Cope elimination.

Diazonium Salts: Preparation and synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols, cyano and nitro compounds. Coupling reactions of diazonium salts (preparation of azo dyes).

UNIT- II

Amino acids (9 h)

Definition and classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: a) from halogenated carboxylic acid, b) Gabriel Phthalimide synthesis c) Strecker's synthesis.

Physical properties: 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.

UNIT- III

Nitro hydrocarbons (9h)

Nomenclature and classification, structure -Tautomerism of nitroalkanes leading to acid and keto form, Preparation of Nitroalkanes, reactivity - halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.

Unit IV

Heterocyclic Compounds (9 h)

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan, Thiophene and Pyrrole - Aromatic character – Preparation from 1, 4, -dicarbonyl compounds, Paul-Knorr synthesis. Properties: Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation - Diels Alder reaction in furan. Pyridine – synthesis - Aromaticity -Basicity - Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

Unit V

UV-Visible & IR Spectroscopy

(9 h)

Selection rules for electronic spectra, types of electronic transitions in molecules, concept of chromophore and auxochrome, effect of conjugation- Woodward Fischer rules for calculating max of conjugated dienes and , unsaturated compounds. Infrared spectroscopy and types of molecular vibrations and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intra molecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on $>C=O$ stretching absorptions).

II. List of Reference Books

- 1) A Text Book of Organic Chemistry by Bahl and Arunbahl
- 2) A Text Book of Organic chemistry by I L Finar Vol I
- 3) Organic chemistry by Bruice
- 4) Organic chemistry by Clayden
- 5) pectroscopy by William Kemp
- 6) Spectroscopy by Pavia
- 7) Organic Spectroscopy by J. R. Dyer
- 8) Elementary organic spectroscopy by Y.R. Sharma
- 9) Spectroscopy by P.S.Kalsi
- 10) Spectrometric Identification of Organic Compounds by Robert M Silverstein, Francis X Webster

https://onlinecourses.nptel.ac.in/noc20_cy08/preview

<https://nptel.ac.in/courses/104105040>

MAHARAJAHS COLLEGE (AUTONOMOUS) :: VIZIANAGARM
DEPARTMENT OF CHEMISTRY
MODEL PAPER(w.e.f 2023 - 2024 admitted batch)

SEMESTER-IV

Time : 2 1/2 hours

Maximum Marks 60

PART-A

Answer any 5 of the following questions each question carries 2 marks 5 X 2=10 marks

1. Write the carbyl amine reaction.
2. Define diazonim salts with example.
3. Define zwitter ion.
4. Define isoelectric point.
5. Define tautomerism of nitro alkanes.
6. What is Diels alder reaction?
7. What is the five membered hetro cyclic compound with examples?
8. Define chromophore with example.

PART-B

Answer any all the following questions each question carries ten marks 5 X 10= 50 Marks

9. (a) How to distinguish primary secondary tertiary Amines by using hinsburg method
Or
(b) Write the preparation and synthetic applications of diazonium salts
- 10) a) Explain the following
 - i) Gabriel pthalimide synthesis
 - ii) Streckers synthesisOr
(b) Classification of amino acids.
- 11.a) Explain the following
 - i) Nef reaction
 - ii) Mannich reactionOr
b) Write the any three methods of preparation of nitroalkanes
- 12.a) Write the nucleophilic substitution reactions of pyridine
Or
b) Explain the electrophilic substitution reactions in pyrrol and furan
- 13.a) Explain the Woodward fischer rules
Or
b) Explain the following
 - a) fingerprint region
 - b) IR spectra of alkanes

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM

DEPARTMENT OF CHEMISTRY

R23	Semester-V Course- 12A (MAJOR) Analytical Methods in Chemistry-Quantitative Analysis	L	P	T	C
	III Year B.Sc (Honours) Chemistry (w.e.f. 2023-24 batch)	4	2	0	4
	TOTAL CONTACT HOURS-45				

Course objectives:

- 1) To identify the importance of solvent extraction and ion exchange method.
- 2) To acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis
- 3) To demonstrate the usage of common laboratory apparatus used in quantitative analysis.
- 4) To understand the theories of different types of titrations.
- 5) To gain knowledge on different types of errors and the minimization method

SYLLABUS

Unit-1: Quantitative analysis-1

9 hrs

1. A brief introduction to analytical methods in chemistry. Principles of volumetric analysis, concentration terms- Molarity, Molality, Normality, v/v, w/v, ppm and ppb, preparing solutions- Standard solution, primary standards and secondary standards. Description and use of common laboratory apparatus- volumetric flask, burette, pipette, beakers, measuring cylinders.

Unit-2: Quantitative analysis-2

9 hrs

1. Principles of volumetric analysis: Theories of acid-base (including study of acid-base titration curves), redox, complex metric, iodometric and precipitation titrations-choice of indicators for the saturations. Principles of gravimetric analysis: precipitation, coagulation, peptization, co precipitation, post precipitation, digestion, filtration, and washing of precipitate, drying and ignition.

Unit-3: Treatment of analytical data

9 hrs

Types of errors- Relative and absolute, significant figures and its importance, accuracy -methods of expressing accuracy, errors- Determinate and indeterminate and minimization of errors, precision-methods of expressing precision, standard deviation and confidence interval.

Unit-4: separation techniques

9 hrs

Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism. Application-Determination of Iron (III). Ion Exchange method: Introduction, action of ion exchange resins, applications.

UNIT-5: Analysis of water

9 hrs

Determination of dissolved solids, total hardness of water, turbidity, alkalinity, Dissolved oxygen, COD, determination of chloride using Mohr's method.

Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Worksheets and Quizzes
3. Presentation, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality.
4. Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester

Course outcomes:

Students after successful completion of the course will be able to:

- 1) Identify the importance of solvent extraction and ion exchange method.
- 2) Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.
- 3) Demonstrate the usage of common laboratory apparatus used in quantitative analysis.
- 4) Understand the theories of different types of titrations.
- 5) Gain knowledge on different types of errors and the minimization method.

IV. List of Reference Books: 1) Fundamentals of Analytical Chemistry by F.James Holler, Stanley R Crouch, DonaldM.West and Douglas A. Skoog, Ninth edition, Cengage.
2) Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and KevinA. Schug, Seventh edition, Wiley.
3) Quantitative analysis by R.A.DayJr.and A.L.Underwood, Sixth edition, Pearson.
4) Text book of Vogel's Quantitative Chemical Analysis,Sixth edition, Pearson.
5) Text book of Environmental Chemistry and Pollution Control by S.S.Dara and D.D.Mishra, Revised edition, S Chand & Co Ltd.

**Course Code 12 A: Analytical Methods in Chemistry – Quantitative analysis:
Credits: 01**

V. Learning Objectives:

On successful completion of this practical course, student shall be able to:

- 1) To estimate Iron(II) using standard Potassium dichromate solution
- 2) To learn the procedure for the estimation of total hardness of water
- 3) To demonstrate the determination of chloride using Mohr's method
- 4) To acquire skills in the operation and calibration of pH meter
- 5) To perform the strong acid vs strong base titration using pH meter

VI. Laboratory course Syllabus:

- 1) Estimation of Iron (II) using standard Potassium dichromate solution (using DPA indicator)
- 2) Estimation of total hardness of water using EDTA
- 3) Determination of chloride ion by Mohr's method
- 4) Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
- 5) Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid, (ii) Ammonium chloride-ammonium hydroxide.
- 6) pH metric titration of (i) strong acid vs strong base, (ii) weak acid vs. Strong base.
- 7) Determination of dissociation constant of a weak acid.

VII. Co-Curricular Activities: Mandatory: (Lab /field training of students by teacher:(lab:10+field:05):

1) For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques / skills of calibration of pH meter, Strong acid vs strong base titration using pH meter, determination of chloride ion, estimation of water quality parameters and estimation of Iron (II).

2) For Student: Student shall visit a related industry / chemistry laboratory in universities / research organizations/private sector facility and observe various methods used for the analysis of water. Write their observations and submit a hand written fieldwork /project work report not exceeding 10 pages in the given format to the teacher.

3) Max marks for Field work / projectwork Report:05.

4) Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings and acknowledgements.

5) Unit tests (IE).

VIII. List of Reference books:

Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson
https://onlinecourses.nptel.ac.in/noc25_cy11/preview

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM

Department of chemistry

Semester-V course-12A (Major)

(Analytical Methods In Chemistry-Quantitative Analysis)

MODEL PAPER (wef. 2023-24 Admitted Batch)

SECTION - A

Answer any **five** questions from the following. Each question Carries **2** Marks **5X2=10M**

- I a). what is Molarity?
- b). Define Iodometric Titrations?
- c). What is filtration?
- d). What is Accuracy?
- e). Define Standard deviation.
- f). What is Synergism?
- g). Write any one application of Solvent extraction.
- h). What is COD?

SECTION-B

Answer All the following questions.

5X10 = 50M

- 2.a) Explain about Analytical methods in chemistry.
[OR]
- b) Write the description and uses of Volumetric flask, Burette and Beakers.
3. a) Explain about Precipitation Titrations.
[OR]
- b) Explain the following.
 - i). Co precipitation
 - ii). Post Precipitation
- 4.a) Explain the types of Errors?
[OR]
- b) Explain about Significant figures.
- 5.a) Explain the following?
 - i). Batch extraction
 - ii). Counter-current extraction.
- [OR]
- b) What is Ion-Exchange method? Write the applications of Ion Exchange method.
6. a) How do you determine the Dissolved oxygen in water
[OR]
- b) Write the determination of chlorides in water using Mohr's method.

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM

DEPARTMENT OF CHEMISTRY

	Semester-V Course- 13(A) (MAJOR)	L	P	T	C
	Chromatography & Instrumental methods of Analysis				

R23	III Year B.Sc (Honours) Chemistry (w.e.f. 2023-24 batch)	4	2	0	4
	TOTAL CONTACT HOURS-45				

Course objectives:

Students after successful completion of the course will be able to:

- 1) To Identify the importance of chromatography in the separation and identification of compounds in a mixture
- 2) To Acquire a critical knowledge on various chromatographic techniques.
- 3) To Demonstrate skills related to analysis of water using different techniques.
- 4) To Understand the principles of spectrochemistry in the determination of metal ions.
- 5) To Comprehend the applications of atomic spectroscopy

SYLLABUS

Unit-1: Chromatography-Introduction and classification

9 hrs

Principle, Classification of chromatographic methods, Nature of adsorbents, eluents, R_f values, factors affecting R_f values.

UNIT-2: TLC and paper chromatography

9 hrs

1. Thin layer chromatography: Principle, Experimental procedure, preparation of plates, adsorbents and solvents, development of chromatogram, detection of spots, applications and advantages.

2. Paper Chromatography: Principle, Experimental procedure, choice of paper and solvents, various modes of development- ascending, descending, radial and two dimensional, applications.

UNIT-3: Column chromatography

9 hrs

1. Column chromatography: Principle, classification, Experimental procedure, stationary and mobile phases, development of the Chromatogram, applications.

2. HPLC: Basic principles, instrumentation –block diagram and applications.

UNIT-4: Spectrophotometry

9 hrs

Principle, Instrumentation: Single beam and double beam spectrometer, Beer-Lambert's law- Derivation and deviations from Beer-Lambert's law, applications of Beer-Lambert's law-Quantitative determination of Fe^{+3} and Mn^{+2} .

UNIT-5: Polarimetry and Refractometry

9 hrs

Polarimetry and Refractometry: Polarimetry: Nature of polarized light, polarimeter, sample cells, operation of the polarimeter, optical purity. Refractometry; The refractive index, Refractometer.

Suggested Co-Curricular Activities:

- 1) Training of students by related industrial experts.
- 2) Assignments, Seminars and Quiz(on related topics).
3. Presentation, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality.
- 4) Visits to laboratories, firms, research organizations etc.
- 5) Invited lectures and presentations on related topics by field/industrial experts

Learning outcomes

Students after successful completion of the course will be able to:

1. Identify the importance of chromatography in the separation and identification of compounds in a mixture
2. Acquire a critical knowledge on various chromatographic techniques.
3. Demonstrate skills related to analysis of water using different techniques.
4. Understand the principles of spectrophotometry in the determination of metal ions.

List of Reference books:

- 1) Fundamental so Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.West and Douglas A.Skoog, Ninth edition, Cengage.
- 2) Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and Kevin A.Schug, Seventh edition, Wiley.
- 3) Quantitative analysis by R.A.Day Jr .and A.L.Underwood, Sixth edition, Pearson.
- 4) Text book of Vogel's Quantitative Chemical Analysis, Sixth edition/Pearson.
- 5) Instrumental methods of Chemical Analysis by Dr.B.K.Sharma 1981

Online links :- http://ndl.iitkgp.ac.in/he_document/swayamprabha/swayam_prabha/rnxgta4tg2q

13(A): Chromatography & Instrumental methods of Analysis

PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Perform the separation of a given dye mixture using TLC
2. Learn the preparation of TLC plates
3. Demonstrate the separation of mixture of amino acids using paper chromatography
4. Acquire skills in using column chromatography for the separation of dye mixture

VI. Practical (Laboratory) Syllabus: (30hrs) (Max.50Marks)

1. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent)
2. Separation of mixture of methyl orange and methylene blue by column chromatography.
3. Separation of given mixture of amino acids (glycine and phenyl alanine) using ascending paper chromatography.
4. Separation of food dyes using Column Chromatography
5. Separation of triglycerides using TLC
6. Verification of Beer Lambert's law. (Using potassium permanganate solution) using colorimeter /spectrophotometer.

Lab References:

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
2. Vogel A. I. Practical Organic Chemistry, Longman Group Ltd
3. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley- Eastern
4. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
5. Mann F.Gand Saunders B.C, Practical Organic Chemistry, Pearson Education

MAHARAJA'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY
V – SEMESTER (MAJOR)
COURSE- 13A
CHROMATOGRAPHY AND INSTRUMENTAL METHODS OF ANALYSIS

MODEL QUESTION PAPER

Time: 2 ½ hrs

Max Marks: 60

PART – A

Answer any FIVE from the following questions.

5X2=10 Marks

1.
 - a) Explain the principle involved in Chromatography methods.
 - b) Explain the selection of solvents used in thin layer chromatography.
 - c) Write any two applications of column chromatography.
 - d) What is Beer Lambert's law.
 - e) What is Refractive Index.
 - f) Define Adsorbent and Eluent.
 - g) Write about choice of papers used in paper chromatography.
 - h) Define absorbance and Transmittance.

PART-B

Answer ALL the following questions.

5X10=50 Marks

2 a) What is meant by R_f Value and Write the factors affecting R_f value.

(Or)

b) Explain the Nature of Adsorbents and Eluents used in Chromatography.

3 a) Explain the Experimental procedure of paper Chromatography.

(Or)

b) Explain the following.

i) Preparation of TLC plates ii) Detection of Spots in TLC.

4 a) Explain the Process of Elution in column Chromatography.

(Or)

b) Explain the Principle and Instrumentation of HPLC.

5 a) Explain the quantitative determination of Fe^{2+} and Mn^{2+} by using Beer Lambert's law.

(Or)

b) Write about the principle and instrumentation of Single beam and Double beam spectrophotometer

6 a) Explain the principle and instrumentation of polarimetry.

(Or)

b) Explain the instrumentation and Applications of refractometry.

DEPARTMENT OF CHEMISTRY

R23	SEMESTER -V	L	P	T	C
	Course 14A: Synthetic Organic Chemistry. (w.e.f. 2023-24 Batch)	4	2	0	4
	TOTAL CONTACT HOURS - 45				

I. Course Objectives:

Students after successful completion of the course will be able to:

- 1) To identify the importance of reagents used in the synthesis of organic compounds.
- 2) To acquire knowledge on basic concepts in different types of pericyclic reactions.
- 3) To Understand the importance of retro synthesis inorganic chemistry.
- 4) To Compre and the applications of different reactions synthetic organic chemistry.

II. Syllabus:

Unit-1: Pericyclic reactions

9 hours

<https://archive.nptel.ac.in/courses/104/106/104106077/>

Definition and classification of pericyclic reactions: Phases, nodes and symmetry properties of molecular orbital's in ethylene,1,3-butadiene,1,3,5-hexatriene,alkylationandallylradical. Thermal and photochemical reactions. Electro cyclic reactions: Definition and examples, definitions of con and disrotation. Woodward-Hoffmann selection rules. (Correlation diagrams excluded) Cyclo addition reactions: Definition and examples, definitions of supra facial and antar facial addition, Woodward-Hoffmann selection rules. (Correlation diagrams excluded)

Unit-2: Organic photochemistry

9 hours

<https://archive.nptel.ac.in/courses/104/106/104106077/>

Jablonski diagram-singlet and triplet States Photochemistry of Carbonyl compounds – * and – *transitions, Norrish type-1 and type-2 reactions Paterno–Buchi reaction.

Unit-3: Retro synthesis.

9 hours

<https://nptel.ac.in/courses/104105087>

Important terms in Retro synthesis with examples-Disconnection, Target molecule, FGI, Synthon, Retrosynthetic analysis, chemo selectivity, region selectivity. Importance of Order of events in organic synthesis. Retrosynthetic analysis of the compounds: a) cyclohexene b)4-Nitro toluene c)

Paracetamol.

Unit-4: Synthetic Reactions.**9 hours**

https://onlinecourses.nptel.ac.in/noc23_cy48/preview

Shapiro reaction, Stork - enamine reaction(only alkylation), Wittig reaction, Robinson annulation, Bailys-Hillman reaction, Heck reaction, Suzuki coupling. Synthesis of aldehydes and ketones using 1, 3-Dithiane.

Unit-5: Reagents in Organic Chemistry**9 hours**

<https://archive.nptel.ac.in/courses/104/103/104103023/>

Oxidizing agents: PCC, PDC, SeO₂(Riley oxidation), NBS.

Reducing agents: LiAlH₄(with mechanism), LTBA, Metal-solvent reduction(Birch reduction),

Catalytic reduction.

III. Suggested Co-Curricular Activities:

- 1) Training of students by related industrial experts.
- 2) Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3) Visits to laboratories, firms, research organizations etc.
- 4) Invited lectures and presentations on related topics by field/industrial experts.

IV. List of Reference books:

- 1) Pericyclic reactions by, Ian Fleming Second edition, Oxford University press.
- 2) Pericyclic Reactions-A Textbook: Reactions, Applications and Theory by S. Sankararaman, WILEY-VCH.
- 3) Reaction Mechanism inorganic Chemistry by S.M.Mukherji and S.P.Singh ,Revised edition, Trinity Press.
- 4) Pericyclic reactions –A Mechanistic study by S.M.Mukherji, Macmillan India.
- 5) Organic synthesis: The disconnection approach by Stuart Warren, John Wiley & Sons.
- 6) Organic chemistry by Jonathan Clayden, Nick Greeves and Stuart Warren, Second edition, Oxford university press.
- 7) Reactions, Reagents and Rearrangements by S.N. Sanyal, Bharati Bhawan Publishers & Distributors

COURSE 14A
SYNTHETIC ORGANIC CHEMISTRY

V. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

- 1) Perform the organic qualitative analysis for the detection of N, Sand halogens using the green procedure.
- 2) Learn the procedure for the separation of mixture famine acids using paper Chromatography.
- 3) Prepare the TLC plates for TL chromatography.
- 4) Acquire skills in conducting column chromatography for the separation of dyes in the given mixture.

VI. Laboratory course syllabus:

- 1) Green procedure for organic qualitative analysis: Detection of N, Sand halogens
- 2) Separation of given mixture of amino acids (glycine and phenylalanine) using ascending paper chromatography.
- 3) Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
- 4) Separation of mixture of methyl orange and methylene blue by column chromatography
- 5) Separation of food dyes using Column Chromatography
- 6) Separation of triglycerides using TLC

VII. Suggested Co-Curricular Activities

- 1) Mandatory: *(Lab/field training of students by teacher: (lab:10+field:05):*
- 2) For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of detection of N, Sand halogens using the green procedure, preparation of TLC plates, detection of organic compounds using R_f values in TLC / paper chromatography, loading of column, selection of solvent

system for column chromatography, separation of amino acids and dye mixture using chromatographic techniques.

- 3) For Students: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes the synthetic reactions. Write their observations and submit a hand written fieldwork/project workreportnotexceeding10 pages in the given format to the teacher.
- 4) Maxmarks for Fieldwork/projectworkReport:05.
- 5) Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.*
- 6) Unittests(IE).

VIII. ListofReference books:

- 1) Vogel A.I. Practical Organic Chemistry, Longman Group Ltd.
- 2) Bansal R.K.Laboratory Manual of Organic Chemistry, Wiley-Eastern.
- 3) AhluwaliaV.K.andAggarwalR.ComprehensivePracticalOrganicChemistry, University press.
- 4) MannF. .C, Practical Organic Chemistry,PearsonEducation.

MODEL PAPER (wef.2023-24 Admitted Batch)

MAX MARKS:60 M

Time: 2 1/2 hrs.

SECTION - A

1) Answer any five **questions** from the following.

5x2=10M

- a) Write the PMO Method for Electro cyclic reactions.
- b) write the [2+2] Cyclo addition reaction with one example
- c) Write a note on paternoBuchi reaction
- d) write a note on chemo selectivity with examples
- e) write a short note on Retro synthetic analysis.
- f) Write a note on stark –Enamine reaction.
- g) Discuss the synthesis of aldehydes and ketones using (1,3) diethane
- h) Define Birch reduction with one example.

Section-B

Answer all the questions

5 X 10 =50m

2. a) Draw the correlation diagram for $(4n+2) \pi$ cyclo- addition reaction And explain why it is thermally allowed.

(Or)

b) write the Frontier molecular orbital diagram of the following

i. (1,3) Buta diene

ii. (1,3,5) Hexa triene

3. a) Explain Jablonsky diagram of singlet and triplet states photo chemistry of carbonyl compounds. $n-\pi^*$ and $\pi-\pi^*$

Or)

b) Write a note on Norrish type-I and Norrish type II reaction

4) a) Explain about

i) FGI with any two examples

ii) Write a note on target molecule synthons

(Or)

b) Write the retero synthetic analysis of

i) cyclo hexane

ii) paracetmol

5) a) Write the reaction and mechanism of following

i) Shapiro reaction

ii) Baylis - Hillman reaction.

(Or)

b) Explain

i) Heck reaction ii) Robinson annulations

6) a) Discuss the following reagents involved in the organic reactions

i) PDC

ii) NBS

(Or)

b) Explain the following reagents involved in the organic reactions

i) LAH ii) Catalytic reduction

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM

DEPARTMENT OF CHEMISTRY

	SEMESTER-VII	L	P	T	C
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R23	Inorganic Chemistry: I Advance studies in complexes and Group theory	4	3	0	4
	Course (W.e.f.2023-2024 Batch)				
TOTAL CONTACT HOURS – 45					

Course Objectives:

On successful completion of this course, students shall be able to:

- 1) To understand the VSEPR theory, symmetric and unsymmetric Hydrogen bonds in inorganic molecules.
- 2) To gain the knowledge of Crystal field theory and Jahn Teller- Effects.
- 3) To The students will be able to understand the basics of molecular orbital theory and energetic of hybridization.
- 4) To Identify the Job's method, and analyze the hard and soft acids and bases.
- 5) To acquire the knowledge of symmetry

Syllabus

Unit-I: Chemistry of non-transition elements: [9 Hours]

Inter halogen compounds, Halogen oxides and oxyfluorides, Clathrate compounds, Spectral and Magnetic properties of Lanthanides and Actinides. Analytical applications of Lanthanides and Actinides. Synthesis, properties and structure of B-N, S-N, P-N cyclic compounds. Intercalation compounds.

Metal π - complexes: preparation, structure and bonding in Nitrosyl, Dinitrogen and Dioxygen complexes.

Unit-II: Structure and Bonding: [9 Hours]

$p\pi-d\pi$ bonding, Bent's rule, non-valence cohesive forces, VSEPR theory. Molecular Orbital theory, Symmetry of Molecular orbitals, Molecular orbitals in triatomic (BeH_2) molecules and ions (NO_2^-) and energy level diagrams. Application of MO theory to square planar

(PtCl₄²⁻) and octahedral complexes (CoF₆³⁻, Co (NH₃)₆³⁺). Walsh diagrams for linear (BeH₂) and bent (H₂O) molecules.

Unit-III: Metal–ligand bonding: 9 Hours

Crystal Field Theory of bonding in transition metal complexes-Splitting of d-orbitals in octahedral, tetrahedral, square planar and Trigonal bipyramidal and Square pyramidal fields. Tetragonal distortions -Jahn-Teller effect. Applications and limitations of CFT. Experimental evidences for covalence in complexes. Molecular Orbital Theory of bonding for Octahedral, tetrahedral and square planar complexes. π -bonding and MOT - Effect of π - donor and π – acceptor ligands on Δ_o . Experimental evidence for π -bonding in complexes.

Unit-IV: Metal–ligand Equilibrium solutions: [9 Hours]

Step wise and over all formation constants. Trends in stepwise constant (statistical effect and statistical ratio). Determination of formation constants by Spectrophotometric method (Job's method) and pHmetric method (Bjerrum's). Stability correlations-Irwing-William's series. Hard and soft acids and bases (HSAB), Acid-base strengths.

Unit-V: Group theory [9 Hours]

Basic concepts of Symmetry and Group theory- Symmetry elements, symmetry operations and point groups. Schoenflies symbols-Classification of molecules into point groups-Axioms of Group theory- Group multiplication tables for C_{2v} and C_{3v} point groups-Similarity. Transformation and classes Representations-reducible and irreducible representations. Mulliken symbols, Orthogonality theorem and its implications, character table and its anatomy.

II. Suggested Co-Curricular Activities

- 1) Training of students by related industrial experts.
- 2) Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3) Visits to industries, firms, research organizations etc.
- 4) Invited lectures and presentations on related topics by field/industrial experts.

III. List of Textbooks:

- 1) Inorganic Chemistry Huheey, Harper and Row.
- 2) Physical methods in inorganic chemistry, R.S. Drago. Affiliated East-West Pvt. Ltd.
- 3) Concise inorganic chemistry, J.D. Lee, ELBS.
- 4) Modern Inorganic Chemistry, W.L. Jolly, McGraw Hill.
- 5) Inorganic Chemistry, K.F. Purcell and J.C. Kotz Holt Saunders international.
- 6) Concepts and methods of inorganic chemistry, B.E. Douglas and D.H.M.C. Daniel, Oxford Press.
- 7) Introductory quantum mechanics, A.K. Chandra.
- 8) Quantum Chemistry, R.K. Prasad.

IV. Reference books:

- 1) Inorganic Chemistry, Atkins, ELBS.
- 2) Advanced Inorganic Chemistry, Cotton and Wilkinson, Wiley Eastern.
- 3) Textbook of Coordination chemistry, K. Soma Sekhara Rao and K.N.K. Vani, Kalyani Publishers.
- 4) Group Theory and its Applications to Chemistry, K.V. Raman, Tata McGraw– Hill Publishing Company Ltd., New Delhi.
- 5) Chemical Applications of Group Theory, F.A. Cotton Wiley Eastern Limited New Delhi.

<https://youtu.be/CIDvdv4BRhQ?si=q8bJ42GIVHyAtwYi>

<https://youtu.be/-Bcur3XLDQU?si=sWWazRuJoGs3jvs5>

V. Learning Outcomes:

On successful completion of this practical course, students shall be able to:

- 1) List out, identify and handle various equipment in Chemistry lab.
- 2) Understand the basic concepts of qualitative analysis of inorganic mixture.
- 3) Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis.
- 4) Acquire skills in elimination of interfering anion.
- 5) Identification of less familiar cation.

Course 16A: Inorganic Chemistry-I: Advance Studies in Complexes and Group theory practical

Syllabus:

- 1) Synthesis of Inorganic Metal Complexes:
- 2) Synthesis of 3d transition metal complexes of tetrahedral, square planar and octahedral geometries.
- 3) Tetraamminecopper(II) sulphate monohydrate
- 4) Potassium tris(oxalato)ferrate (III) trihydrate
- 5) Tris(thiourea)copper(I) sulphate

Systematic Semi micro–Qualitative Analysis of Inorganic six radical mixtures: In systematic Semi micro qualitative inorganic analysis, inorganic mixture contains three cations and three anions. The analysis involves identification and confirmation of cations and anions containing one less familiar cation (Tungsten, Molybdenum, Zirconium, Thorium, Titanium, Uranium, Cerium, Vanadium, Lithium, Berkelium etc.,) and one interfering anion.

Anions:

CO_3^{2-} , S^{2-} , SO_3^{2-} , Cl^- , Br^- , I^- , NO_3^- , SO_4^{2-} , CH_3COO^- , $\text{C}_2\text{O}_4^{2-}$, $\text{C}_4\text{H}_4\text{O}_6^{2-}$
 PO_4^{3-} , CrO_4^{2-} , AsO_4^{3-} , F^- , BO_3^{3-}

Cations:

Ammonium (NH_4^+)

1stgroup: Hg, Ag, Pb, Tl, W

2ndgroup: Hg, Pb, Bi, Cu, Cd, As, Sb, Sn, Mo 3rdgroup: Fe, Al, Cr, Ce, Th, Ti, Zr, V, U, Be 4th group: Zn, Mn, Co, Ni

5thgroup: Ca, Ba, Sr

6thgroup: Mg, K, Li

Note: A minimum of 4 inorganic mixtures must be analysed in this SEMESTER.

VI. Suggested Co-Curricular Activities

Mandatory: (Lab/field training of students by teacher: (lab: 10 + field: 05):

- 1) **For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of involves identification and conformation of cations and anions containing one less familiar cation and one interfering anion.
- 2) **For Students:** Student shall visit a related industry/chemistry laboratory in universities/ research organizations / private sector facility and observes the synthetic reactions. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

- 3) MaxmarksforFieldwork/projectworkReport:05.
- 4) Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings and acknowledgements.
- 5) Unittests(IE).

VII. ReferenceBooks:

- 1) PracticalInorganicChemistry,G.MarrandB.W.Rockett.
- 2) PracticalInorganicChemistrybyG.PassH.Sutchiffe,
2ndednJohnWiley&Sons.
- 3) ExperimentalInorganic/PhysicalChemistry,M.A.Malati,
Horwood Publishing ,Chichester,UK(1999)
- 4) Vogel'stextbook ofsemimicroqualitative analysis,5th Edition byG.Svehla.

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM

II B.Sc., VII SEMESTER – MODEL QUESTION PAPER

COURSE-16A (MAJOR)

Inorganic Chemistry: I Advance studies in complexes and Group theory

Time: 2 ½ Hr

Marks: 60M

SECTION-A

I Answer any five questions from following. Each question carries 2 marks 5X2=10 M

- a) Write the classification of Interhalogen compounds.
- b) What is Bent's rule?
- c) Draw the Walsh diagram for H₂O molecule.
- d) Write the d-Orbital splitting pattern in octahedral geometry.
- e) Write the effect of π -donor ligands on Δ_o .
- f) Write the Trends in stepwise stability constant.
- g) What is Schoenflies symbols.
- h) Identify the symmetry plane in XeF₄ and BCl₃.

SECTION-B

Answer ALL the questions. 5X10=50 M

2. a) Write the Spectral and Magnetic properties of Lanthanides.

(Or)

- b) Write the preparation ,structure and Bonding Nitrosyl, complexes.

3. a) Write the postulates of VSEPR theory. and its Applications.

(Or)

b) Draw the MO Energy level diagram for $[\text{Co}(\text{NH}_3)_6]^{3+}$.

4. a) State and Explain Jahn –Teller effect with suitable example.

(Or)

b) Draw the common MO Energy level diagrams for octahedral and square planar geometries.

5. a) write any two methods to determine stability or formation constant.

(Or)

b) Discuss in detail about Irving-William's series

6. a) Derive the group multiplication table for H_2O molecule.

(Or)

b) State and explain Orthogonality theorem and its implications.

**MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

	VII-SEMESTER	L	P	T	C
R23	Course 17A: Spectroscopy of Organic compounds (W.e.f.2023-2024 Batch)	4	2	0	4
TOTAL CONTACT HOURS - 45					

I. Learning Objectives:

By the end of the course, the students will be able to:

- 1) To gain insight into the fundamental principles of IR and UV-Vis spectroscopic techniques.
- 2) To use basic theoretical principles underlying UV-visible and IR spectroscopy as a tool for functional group identification in organic molecules
- 3) To interpret of IR, UV-visible spectra and their applications
- 4) To interpret of NMR, Mass spectra and their applications
- 5) To interpret the spectra in identifying the organic compounds

II. Syllabus

Unit-I: UV-Vis Spectroscopy

9 hrs

Energy transitions – Simple chromophores – UV absorption of Alkenes –polyenes unsaturated cyclic systems – Carbonyl compounds, α,β -unsaturated carbonyl systems Woodward Fieser rules – aromatic systems – solvent effects – geometrical isomerism – acid and base effects – typical examples – calculation of λ_{\max} values using Woodward - Fieser rules.

b) **ORD:** Theory of optical rotatory dispersion, α -Axial haloketone rule and octant rule – Application of these rules in the determination of absolute configuration of cyclohexanones, decalones and cholestanones.

Unit-II: Infrared Spectroscopy (FT-IR)

9 hrs

Fundamental modes of vibrations – Stretching and bending vibrations – overtones, combination bands and Fermi resonance, factors influencing vibrational frequencies, hydrogen bonding – fingerprint region and its importance – Study of typical group frequencies for – CH, -OH, -NH, -CO-NH₂, C-C, -CHO, -CO and aromatic systems. Application in structural determination –Simple problems

Unit-III: ¹H NMR spectroscopy

9 hrs

a) Magnetic properties of Nuclei, Nuclear resonance, Fourier Transformation and its importance in NMR. Equivalent and non-equivalent protons, the chemical shift and its importance, calculation of chemical shift, factors affecting the chemical shifts such as electronegativity and anisotropy, effect of deuteration, Signal integration, Spin-spin coupling: vicinal (Karplus relationships), germinal and long range. Coupling constants (J) and factors affecting coupling constants. –Shielding and deshielding mechanisms in acetylene carbonyl and Benzene, anisotropy –Spin-Spin Interactions related to first order and higher order spectra (A₂, AB, AX, AX₂, ABX, ABC, AMX) –temperature dependence spectra, Hydrogen bonding.

Unit-IV: Electron Spin Resonance Spectroscopy (ESR)

9 hrs

Basic Principles, Comparison of NMR & ESR. Determination of 'g' value, Factors affecting the 'g' value. Isotropic and Anisotropic constants. Splitting, hyperfine splitting coupling constants. Line width, zero field splitting, and Kramer degeneracy. Crystal field splitting, Crystal field effects. **Applications:** Detection of free radicals; ESR spectra of (a) Methyl radical (CH₃), (b) Benzene anion (C₆H₆).

UNIT-V: Mass Spectrometry

9 hrs

Introduction, ion production, type of ionization, EI, CI, FD, and FAB factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups (alkanes, alkene, alkynes, aromatic hydrocarbons, alcohols, phenols, carbonyl compounds, amines, carboxylic acids, alkyl chlorides, alkyl bromides), molecular-ion peak, metastable peak, Mac Lafferty rearrangement. Nitrogen rule, isotope labelling. High resolution mass spectrometry, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

III. I. Learning Outcomes:

By the end of the course, the students will be able to:

- 1) Gain insight into the fundamental principles of IR and UV-Vis spectroscopic techniques.
- 2) Use basic theoretical principles underlying UV-visible and IR spectroscopy as a tool for functional group identification in organic molecules
- 3) Interpret of IR, UV-visible spectra and their applications
- 4) Interpret of NMR, Mass spectra and their applications
- 5) Interpret the spectra in identifying the organic compounds

IV. Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
3. Visits of abilities, firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts.

V. Suggested Textbooks:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS
2. Spectroscopy of organic compounds, RM Silverstein and others, 5th Ed, John Wiley
3. Spectroscopy of organic compounds, P.S. Kalsi, Wiley, 1993.

VI. References:

1. NMR in chemistry-A multi nuclear introduction, William Kemp, McMillan, 1986.
2. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmi

Online Links:

1. https://youtube.com/playlist?list=PLyqSpQzTE6M8eGML9tjCEgZjci5USazoW&si=E_P6I6opjp3DVX8q
2. <https://youtu.be/o8zELwp358A?si=A7WAsukYJDciQuP>
3. https://youtu.be/IAYvgodBGpo?si=4v_zl5CCwD_R-Xxf

VII-SEMESTER

Course 17A: Spectroscopy of Organic Compounds- Practical Syllabus

VII. Learning objectives:

By the end of the course students will be able to

1. To identify the functional groups, present in the molecules
2. To apply data to in identification of the molecule
3. To describe principles involved in Spectroscopic methods
4. To predict number of signals, splitting patterns in the proton NMR of a compound
5. To develop ability in the combined use of mass spectrometry and spectroscopic techniques for structure elucidation

VIII. Practical Syllabus

- a) Problems involving individual spectral methods – UV, IR, PMR and Mass

- b) Problems involving combined any two of UV, IR, PMR and Mass
- c) Problems involving combined any three of UV, IR, PMR and Mass
- c) Problems involving all four UV, IR, PMR and Mass spectral data.

IX. Learning Outcomes:

By the end of the course students will be able to

1. Identify the functional groups present in the molecules
2. Apply data to in identification of the molecule
3. Describe principles involved in Spectroscopic methods
4. Predict number of signals, splitting patterns in the proton NMR of a compound
5. Develop ability in the combined use of mass spectrometry and spectroscopic techniques for structure elucidation

X. Co-Curricular Activities:

Mandatory:(Lab/field training of students by teacher:(lab:10+field:05):

1. For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of detection of organic compounds using spectroscopic data.

2. For Students: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes the synthetic reaction and obtaining spectral data and analysing the organic compounds. Write their observations and submit a handwritten fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max. Marks for Fieldwork/project work Report:05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests(IE).

XI. References:

1. NMR in chemistry-A multi nuclear introduction, William Kemp, McMillan, 1986.
2. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmi

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
VII Semester, Course-17A Paper: Spectroscopy of Organic compounds
MODEL PAPER

Max Time: 2 ½ Hrs

Max Marks:

60

SECTION-A

Answer any five questions from the following.

5 x 2 = 10

Marks

1.

- a) Explain the types of electronic transitions
- b) Write a note on Fermi resonance.
- c) Explain about nuclear spin
- d) Write the ESR spectra lines for Methyl radical (CH₃·)
- e) Discuss Nitrogen rule in MS spectra
- f) Explain about fingerprint region
- g) Define chemical shift
- h) Explain the molecular-ion peak

SECTION-B

Answer All the questions from the following.

5 x 10 = 50 Marks

2. (a) Write the Woodward - Fieser rules for α,β -unsaturated carbonyl with two examples

(OR)

- (b) Discuss the octant rule. And determine the absolute configuration of cholestanones.

3. (a) Discuss Fundamental modes of vibrations

(OR)

- (b) Discuss IR frequency of organic compounds with three applications

4. (a) Write about factors effecting on chemical shift

(OR)

- (b) Explain the NMR spectra of AX₂ and AMX type of Spins

5. (a) (i) Explain the Basic Principles of ESR spectroscopy

- (ii) Write the Comparison of NMR & ESR.

(OR)

- (b) Explain the following

- i) Hyperfine splitting
- ii) Kramer degeneracy

6. (a) Write a note on ionization of

- i) EI -method
- ii) FAB method

(OR)

(b) Explain mass spectral fragmentation of Alkyl chlorides, and Amines

**MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

R23	SEMESTER-VII	L	P	T	C
	Physical Chemistry: Thermo dynamics, Electro chemistry and Chemical Kinetics. Course - 18A (W.e.f.2023-2024 Batch)	4	2	0	4
TOTAL CONTACT HOURS – 45					

Course Objectives:

On successful completion of this course, student shall be able to:

1. To understand the classical thermodynamics, fugacity.
2. To describe the Electro chemical cells, Liquid junction potential.
3. To derive the Butler-Volmer equation and Ilkovic equation
4. To understand the complex reactions, chain reactions.
5. To demonstrate the Branching Chain reactions, enzyme catalysis and Photo chemical equilibrium.

SYLLABUS

UNIT-I: Thermodynamics

9 hrs

Classical thermodynamics - Entropy change in reversible and irreversible processes - Entropy of mixing of ideal gases - Entropy and disorder – Free energy functions - Gibbs-Helmholtz equation – Maxwell partial relations. Conditions of equilibrium and spontaneity - Free energy changes in chemical reactions, Van't Hoff reaction isotherm-Van'tHoffequation –Classis-Clapeyronequation-partialmolarquantities-Chemicalpotential-Gibbs-Duhemequation- partial molar volume -determination of partial molar quantities - Fugacity – Determination of fugacity – Thermodynamic derivation of Raoult's law.

UNIT-II:Electrochemistry-1:

9 hrs

Electrochemical cells - Measurement of EMF - Nernst equation –Equilibrium constant from EMF Data - pH and EMF data - Determination of solubility product from EMF measurements. Concentration cells with and without transference – Liquid junction potential and its determination -Activity and activity coefficients - Debye Huckel limiting law and its verification. Effect of dilution on equivalent conductance of electrolytes - Anomalous behavior of strong electrolytes. Debye Huckel –Onsagar equation-verification and limitations- Bjerrum treatment of electrolytes.

UNIT-III: Electro Chemistry-II

9hrs

Reference electrode - Standard hydrogen electrode. Calomel electrode-Indicator electrodes: Metal- metal ion electrodes – Inert electrodes-Membrane electrodes - theory of glass membranepotential, potentiometrictitrations,Conductometrictitrations.Electrodepotentials -

Double layer at the interface - rate of charge transfer - Decomposition potential - Over potential - Tafel plots - Derivation of Butler-Volmer equation for one electron transfer - electrochemical potential.

UNIT-IV: Chemical kinetics and Photochemistry:

9 hrs

Branching Chain Reactions - Hydrogen-oxygen reaction - lower and upper explosion limits - Fast reactions - Study of kinetics by flow methods - Relaxation methods - Flash photolysis. Acid base catalysis - protolytic and prototropic mechanism. Enzyme catalysis - Michaelis-Menten kinetics. Photochemistry: Quantum yield and its determination, Actinometry, Reactions with low and high quantum yields, Photo sensitization, Exciplexes and Excimers, Kinetics of collisional quenching - Stern-Volmer equation.

UNIT-V: Chemical kinetics - II:

9 hrs

Methods of deriving rate laws - complex reactions - Rate expressions for opposing, parallel and consecutive reactions involving unimolecular steps. Theories of reaction rates - collision theory - Steric factor - Activated complex theory - Thermo dynamic aspects - Unimolecular reactions - Lindemann's theory - Lindemann Hinshelwood theory. Primary and secondary salt effects. Elementary account of linear free energy relationships - Hammett-Taft equation - Chain reactions - Rate laws of H_2-Br_2 , photochemical reaction of $H_2 - Cl_2$. Decomposition of acetaldehyde and ethane - Rice-Hertzfeld mechanism.

Course Learning outcomes:

On successful completion of this course, student shall be able to:

- 1) Understand the classical thermo dynamics, fugacity.
- 2) Describe the Electrochemical cells, Liquid junction potential.
- 3) Derive the Butler - Volmer equation and Ilkovic equation
- 4) Understand the complex reactions, chain reactions.
- 5) Demonstrate the Branching Chain Reactions, Enzyme catalysis and Photochemical equilibrium.

Suggested Co-Curricular Activities:

Training of students by related industrial experts.

Assignments, Seminars, discussions and debates and Quiz (on related topics), collection of relevant videos and material. Visits to laboratories, firms, research organization etc.

Invited lectures and presentations on related topics by field/industrial experts.

List of Text books:

Physical Chemistry P.W. Atkins, ELBS.

Chemical Kinetics - K.J. Laidler, McGraw Hill Pub.

Text Book of Physical Chemistry. Samuel Glasstone, Mcmillan Pub.

Physical Chemistry, G.W. Castellan. Narosa Publishing House

Reference books:

Thermodynamics for Chemists. Samuel Glasstone.

Electrochemistry, Samuel Glasstone, Affiliated East West

Physical Chemistry, W.J. Moore, Prentice Hall

Course18A: Physical Chemistry: Thermo dynamics, Electro chemistry and Chemical Kinetics.

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

List out, identify and handle various equipment in Chemistry lab.

Learn and apply the concepts of electro chemistry in experiments.

Be familiar with electro analytical methods and techniques which study an analyte by measuring the potential (volts) and / or current (amperes) in an electro chemical cell containing the analyte..

Learn the procedures of preparation of standard solutions.

Acquire skills in operation and calibration of instruments..

SYLLABUS:

1. Conductometric titration of Strong acid versus Strong base
2. Dissociation constant of weak acid(CH_3COOH) by conductometric method.
3. Conductometric titration of Weak acid vs Strong base.
4. Determination of cell constant
5. Acid-catalyzed hydrolysis of methylacetate
6. Determination of partial molar volume of solute– H_2O system by apparent molar volume method.

Suggested Co-Curricular Activities

Mandatory: **(Lab/field training of students by teacher: (lab:10+field:05):**

For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of handling conductometric titrations.

For Students: Student shall visit a related industry / chemistry laboratory in universities/research organizations/private sector facility and observe the synthetic reactions. Write their observations and submit a hand written field

work/project work report not exceeding 10 pages in the given format to the teacher.

Max marks for Fieldwork/projectworkReport:05.

Suggested Format for Fieldwork/projectwork: Titlepage, student details, index page, details of place visited, observations, findings and acknowledgements. Unit tests (IE).

Reference book:

Vogel's Text Book of Quantitative Chemical Analysis, J. Mendham, R. C. Denney, J. D. Barnes and M. J. Thomas, 4th & 6th Ed. (Pearson Education Asia).

Online link :

1. <https://www.coursera.org/learn/physical-chemistry>
2. https://youtu.be/syhwfcv3Qhc?si=-DEdpy1s_c-C090D
3. <https://youtu.be/EDvUE5BcwO0?si=uSPXzZNIY-hgC527>

**MAHARAJA'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

VII – SEMESTER (Major)

**Course -18A Physical Chemistry: Thermo dynamics, Electro chemistry and
Chemical Kinetics.**

MODEL PAPER

SECTION – A

Answer any FIVE from the following question

5X2=10

Marks

1.

- a) Explain Gibbs Helmholtz equation
- b) What is Chemical potential ?
- c) Define Activity and activity coefficients ?
- d) Explain Conductometric titrations ?
- e) Explain Over potential .
- f) What is Quantum yield ?
- g) What is the drawback of Collision theory ?
- h) Explain primary and secondary Salt effects ?

SECTION – B

**Answer ALL the following questions.
5X10=50 Marks**

- 2 (a). Derive Maxwell's relations.
(Or)
b). i) Derive Gibb's-Duhem equation
ii) Derive Van't Hoff reaction Isotherm.
3. (a) Explain Concentration cells with transference.
(Or)
b) . Explain Debye Huckel - Onsager equation for strong electrolyte and it's limitations.
- 4 .(a) Derive Butler- Volmer equation.
(Or)
(b) Explain Standard Hydrogen electrode and calomel electrode.
- 5 . (a) Explain the Michaelis-Menten mechanism for enzyme catalysis .
(Or)
(b) Explain Stern-Volmer equation .
6. (a) Explain Lindeman's theory of unimolecular reaction and their limitations.
(Or)
(b) Explain Hammett and Taft equation

**MAHARAJAH'S COLLEGE (AUTONOMOUS)::
VIZIANAGARAM**

DEPARTMENT OF CHEMISTRY

		SEMESTER-VII			
		L	P	T	C
R23	Course 19 A: Green Chemistry	4	0	0	3
	Skill Enhancement Course				
	(W.e.f.2023-2024 Batch)				
TOTAL CONTACT HOURS - 60					

I. Learning Objectives:

By the end of the course Students will be able to:

1. To understand the twelve principles of green chemistry and will build the basic understanding of toxicity, hazard and risk of chemical substances.
2. To understand stoichiometric calculations and relate them to green chemistry metrics.
3. To they will learn about atom economy and how it is different from percentage yield.
4. To learn to design safer chemical, products and processes that are less toxic, than current alternatives. Hence, they will understand the meaning of inherently safer design for accident prevention and the principle "what you don't have can't harm you"
5. To understand benefits of use of catalyst and bio catalyst, use of renewable feed stock which helps in energy efficiency and protection of the environment, renewable energy sources, and importance led reactions in various green solvents.
6. To appreciate the use of green chemistry in problem solving skills, critical thinking and valuable skills to innovate and find out solution to environmental problems. Thus, the students can realize that chemistry can be used to solve rather than cause environmental problems.
7. To green chemistry is a way to boost profits, increase productivity and ensure sustainability with absolute zero waste. Success stories and real-world cases also motivate them to practice

Green chemistry.

II. Syllabus:

Unit 1: Introduction to Green Chemistry [9 hours]

What is Green Chemistry? Some important environmental laws, pollution prevention Act of 1990, emergence of green chemistry, Need for Green Chemistry. Goals of Green Chemistry. Limitations/ Obstacles in the pursuit of the goals of Green Chemistry.

Unit 2: Principles of Green Chemistry and Designing a Chemical synthesis [9 hours]

Twelve principles of Green Chemistry and their explanation with examples Special emphasis on the following: Prevention of Waste/ by products; maximum incorporation of the materials used in the process into the final products, Environmental impact factor, waste or pollution prevention hierarchy. Green metrics to assess greenness of a reaction, e.g. Atom Economy, calculation of atom economy of the rearrangement, addition, substitution and elimination reactions. Prevention/ minimization of hazardous/ toxic products reducing toxicity. Risk = (function) hazard x exposure. Designing safer

chemicals with minimum toxicity yet could perform the desired functions. Green solvents: super critical fluids with special reference to carbon dioxide, water as a solvent for organic reactions, ionic liquids, fluorous biphasic solvent, PEG, solventless processes, solvents obtained from renewable resources and how to compare greenness of solvents. Energy requirements for reactions – alternative sources of energy: use of microwaves, Ultrasonic energy and photochemical energy. Selection of starting materials; should be renewable rather than depleting, Illustrate with few example such as biodiesel and polymers from renewable resources (such as green plastic). Avoidance of unnecessary derivatization –careful use of blocking/protecting groups. Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents; catalysis and green chemistry, comparison of heterogeneous and homogeneous catalysis, biocatalysis, asymmetric catalysis and photocatalysis.

Unit 3: Examples of Green Synthesis/ Reactions

[9 hours]

Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis). Green Reagents: Non-phosgene Isocyanate Synthesis, Selective Methylation using Dimethyl carbonate. Microwave assisted solvent free synthesis of copper phthalocyanine. Microwave assisted reactions in water: Hofmann Elimination, methyl benzoate to benzoic acid. And Decarboxylation reaction Ultrasound assisted reactions: Sono chemical Simmons-Smith Reaction (Ultrasonic alternative to Iodine)

Unit

4:

[9 hours]

Real world case studies based on the Presidential green chemistry awards of EPA Surfactants for Carbon Dioxide – replacing smog producing and ozone depleting solvents with CO₂ for precision cleaning and dry cleaning of garments. A new generation of environmentally advanced wood preservatives: Getting the chromium and Arsenic out of pressure treated wood. An efficient, green synthesis of a compostable and widely applicable plastic (polylactic acid) made from corn. Healthier Fats and oils by Green Chemistry: Enzymatic Inter esterification for production of No Trans-Fats and Oils.

Unit 5: Future Trends in Green Chemistry hours]

[9

Oxidation reagents and catalysts; Biomimicry and green chemistry, Biomimetic, Multifunctional Reagents; mechanochemical and solvent free synthesis of inorganic complexes; co crystal controlled solid state synthesis(C2S3); Green chemistry in sustainable development.

III. Learning Outcomes:

By the end of the course Students will be able to:

1. Understand the twelve principles of green chemistry and will build the basic understanding of toxicity, hazard and risk of chemical substances.
2. Understand stoichiometric calculations and relate them to green chemistry metrics.
3. They will learn about atom economy and how it is different from percentage yield.
4. Learn to design safer chemical, products and processes that are less toxic, than current alternatives. Hence, they will understand the meaning of inherently safer design for accident prevention and the principle "what you don't have can't harm you"
5. Understand benefits of use of catalyst and bio catalyst, use of renewable feed stock which helps in energy efficiency and protection of the environment, renewable energy sources, and importance led reactions in various green solvents.
6. Appreciate the use of green chemistry in problem solving skills, critical thinking and valuable skills to innovate and find out solution to environmental problems. Thus, the students can realize that chemistry can be used to solve rather than cause environmental problems.
7. Green chemistry is a way to boost profits, increase productivity and ensure sustainability

with absolute zero waste. Success stories and real-world cases also motivate them to practice

IV. Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
3. Visits of abilities, firms, research organizations etc.

4. Invited lectures and presentations on related topics by field/industrial experts.

V. Suggested Textbooks:

1. Anastas, P.T.; Warner, J.C. (1998), Green Chemistry, Theory and Practice, Oxford University Press.

2. Lancaster, M. (2016), Green Chemistry An Introductory Text.2nd Edition, RSC Publishing.

3. Cann , M. C. ;Connely,M. E.(2000), Real-World cases in Green Chemistry, American

Chemical Society,Washington.

4. Matlack, A.S.(2001),Introduction to Green Chemistry, Marcel Dekker.

5. Alhuwalia,V. K.; Kidwai, M.R.(2005),New Trends in Green chemistry,Anamalaya Publishers

VI. References:

1. Kirchoff, M.; Ryan, M.A. (2002), Greener approaches to undergraduate chemistry experiment. AmericanChemical Society, Washington DC.

2. Sharma, R.K.; Sidhwani, I.T.; Chaudhari, M.K.(2013), Green Chemistry Experiments: A

monograph, I.K.International Publishing House Pvt Ltd. New Delhi.

3. Pavia,D.L.; Lamponam, G.H.; Kriz, G.S.W. B.(2006),Introduction to organic Laboratory Technique-A Micro-scale approach,4th Edition, Brooks-Cole Laboratory Series for Organic chemistry.

VII - SEMESTER

Skill Enhancement Course

Course 19 A: Green Chemistry practical

VII. Learning Objectives:

By the end of the course students will be able to

1. To synthesize nanoparticles using green methods
2. To prepare biodiesel from waste cooking oil
3. To synthesize inorganic complexes using green methods
4. To synthesize benzopinacol in the presence of sunlight

VIII. Practical Syllabus

1. Preparation and characterization of nanoparticles of CuO/ ZnO nanoparticles using plant extracts.
2. Preparation of biodiesel from waste cooking oil and characterization (TLC, pH, Solubility, Combustion Test, Density, Viscosity).
3. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.
4. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).
5. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.
6. Spot tests for qualitative inorganic analysis for cations and anions, and qualitative organic analysis for preliminary test and functional group analysis.

IX. Learning Outcomes:

By the end of the course students will be able to

1. Synthesize nanoparticles using green methods
2. Prepare biodiesel from waste cooking oil
3. Synthesize inorganic complexes using green methods
4. Synthesize benzopinacol in the presence of sunlight

X. Co-Curricular Activities:

Mandatory:(Lab/field training of students by teacher : (lab:10+field:05):

1. For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of green methodologies in place of polluting solvents/chemicals
2. For Students: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the green synthetic methods adopted in the industry. Write their observations and submit a handwritten fieldwork/project work report not exceeding 10 pages in the given format to the teacher.
3. Max. Marks for Fieldwork/project work Report:05.
4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.
5. Unit tests (IE).

XI. References:

1. Wealth from Waste: A green method to produce biodiesel from waste cooking oil and

generation of useful products from waste further generated. Indu Tucker Sidhwani et al.

University of Delhi, Journal of Undergraduate Research and Innovation, Volume 1, Issue

1, February 2015, ISSN: 2395-2334.

2. Sidhwani, Tucker I.; Chowdhury, S. Greener alternatives to Qualitative Analysis for Cations without H₂S and other sulfur containing compounds, J. Chem. Educ. 2008, 85, 1099.

3. Sidhwani, Tucker I.; Chowdhury, S. et al., DU Journal of Undergraduate Research and Innovation, 2016, Volume 2, Issue 2, 70-79.

4. Dhingra, S., ;Angrish, C. Qualitative organic analysis: An efficient, safer, and economical approach to preliminary tests and functional group analysis. Journal of Chemical Education, 2011, 88(5), 649-651

**MAHARAJAH'S COLLEGE (AUTONOMOUS)::
VIZIANAGARAM**

VII Semester, Course-19A Paper: Green Chemistry

MODEL QUESTION PAPER

Max Time: 2 ½ Hrs

Max

Marks: 60

Part-A

Answer any Five questions form the following.

5 x 2 = 10 Marks

2.

- i) Write any two important environmental laws.
- j) Give any two examples of biocatalysts.
- k) Explain about green solvents.
- l) Write the green reagents.

- m) Write environmentally advanced wood preservatives.
- n) Write a note Biomimicry in green chemistry.
- o) A few words about pollution prevention Act of 1990.
- p) Explain Selective Methylation using Dimethyl carbonate.

Part-B

Answer **all the questions** form the following.

5 x 10 = 50

Marks

3. (a) Write a note on

- i) Emergence of green chemistry
- ii) Need for Green Chemistry

(OR)

(b) Explain Goals of Green Chemistry and write the Limitations/ Obstacles in the pursuit of the goals of Green Chemistry.

4. (a) Discuss the Twelve principles of Green Chemistry

(OR)

(b) Discuss the following

- i. heterogeneous
- ii. homogeneous catalysis in green chemistry

5. (a) Green Synthesis of the following compounds

- i) Adipic acid
- ii) Catechol

(OR)

(b) Explain the following green reactions

- i) Hofmann Elimination.
- ii) Simmons-Smith Reaction

6. (a) Explain the cleaning and dry cleaning of garments

(OR)

(b) Explain the Enzymatic Inter esterification for production of No Trans-Fats and Oils

7. (a) Write a note on solvent free synthesis of inorganic complexes

(OR)

(b) i) Explain the Green chemistry in sustainable development.

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY

	SEMESTER –VII	L	P	T	C
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R23	COURSE-20A (Polymer chemistry)	4	2		4
	(w.e.f. 2023-24 batch)				
TOTAL CONTACT HOURS-45					

COURSE OBJECTIVES:

At the end of the course student will be able to

1. Know about history of polymeric materials and their classification
2. Learn about different mechanisms of polymerization and polymerization techniques
3. Evaluate kinetic chain length of polymers based on their mechanism
4. Differentiate between polymers and copolymers
5. Learn about different methods of finding out average molecular weight of polymers
6. Differentiate between glass transition temperature (T_g) and crystalline melting point (T_m)
7. Determine T_g and T_m
8. Know about solid and solution properties of polymers
9. Learn properties and applications of various useful polymers in our daily life

SYLLABUS

UNIT - I

[9 hours]

History of polymeric materials and functionality and its importance. Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers. Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bi-functional systems, Poly-functional systems.

UNIT – II

[9 hours]

Kinetics of Polymerization Mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.

UNIT-

III

[9 hours]

Determination of molecular weight of polymers and crystallinity (M_n, M_w , etc) by end group analysis, viscometry, light scattering and osmotic pressure methods. Molecular weight distribution and its significance. Poly dispersity index. Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point.

UNIT-

IV

[9 hours]

Glass transition temperature (T_g) and Polymer Solution Free volume theory, WLF equation, Factors affecting glass transition temperature (T_g). Criteria for polymer

solubility, Solubility parameter, Thermodynamics of polymer solutions, entropy, enthalpy, and free energy change of mixing of polymers solutions, Flory- Huggins theory, Lower and Upper critical solution temperatures

UNIT-

V

[9 hours]

Properties of Polymers

(Physical, thermal, Flow & Mechanical Properties).s Brief introduction to preparation, structure, properties and application of the following polymers: poly olefins, polystyrene and styrene copolymers, poly (vinyl chloride) and related polymers, poly(vinyl acetate) and related polymers, acrylic polymers, fluoro polymers, polyamides and related polymers. Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers, polydienes, Polycarbonates, Conducting Polymers, [poly acetylene, poly aniline, poly(p-phenylene sulphide poly pyrrole, poly thiophene)].

Co-curricular activities and Assessment Methods

Continuous Evaluation: Monitoring the progress of student's learning Class Tests, Worksheets and Quizzes

Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality.

Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

List of Reference Books

- 1.R.B. Seymour & C.E. Carraher: Polymer Chemistry: An Introduction, Marcel Dekker, Inc. New York, 1981.
2. G. Odian: Principles of Polymerization, 4th Ed. Wiley, 2004.
3. F.W. Billmeyer: Textbook of Polymer Science, 2nd Ed. Wiley Interscience, 1971.
4. P. Ghosh: Polymer Science & Technology, Tata McGraw-Hill Education, 1991.
5. R.W. Lenz: Organic Chemistry of Synthetic High Polymers. Interscience Publishers, New York, 1967

Learning outcomes:

At the end of the course, the student will be able to;

1. Know about history of polymeric materials and their classification
2. Learn about different mechanisms of polymerization and polymerization techniques
3. Evaluate kinetic chain length of polymers based on their mechanism
4. Differentiate between polymers and copolymers
5. Learn about different methods of finding out average molecular weight of polymers
6. Differentiate between glass transition temperature (T_g) and crystalline melting point (T_m)
7. Determine T_g and T_m

8. Know about solid and solution properties of polymers
9. Learn properties and applications of various useful polymers in our daily life

Course 20A:Polymer Chemistry- Practical Syllabus

VI. Learning Outcomes:

By the end of the course students will be able to

1. Determine the molecular weight of a polymer by viscometric studies
2. Prepare urea formaldehyde polymer
3. Determine the molecular weight by end group analysis

VII. Practical Syllabus

1. Estimation of the amount of HCHO in the given solution by sodium sulphite method
2. Determination of molecular weight by viscometry: Poly vinyl propylidene (PVP) in water
3. Determination of molecular weight by end group analysis
4. Preparation of urea-formaldehyde resin
5. Precipitation polymerization of acrylonitrile
6. Redox polymerization of acrylamide

VIII. Co-Curricular Activities:

Mandatory:(Lab/field training of students by teacher :(lab:10+field:05):

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY
Semester -VII ,COURSE -20 A (POLYMER CHEMISTRY)

TIME : 2.30 hrs
: 60 M

(WEF BATCH 2023-24)

Max.Marks

MODEL PAPER

SECTION -A

Answer any five from the following questions . 5x2=10

Each question carries two marks

1.

- a) What is a polymeric material ? give an example ?
- b) What is a the degree of polymerization in kinetics ?
- c) What is poly dispersity index ?
- d) What is the WLF equation ?
- e) Write is the preparation method of polyamide ?
- f) Define crystallinity of polymers ?
- g) What is lower critical solution temperature ?
- h) What are the physical properties of polymers ?

Section-B

ANSWER ALL THE FOLLOWING QUESTIONS 5X10=50 M

Each question carries TEN marks

- 2 a) explain the different schemes of classification of polymers ?
or
b) write a brief note on Bi-functional and poly- functional systems in polymers
?
and kintics
- 3 a) explain the mechanism and kinetics of coordination polymerization ?
or
b) explain the mechanisam and kinetics of copolymerization ?

4. a) Determine the molecular weight of polymers by viscometry ?

or

b) Explain the factors that affecting crystalline melting point ?

5. a) explain the factors that affecting glass transition temperature ?

or

b) explain about flory -huggins theory ?

6. a) explain the structure and properties of polystyrene ?

or

b) write the preparation methods of silicon polymers ? write its applications ?

**MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

	SEMSTER - VIII	L	P	T	C
R 23	Course 21A: Inorganic Chemistry – II Metal clusters, electronic spectra of Complex compounds and Bio-inorganic chemistry (w.e.f. 2023-24 Batch)	4	2	0	4
	TOTAL CONTACT HOURS - 45				

I Course Objectives:

On successful completion of this course, student shall be able to:

1. Understand the study of age compounds of oxygen, phosphorous and sulphur.
2. Explain the various metal clusters and metal π complexes.
3. Describe the reactions of organo metallic compounds and its applications.
4. Understand the reaction mechanism in transition metal complexes.
5. Demonstrate the Orgel diagrams and electronic spectra of transition metal complexes.
6. Discuss structure and functions of hemoglobin, myoglobin and vitamin B12, photochemical laws.

II. Syllabus

Unit-I: Non-metal cages and metal clusters:

9Hrs

Structure and bonding in phosphorous- oxygen, phosphorous -Sulphur cages; structure and bonding in higher boranes with (special referencetoB12 icosahedra). Carboranes, Metallo boranes, Metallo carboranes. Classification- LNCs and HNCs, Isoelectronic and Isolobal relationships, electron counting rules: Wade's and Lauher's rules. M – M multiple bonding; preparation, structure and bonding in di nuclear $[\text{Re}_2\text{Cl}_8]^{2-}$ ion, trinuclear $[\text{Re}_3\text{Cl}_9]$, tetranuclear $\text{W}_4(\text{OR})_{16}$, hexanuclear $[\text{Mo}_6\text{Cl}_8]^{4+}$ and $[\text{Nb}_6\text{Cl}_{12}]^{2-}$.

Unit-II: Organo metallic chemistry of transition metals:

9Hrs

Classification and electron counting rules, hapticity, synthesis, structure and bonding of Ferrocene, dibenzene chromium, cycloheptatriene and tropylium complexes of transition metals. Reactions of organo metallic compounds- oxidative addition, reductive elimination, insertion and elimination. Applications of organo metallic compounds - Catalytic hydrogenation, Hydro formylation.

Unit-III: Reaction mechanism of transition metal complexes: 9Hrs

Kinetics of octahedral substitution, acid hydrolysis, base hydrolysis - conjugate base (CB) mechanism. Direct and indirect evidences in favour of CB mechanism. Anation reactions. Reactions without metal-ligand bond cleavage. Factors affecting the substitution reactions in octahedral complexes. Trans effect on substitution reactions in square planar complexes. Mechanism of redox reactions, outer sphere mechanism, cross reactions and Marcus – Hush equation, inner sphere mechanism.

Unit-IV: Term symbols and Electronic spectra:

9Hrs

Term symbols and their derivation. Microstates, Hunds rules to predict ground terms and ground states. List of ground energy and higher energy terms from d¹ to d⁹ configurations;

Electronic spectra of transition metal complexes: Spectroscopic terms. Selection rules, Slater– Condon parameters, Racah parameters, Term separation energies for dⁿ configurations. Correlation diagrams and Orgel diagrams. Tanabe- Sugano diagrams for d¹ to d⁹ configurations. Calculations of Dq, B and β parameters. Charge transfer spectra.

Unit-V: Bio-inorganic chemistry and Magnetic properties of complexes:

9Hrs

Bio-inorganic chemistry:

Storage and transport of dioxygen by Hemoglobin and Myoglobin, Chlorophyll, Vitamin B12 and its importance.

Magnetic properties of transition metal complexes:

Orbital and spin contribution, spin-orbit coupling and magnetic moments. Types of magnetism, factors affecting on Paramagnetism, Dia, ferro and Anti magnetism.

III. suggested Co- Curricular Activities

- 1) Training of students by related industrial experts.
- 2) Assignments, Seminars, discussions, debates and Quiz (on related topics), collection of relevant videos and material.
- 3) Visits to laboratories, firms, research organizations etc.
- 4) Invited lectures and presentations on related topics by field/industrial experts.

IV. List of Textbooks:

- 1) Inorganic Chemistry by Huheey, Harper and Row.
- 2) Concise inorganic chemistry by J.D. Lee ,ELBS.
- 3) Inorganic chemistry, K.F.Purcell and J.C.Kotz, Holt Saunders international
- 4) Organo metallic chemistry by R.C.Mehrotra and A.Singh.NewAge International.
- 5) Advanced Inorganic Chemistry by Cotton and Wilkinson, Wiley Eastern

V. Reference books:

- 1) Inorganic reaction mechanism by Basolo and Pearson, Wiley Eastern
- 2) Bioinorganic Chemistry by K.Hussan Reddy
- 3) Biological Aspects of inorganic chemistry by A.W. Addiso, W.R.Cullen, D.Dorphan and G.J.James. Weliey Interscience.
- 4) Photo chemistry of coordination compounds by V.Balzani and V. Carassiti. Academic Press.
- 5) Text book of Coordination chemistry by K.Soma Sekhara Rao and K.N.K.Vani, Kalyani Publishers.

Course 21A: INORGANIC CHEMISTRY PRACTICALS –II

VI. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

- 1) List out, identify and handle various equipment in Chemistry lab.
- 2) Learn the concepts and procedures of preparation of standard solutions, primary and secondary standards.
- 3) Demonstrate skills in Volumetric and gravimetric determinations.
- 4) Acquire skills in standardizing and determination of different metal ions.
- 5) Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria.

VII. Practical Syllabus:

Quantitative analysis -

Volumetric:

- 1) Determination of Ferric iron by photochemical reduction
- 2) Determination of Nickel by EDTA
- 3) Determination of Calcium and Magnesium in a mixture by EDTA
- 4) Determination of Ferrocyanide by Ceric sulphate
- 5) Determination of Copper(II) in presence of iron(III)

Gravimetric:

- 1) Determination of Zinc as Zinc pyrophosphate
- 2) Determination of Nickel from a mixture of Copper and Nickel.

VIII. Suggested Co-Curricular Activities

Mandatory: *(Lab/field training of students by teacher: (lab:10+field:05):*

- 1) **For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of determination of cations by volumetric and gravimetric determinations.
- 2) **For Students:** Student shall visit a related industry/ chemistry laboratory in universities/ research organizations/private sector facility and observe the synthetic reactions. Write their observations and submit a hand written field work/project work report not exceeding 10 pages in the given format to the teacher.
- 3) Max marks for Field work / project work Report: 05.
- 4) Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.
- 5) Unit tests (IE).

IX. Reference books:

1) Vogel's text book of quantitative chemical analysis, 5th edition by G.H. Jeffery et al.

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM

Department of chemistry

Semester-VIII course-21A (Major)

(Inorganic Chemistry – II – Metal clusters, electronic spectra of Complex compounds and Bio – Inorganic chemistry)

MODEL PAPER (w.e.f. 2023-24 Admitted Batch)

Max marks: 60 M

Time: 2

1/2 hrs.

SECTION - A

1. Answer any **FIVE** questions from the following. Each question carries 2 marks
5x2=10 M
- Write the structure of P – S cages
 - Write Wade's rule with one example
 - Write one application of Organo metallic compounds
 - What is Anation reaction. Example
 - Find the micro states for Carbon and Fluorine
 - Define Racha parameter
 - Draw the structure of Hemoglobin and Chlorophyll
 - Calculate the spin only magnetic momentum of Mn^{2+} , Fe^{3+} and Cu^{2+}

SECTION – B

Answer **ALL** the questions
10 =50 M

5 X

2. a. Give a brief note on structure and bonding in higher boranes
(OR)
- b. Write the preparation, structure and bonding of di nuclear metal cluster
3. a. Write the synthesis, structure and bonding of di benzene chromium
(OR)
- b. Give an account on oxidative and reductive elimination reactions

4. a. Explain in detail about direct and indirect evidences in favor of conjugate base mechanism
(OR)
b. Discuss the concept of Inner sphere and outer sphere mechanisms
5. a. Derive the term symbol for $[\text{Ti}(\text{H}_2\text{O})_6]^{2+}$ and $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$
(OR)
b. Draw Tanabe – Sugano diagrams for $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ and $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
6. a. Write a brief note on storage and transport of dioxygen by Myoglobin and Vitamin B₁₂ and its importance
(OR)
b. Give an account on factors affecting various magnetic behavior

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM

DEPARTMENT OF CHEMISTRY

R23	Semester-VIII Course- 22A (MAJOR) Organic Chemistry: Modern Organic synthesis, Heterocyclics and Natural products.	L	P	T	C
	IV Year B.Sc (Honours) Chemistry (w.e.f. 2023-24 batch)	4	2	0	4
	TOTAL CONTACT HOURS-45				

On successful completion of this course, student shall be able to

- 1) To Explain formation of various heterocyclic compounds and their synthesis and importance.
- 2) To Describe the importance of natural products in medicinal chemistry
- 3) To acquire the knowledge of formation of c-c and c=c bonds

Syllabus

Unit-I Reactive Intermediates

9 hours

Phosphorus ylides: Wittig reaction-Horner-Wadsworth-Emmons reaction and its modifications. Sulphur Ylides: Sulphonium and sulfoxonium ylides involved in C-C bond formation.

Methods of generation of Carbene, Benzyne Mechanisms and their synthetic applications in organic synthesis.

Unit-II Modern Synthetic reactions

9 hours

RCM olefin metathesis, Grubbs catalyst, Mitsunobu reaction, McMurrey reaction, Julia-Lythgoe olefination.

Hofmann-Löffler-Freytag reaction. Barton nitrite photolysis. Eschenmoser-Tanabe fragmentation Dienone-phenol rearrangement.

**Unit-III
compounds**

9 hours

Heterocyclic

Methods of synthesis and chemical reactions with emphasis on the mechanism of electrophilic substitution reaction, mechanism of nucleophilic substitution reactions in pyridine Pyridine-N-oxide, Indole, Quinoline, Iso quinoline. Comparison of basicity of pyridine, piperidine and pyrrole

UNIT-IV: Steroid hormones

9Hours

Nomenclature, basic skeleton, Diel's hydrocarbon and it's stereochemistry. Isolation, structure determination and synthesis of androsterone, testosterone, oestrone and progesterone.

UNIT-V: Chemistry of some typical natural products (Alkaloids and Terpinoids)

9 Hours

A study of the following compounds involving their isolation, structure elucidation, synthesis and biogenesis of Alkaloids; Atropine, Nicotine, and Quinine.

Terpenoids: α - Terpineol, α -Pinene and Camphor.

Learning outcomes:

On successful completion of this course, student shall be able to

- 1) Explain formation of various heterocyclic compounds and their synthesis and importance.
- 2) Describe the importance of natural products in medicinal chemistry
- 3) Acquire the knowledge of formation of c-c and c=c bonds

List of reference books:

1. Advanced organic chemistry-Reaction, mechanism and structure, Jerry March, John Wiley.
2. Advanced organic chemistry, F.A.Carey and R.J.Sundberg, Springer, New York.
3. J.A. Joule and K. Mills Heterocyclic Chemistry Fifth Edition
4. Chemistry of natural products by S.V.Bhat ,B.A.Nagasampangi

22A: ORGANIC CHEMISTRY PRACTICALS –II

VI. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

- 1) List out, identify and handle various equipment in Chemistry lab.
- 2) Learn the concepts and procedures of handling chemical reagents appropriately.
- 3) Demonstrate skills to perform reflux, distillation, recrystallisation and vacuum filtration.
- 4) Calculate theoretical yield and percent yield.
- 5) Dispose chemicals in a safe and responsible manner.

VII. Syllabus:

Preparation, recrystallization, and determination of melting point & yield of the following compounds:

- 1) Aspirin
- 2) Neriolin
- 3) Chalcone
- 4) p-Nitro acetanilide
- 5) 2,4,6- Tri bromoaniline
- 6) m-Dinitrobenzene
- 7) Phthalimide
- 8) Diels-Alder adduct.

VIII. Suggested Co-Curricular Activities Mandatory:

(Lab/field training of student by teacher:(lab:10+field:05):

- 1) For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of organic synthesis and recrystallization of the organic compound
- 2) For Students: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the synthetic reactions. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3) Max marks for Fieldwork /project work Report:05.

4) Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings and acknowledgements.

5) Unit tests (IE).

IX. Reference Books:

1) Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R. C. Denney, J. D. Barnes and M. J. Thomas, 4th& 6th Ed. (Pearson Education Asia).

2) Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, P.W.G.Smith, A.R. Tatchell, 5 Ed.(Longman Scientific & Technical)

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
Department of chemistry
Semester-VIII course-22A (Major)
(Organic Chemistry: Modern Organic synthesis,
Heterocyclics and Natural products.)

MODEL PAPER (wef. 2023-24 Admitted Batch)

Time: 2 1/2 hrs
marks 60 M

Max

SECTION – A

I. Answer any FIVE questions from the following.

5X2=10M

- Write a short note on phosphorous yields?
- Write a note on Grubbs catalyst?
- Compare the basicity of pyridine, piperidine and pyrrole
- Write a note on Diel's hydro carbon?
- What are alkaloids? Give examples?

- f) What are sulphonium ylides? Give examples?
- g) What is Mc murray reaction?
- h) Write the biogenesis of nicotine?

SECTION- B

Answer all the following questions
=50M

5X10

2 a) Explain the methods of generation of carbenes and their synthetic applications in organic synthesis?

(or)

b) Discuss the mechanism of wittig reaction?

3 a) Explain the mechanism and synthetic applications of the following?

- i) RCM olefin metathesis
- ii) Julia lythigoe olefination

(or)

b) Explain the following reaction?

- i) Hofmann–Löffler–Freitag reaction
- ii) Barton reaction

4.a) Write the synthesis and reactivity and chemical reactions of quinoline?

(or)

b) Write the synthesis and chemical reactions of pyridine- N-oxide?

5.a) Discuss the isolation and structure determination of Androsterone

(or)

b) Explain the synthesis of progesterone

6. a) Discuss the structure elucidation of atropine

(or)

b) Discuss the synthesis of Camphor

**MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

	SEMESTER -VIII	L	P	T	C
R23	Course 24A : <u>Pharmaceutical and Medicinal Chemistry</u> Skill Enhancement courses (w.e.f. 2023-24 Batch)	4	2	0	4
	TOTAL CONTACT HOURS - 45				

Learning Objectives :

To know the Terminology in Pharmaceutical chemistry.

To describe the classification of Pharmaceutical chemistry

To learn the procedure for Synthesis and therapeutic activity of the compounds.

To acquire knowledge on Pharmacodynamics and Anesthetics Drugs

To gain knowledge on HIV-AIDS and Drugs.

SYLLABUS

UNIT-I Pharmaceutical chemistry

9 hrs

Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors - brief treatment), Metabolites and Anti metabolites. Nomenclature: Chemical name, Generic name and trade names with examples.

UNIT-II Classification of Drugs

9

hrs

Classification based on structures and therapeutic activity with one example each, Administration of drugs. Absorption of drugs - factors affecting absorption of drugs, routes of administration - local, enema, oral and external, parental routes - advantages and disadvantages.

UNIT-III Synthesis and therapeutic activity of the compounds
hrs

9

Chemo therapeutic Drugs : 1. Sulpha drugs (Sulpha meth oxazole) 2. Antibiotics - β - Lactam Antibiotics, Macrolide Antibiotics, 3. Anti malarial Drugs(chloroquine)

Psychotherapeutic Drugs: 1. Anti pyretics (Paracetamol) 2. Hypnotics, 3. Tranquilizers (Diazepam) 4. Levodopa

UNIT-IV Pharmacodynamics and Anesthetics Drugs

9 hrs

1. Antiasthma Drugs (Salbutamol)
2. Antianginals (Glyceryl trinitrate)
3. Diuretics (Furosemide)

Anesthetics - general - ether, chloroform, ethyl chloride, halothane, nitrous oxide, local -esters - cocaine, benzo cocaine.

UNIT-V HIV-AIDS

9 hrs

Immunity - CD-4cells, CD-8cells, Retro virus, Replication in human body, Investigation available, prevention of AIDS, Drugs available - examples with structures: PIS: Indinavir (crivivan), Nelfinavir (Viracept), AZT- Zidovudine.

COURSE OUTCOMES :

On successful completion of this practical course, student shall be able to:

1. Know the Terminology in Pharmaceutical chemistry.
2. Describe the classification of Pharmaceutical chemistry
3. Learn the procedure for Synthesis and therapeutic activity of the compounds.
4. Acquire knowledge on Pharmacodynamics and Anesthetics Drugs
5. Gain knowledge on HIV-AIDS and Drugs.

Suggested Co-Curricular Activities:

Training of students by related industrial experts. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material. Visits of related Industries/firms, research organizations etc. Invited lectures and presentations on related topics by field/industrial experts.

List of text Books:

1. Synthetic Drugs by O.D .Tyagi & M. Yadav
3. Medicinal Chemistry by Ashutoshkar
2. Medicinal Chemistry by P. Paramo
3. Pharmacology & Pharmacotherapeutics R .S Satoshkar & S.D. Bhandenkar
4. Reference Books:
5. Medicinal Chemistry by Dr. B.V. Ramana
6. Synthetic Drugs by O.D. Tyagi & M. Yadav
3. Medicinal Chemistry by Ashutoshkar
7. Medicinal Chemistry by P. Paramo
8. Pharmacology & Pharmacotherapeutics R. S Satoshkar & S.D. Bhandenkar
9. Medicinal Chemistry by Kada metal P-I & P.II European Pharmacopoeia.

Online Links

https://onlinecourses.nptel.ac.in/noc24_cy17/unit?unit=123&lesson=124

https://onlinecourses.nptel.ac.in/noc24_cy17/unit?unit=114&lesson=115

COURSE 24A
PHARMACEUTICAL AND MEDICINAL CHEMISTRY- PRACTICAL SYLLABUS
SKILL ENHANCEMENT COURSE

Learning Objectives:

1. To learn the procedure for the synthesis of drugs.
2. To synthesis of Drugs Assisted by Microwave Oven
3. To acquire skills in Drawing structure and Reaction using Chemdraw
4. To know the reactions and mechanisms involved in synthesis of Drugs.

LABORATORY COURSE SYLLABUS

1. Synthesis of Sulphanilamide
2. Synthesis of 7- Hydroxy -4- methyl coumarin
3. Synthesis of Chlorobutanol
4. Synthesis of Tolbutamide 07
5. Assay of Chlorpheniramine Maleate
6. Assay of Benzyl Penicillin 2
7. Synthesis of Aspirin Assisted by Microwave Oven
8. Drawing structure and Reaction using Chemdraw

Course outcomes :

On successful completion of this practical course, student shall be able to:

1. Learn the procedure for the synthesis of drugs.
2. Synthesis of Drugs Assisted by Microwave Oven
3. Acquire skills in Drawing structure and Reaction using Chemdraw
4. Know the reactions and mechanisms involved in synthesis of Drugs.

List of Reference books:

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Led nicer, Vol. 1-5.
9. Text book of practical organic chemistry- A.I. Vogel.

Suggested Co-Curricular Activities

Mandatory:(Lab /field training of students by teacher:(lab: 10+field:05):

For Teacher:

Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of comprehensive product development programs to meet new product criteria and timing. Acquire skills in the preparation of drugs and pharmaceuticals, learn the procedure of synthesis of drugs with good yield.

For Students:

Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes the preparation of Cosmeceuticals and Pharmaceutical. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher

Max marks for Fieldwork/project work Report: 05.

Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.*

Unit tests (IE).

Reference books:

1. The Organic Chemistry of Drug Synthesis by Led nicer, Vol. 1-5.
2. Text book of practical organic chemistry- A.I. Vogel.

MAHARAJAH'S COLLEGE (AUTONOMOUS) :: VIZIANAGARAM
Department of chemistry
Semester-VIII course-24A (Major)
(Pharmaceutical and Medicinal Chemistry)
MODEL PAPER (wef. 2023-24 Admitted Batch)

Time: 2 1/2 hrs.

Max marks : 60 M

SECTION - A

Answer any five questions from the following. Each question carries 2 marks 5x2=10M

1.
 - a. Define Pharmacy and Pharmacology?
 - b. Give the Chemical, Generic and Trade name of Paracetamol?
 - c. What are Local Routes of Drug Administration? Give one example.
 - d. Give Two examples of Macrolide antibiotics?
 - e. What is the Primary Therapeutic use of Levodopa?
 - f. Name One Therapeutic use of Benzocaine?
 - g. What is the Primary action of halothane.
 - h. What is Retrovirus?

SECTION-B

Answer All the following questions. Each question Carries 10 Marks. 5X10 = 50M

2. a) Explain the concept of Receptors in Pharmacology and their role in Drug action.
[OR]
 - b) Explain the role of Metabolites and Antimetabolites in Pharmacology.
3. a) Write the classification of Drugs based on Therapeutic activity?
[OR]
 - b) Discuss the Factors affecting the absorption of Drugs.
4. a) Discuss the therapeutic uses and side effects of β -lactam antibiotics .
[OR]
 - b) Explain the synthesis therapeutic activity and side effects of diazepam.

5. a) Write a detailed note on the mechanism of action and applications of glycolyl trinitrate.

[OR]

b) What is the mechanism of action of salbutamol in relieving asthma symptoms.

6. a) What is the function of CD₄ cells in immunity?

[OR]

b) Explain the structural features, synthesis and therapeutic uses of indinavir and zidovudine .

**MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
DEPARTMENT OF CHEMISTRY**

	VIII-SEMESTER	L	P	T	C
R23	Course 25A: Corrosion and Its Prevention	4	2	0	4
	Skill Enhancement course				
	(W.e.f.2023-2024 Batch)				
TOTAL CONTACT HOURS - 45					

I. Learning Objectives:

1. To this course will create awareness of corrosion and its control process
- 2.To it focuses on protective metallic coatings for prevention of corrosion
3. To It focuses on protective coatings of materials.
- 4.To it covers about the insulating materials in electric industries and aware about semiconductors.

II. Syllabus:

Unit-I: Corrosion
9hrs

Introduction - Economic aspects of corrosion - Dry or Chemical Corrosion - Wet or electrochemical corrosion - Mechanism of Electrochemical Corrosion. Galvanic Corrosion -Concentration Cell Corrosion - Differential aeration corrosion – Pitting Corrosion Underground or soil corrosion-Passivity.

Unit-II: Corrosion and Its Control

9hrs

Factors Influencing Corrosion - Microbiological Corrosion, Atmospheric corrosion – Corrosion Control-Proper designing –Using pure metal-Using metal alloys. Chemical conversion – Coating - Phosphating - Chromising - Treatment of metal surfaces hot dipping-Use of inhibitors.

Unit-III: Protective Coatings

9hrs

Introduction-Metallic Coatings-Variou methods of cleaning articles before electrode position– Electroplate and -Electroplating methods. Pre-treatment of the surface–Metallic Coatings-Hot Dipping-Cementation or Impregnated Coatings-Sprayed Metal Coatings-Cladding–Vapour Deposition.

Unit-IV Paints`

9hrs

Paints-ingredients and their functions required properties of a Paint-Paint Constituents and their Functions-Manufacture of Paint. Types of Pigments-Characteristics of pigment-Oils-Uses in Paint Emulsion Paints–Special Paints-Paint Remover Varnishes.

Unit-V: Insulators and Semiconductor

9h

Electrical Insulating Materials-Dielectric Properties-Requirements of an Electrical Insulating Material-Classification of insulating material-Electrical Rigid Insulations. Semiconductors-Introduction-Classification–Degenerate semiconductors Super conductors.

III. Learning Outcomes:

1. This course will create awareness of corrosion and its control process
2. It focuses on protective metallic coatings for prevention of corrosion
3. It focuses on protective coatings of materials.
4. It covers about the insulating materials in electric industries and aware about

semiconductors.

IV. Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
3. Visits of related Industries/firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts.

V. Text Books

1. M.G.Fontana:Corrosion Engineering, McGrawHillInternationalBookCo. London.
2. L.L. Shreir: Corrosion, Vol I and Vol II, Newness Butterworths,EdwardArnoldLtd, London.
3. J.C.Scully:Fundamental of Corrosion,PergamonPressInc.NewYork, USA.

V. References Books:

1. M.G.Fontana:Corrosion Engineering,McGraw Hill InternationalBookCo. London.
2. L.L. Shreir: Corrosion, Vol I and Vol II, Newness Butterworths,EdwardArnoldLtd, London.
3. J.C.Scully: Fundamental of Corrosion, Pergamon PressInc. NewYork, USA.
4. V.S.Sastry: Corrosion Inhibitors, Principles & Applications, John Wiley & Sons.
5. C.C.Nathan :Corrosion Inhibitors, NACE, Houston, Texas.
6. Corrosion-Causes and Prevention: Speller.F. N.
7. Material Science mini refresher by H.S.Bawa, Tata publisherIndia.

Online link :

https://ndl.iitkgp.ac.in/he_search?key=corrosion%20video%20lectures

Course 25A: Corrosion and its Prevention-Practical Syllabus:

Skill Enhancement course

VI. Learning Objectives:

On successful completion of this practical course, student shall be able to:

1. To chalk out a plan to decrease the rate of corrosion.
2. To preparation of pigment.
3. To study about the Rate of corrosion with respect to Aluminium and Iron plates
4. To determine the effect of Temperature on rate of corrosion

VII. Practical (Laboratory) Syllabus:

1. Electroless metallic coatings on ceramic and plastic material.
2. Preparation of pigment (zinc oxide)
3. Determine the rate of corrosion on different metallic plates (Iron, Aluminium) in various Concentrations of HCl.
4. Determine the effect of temperature on rate of corrosion in acidic medium.
5. Determine the rate of corrosion on an Aluminium plate in basic medium.

VIII. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Chalk out a plan to decrease the rate of corrosion.
2. Preparation of pigment.
3. To study about the Rate of corrosion with respect to Aluminium and Iron plates
4. To determine the effect of Temperature on rate of corrosion

IX. Lab References:

1. Analytical Chemistry by Gary D. Christian 6th edition Wiley publication.
2. Senior Practical Physical Chemistry, B.D.Khosla, V.C.Garg, Adarsh Gulati, R.Chand and Co.
3. Applied Chemistry Theory and Practice, O.P.Virani, A.K.Nebula. New Age International Publishers, 2nd Edition.
4. S.W.Rajbhoj and T.K.Chondhekar, Systematic Experimental Physical Chemistry, Anjali Publication, Second Edition 2000.
5. Sunita Rattan, Experiments in Applied Chemistry, S.K.Kataria & Sons, Second edition, 2008
6. Khosla, B.D.; Garg, V.C. & Gulati, A. Senior Practical Physical Chemistry, R.C hand & Co.: New Delhi (2011).
7. UGC practical manual for experimental analysis.

X. Cocurricular Activities:

a) Mandatory: (Lab/field training of students by teacher: (lab: 10+fields: 05):

1. For Teacher: Training of students but the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of corrosion formation observations in nature.

2. For Students: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes corrosion process and its prevention. Write their observations and submit a handwritten fieldwork/project work report not exceeding 10 pages in the given format to the teacher. And observe the semiconductors, insulators used in industry.

a. Max marks for Fieldwork/project work Report: 05.

b. Suggested Format for Fieldwork/project work: Title page,

student details, index page, details of place visited,

observations, findings and acknowledgements.

C. Unit tests(IE)

MAHARAJAH'S COLLEGE (AUTONOMOUS):: VIZIANAGARAM
VIII Semester, Course-25A Paper: Corrosion and its Prevention
MODEL QUESTION PAPER

Max Time: 2 ½ Hrs

Max

Marks: 60

SECTION-A

Answer any five questions form the following.

5 x

2 = 10 Marks

8.

- q) Define corrosion.
- r) Write any two uses of corrosion inhibitors.
- s) Explain Metallic Coatings.
- t) Write a note on Cladding.
- u) Write any two Economic aspects of corrosion.
- v) What are the constituents of Paints.
- w) What is the primary difference between semiconductors and super conductors.
- x) Discuss the Atmospheric corrosion.

SECTION-B

Answer all the questions form the following.

5 x 10 = 50

Marks

2. (a) Explain the Chemical Corrosion and electrochemical corrosion its Mechanism

(OR)

(b) Discuss the Pitting Corrosion and soil corrosion.

3. (a) Explain the Factors Influencing Corrosion.

(OR)

(b) Discuss the corrosion control methods

4. (a) Write about Electroplate and -Electroplating methods.

(OR)

(b) Explain Pre-treatment of the surface–Metallic Coatings

5. (a) Classify paints based on their applications.

(OR)

(b) Explain the types of Pigments and Characteristics of pigments

6. (a) Write a note Degenerate semiconductors and Superconductors

(OR)

(b) Classify and discuss of insulating material

