



UNIVERSITY OF CALICUT

Abstract

General and Academic - Faculty of Science - Syllabus of BSc Chemistry Programme under CBCSS UG Regulations 2019 with effect from 2019 Admission onwards - Implemented - Orders Issued

G & A - IV - J

U.O.No. 9082/2019/Admn

Dated, Calicut University.P.O, 09.07.2019

*Read:-*1. U.O.No. 4368/2019/Admn dated 23.03.2019

2. Item No. 1 of the minutes of the combined meeting of the Boards of Studies in Chemistry UG, Polymer Chemistry and Industrial Chemistry held on 27.05.2019

3. Item No. 1.16 of the minutes of the meeting of Faculty of Science held on 27.06.2019

ORDER

The Regulations for Choice Based Credit and Semester System for Under Graduate (UG) Curriculum 2019 (CBCSS UG Regulations 2019) for all UG Programmes under CBCSS-Regular and SDE/Private Registration w.e.f. 2019 admission has been implemented vide paper read first above.

The combined meeting of the Boards of Studies in Chemistry UG, Polymer Chemistry and Industrial Chemistry on 27.05.2019 has approved the Syllabus of BSc Chemistry Programme in tune with the new CBCSS UG Regulations with effect from 2019 Admission onwards, vide paper read second above.

The Faculty of Science at its meeting held on 27.06.2019 has approved the minutes of the combined meeting of the Boards of Studies in Chemistry UG, Polymer Chemistry and Industrial Chemistry on 27.05.2019 vide paper read third above.

Under these circumstances, considering the urgency, the Vice Chancellor has accorded sanction to implement the Scheme and Syllabus of BSc Chemistry Programme in accordance with the new CBCSS UG Regulations 2019, in the University with effect from 2019 Admission onwards, subject to ratification by the Academic Council.

The Scheme and Syllabus of BSc Chemistry Programme in accordance with CBCSS UG Regulations 2019, is therefore implemented in the University with effect from 2019 Admission onwards.

Orders are issued accordingly. (Syllabus appended)

Biju George K

Assistant Registrar

To

The Principals of all Affiliated Colleges

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Section Officer



UNIVERSITY OF CALICUT

B.Sc. DEGREE PROGRAMME IN CHEMISTRY

(CBCSSUG 2019)

UNDER CHOICE BASED CREDIT AND SEMESTER SYSTEM

SCHEME AND SYLLABI

2019 ADMISSION ONWARDS

UNDERGRADUATE PROGRAMME – AN OVERVIEW

Programme means the entire course of study and examinations for the award of a degree. **Duration** of an undergraduate programme is six semesters distributed in a period of 3 years. An **academic week** is a unit of five working days in which distribution of work is organized from Monday to Friday with five contact periods of one hour duration on each day. A sequence of 18 such weeks (16 instructional weeks and two weeks for examination) constitutes a **semester**.

Course means a segment of subject matter to be covered in a semester. The undergraduate programme includes 5 types of courses, *viz.*, common courses, core courses, complementary courses, open course and audit course. **Common courses** include English and additional language courses. Every undergraduate student shall undergo 10 common courses [6 English courses and 4 additional language courses] for completing the programme. **Core courses** comprise compulsory course in a subject related to a particular degree programme offered by the parent department. There are 18 core courses including a project work. **Complementary courses** cover two disciplines that are related to the core subject and are distributed in the first four semesters. There shall be one **open course** in the 5th semester. Students can opt one open course of their choice offered by any department in the institution other than their parent department. **Audit courses** are courses which are mandatory for a programme but not conducted for the calculation of SGPA or CGPA. There shall be one audit course each in the first 4 semesters. Audit courses are not meant for class room study. The students can attain only pass (Grade P) for these courses. At the end of each semester there shall be examination conducted by the college from a pool of questions (Question Bank).

Each course shall have certain credits. **Credit** is a unit of academic input measured in terms of weekly contact hours/course contents assigned to a course. A student is required to acquire a minimum of 140 credits for the completion of the UG programme, of which 120 credits are to be acquired from class room study and shall only be counted for SGPA and CGPA. Out of the 120 credits, 38 (22 for common (English) courses + 16 for common languages other than English) credits shall be from common courses, 55 credits for core courses (including 2 credits each for project work and Elective), 24 credits for complementary courses (12 credits each) and 3 credits for the open course. Audit courses shall have 4 credits per course and a total of 16 credits in the entire programme.

Extra credits are mandatory for the programme. Extra credits will be awarded to students who participate in activities like NCC, NSS and Swatch Bharath. Those students who could not join in any of the above activities have to undergo Calicut University Social Service Programme (CUSSP). Extra credits are not counted for SGPA or CGPA. The maximum credit acquired under extra credit shall be 4. If more Extra credit activities are done by a student that may be mentioned in the Grade card.

Each course shall have a unique alphanumeric **code number**, which includes abbreviation of the subject in three letters, the semester number (1 to 6) in which the course is offered, the code of the course (A: Common course, B: Core course, C: Complementary course, D: Open course and E: Audit course) and the serial number of the course (01, 02, *etc.*). For example, CHE5B06 represents a core course of serial number 06 offered in 5th semester in B.Sc. Chemistry Programme.

UNDERGRADUATE PROGRAMME IN CHEMISTRY

PREAMBLE

Science education is central to the development of any society. This can be achieved only by revamping the undergraduate programme to make it effective and meaningful. The development of scientific temper in society necessitates proper education and guidance. In order to achieve this, one must update the developments in the field of science. An effective science education can be imparted at the undergraduate level only by revamping the present curriculum. To achieve this goal, the curriculum should be restructured by emphasising various aspects such as the creativity of students, knowledge of current developments in the discipline, awareness of environmental impacts due to the development of science and technology, and the skills essential for handling equipments and instruments in laboratories and industries.

Chemistry, being an experimental science, demands testing theories through practical laboratory experiences for a thorough understanding of the subject. Nowadays, chemistry laboratories in academic institutions use large amounts of chemicals. The awareness and implementation of eco-friendly experiments becomes a global necessity. It is essential to ensure that laboratory chemicals are used at a minimal level without affecting the skill and understanding aimed through laboratory sessions. This creates an environmental awareness among the students and pollution free atmosphere in the campus.

During the preparation of the syllabus, the existing syllabus, the syllabi of XIth & XIIth standards, UGC model curriculum and the syllabi of other universities have been referred. Care has been taken to ensure that the syllabus is compatible with the syllabi of other universities at the same level. Sufficient emphasis is given in the syllabus for training in laboratory skills and instrumentation.

The units of the syllabus are well defined. The number of contact hours required for each unit is given which excludes prerequisites. The pre requisites provided at the beginning of the units guides the students to what he/she should know before exploring the topic. This can be assessed by the teacher either before delivering the particular topic or as a bridge course at the beginning of each semester. **These shall not be considered for external evaluation.** A list of references and further readings are provided at the end of each unit.

AIMS

This curriculum has been prepared with the objective of giving sound knowledge and understanding of chemistry to undergraduate students. The goal of the syllabus is to make the study of chemistry stimulating, relevant and interesting. It has been prepared with a view to equip students with the potential to contribute to academic and industrial environments. This curriculum will expose students to various fields in chemistry and develop interest in related disciplines. Chemistry, being a border science to biology, physics and engineering, has a key role to play in the understanding of these disciplines. The updated syllabus is based on an interdisciplinary approach to understand the application of the subject in daily life.

BROAD OBJECTIVES

To enable the students

- To understand basic facts and concepts in chemistry.
- To apply the principles of chemistry.
- To appreciate the achievements in chemistry and to know the role of chemistry in nature and in society.
- To familiarize with the emerging areas of chemistry and their applications in various spheres of chemical sciences and to apprise the students of its relevance in future studies.
- To develop skills in the proper handling of instruments and chemicals.
- To familiarize with the different processes used in industries and their applications.
- To develop an eco-friendly attitude by creating a sense of environmental awareness.
- To be conversant with the applications of chemistry in day-to-day life.

PROGRAMME STRUCTURE

Semester	Common course		Core course	Complementary course		Open course	Total
	English	Additional Language		Mathematics	Physics		
II	4+3	4	2	3	2	-	18
III	4	4	3	3	2	-	16
IV	4	4	3+4*	3	2+4*	-	24
V	-	-	3+3+3	-	-	3	12
VI	-	-	3+3+3+3+2 [#] +4*+4*+4*+ 4*+2 ^{**}	-	-	-	32
Total	22	16	55	12	12	3	120

*Practical **Project #Elective

Mark and Indirect Grading System

Mark system is followed instead of direct grading for each question. After external and internal evaluations marks are entered in the answer scripts. All other calculations, including grading, will be done by the university using the software. Indirect Grading System in 10 point scale is followed. Each course is evaluated by assigning marks with a letter grade (O, A⁺, A, B⁺, B, C, P, F, I or Ab) to that course by the method of indirect grading.

Mark Distribution

Sl. No.	Course	Marks
1	English	550
2	Additional Language	400
3	Core course: Chemistry	1475
4	Complementary course: Mathematics	300
5	Complementary course: Physics/Food Science/Computer science	400
6	Open Course	75
	Total Marks	3200

CREDIT AND MARK DISTRIBUTION IN EACH SEMESTER

Total Credits: 120

<i>Semester</i>	<i>Course</i>	<i>Credit</i>	<i>Mark</i>
I	Common course: English	4	100
	Common course: English	3	75
	Common course: Additional Language	4	100
	Core Course I: Theoretical and Inorganic Chemistry- I	2	75
	Complementary course: Mathematics	3	75
	Complementary course: Physics	2	75
	Total	18	500
II	Common course: English	4	100
	Common course: English	3	75
	Common course: Additional Language	4	100
	Core Course II: Theoretical and Inorganic Chemistry- II	2	75
	Complementary course: Mathematics	3	75
	Complementary course: Physics	2	75
	Total	18	500
III	Common course: English	4	100
	Common course: Additional Language	4	100
	Core Course III: Physical Chemistry-I	3	75
	Complementary course: Mathematics	3	75
	Complementary course: Physics	2	75
	Total	16	425
IV	Common course: English	4	100
	Common course: Additional Language	4	100
	Core Course IV: Organic Chemistry-I	3	75
	Core Course V: Inorganic Chemistry Practical-I	4	100
	Complementary course: Mathematics	3	75
	Complementary course: Physics	2	75
	Complementary course: Physics Practical	4	100
	Total	24	625
V	Core Course VI: Inorganic Chemistry-III	3	75
	Core Course VII: Organic Chemistry-II	3	75
	Core Course VIII: Physical Chemistry-II	3	75
	Open course	3	75
	Total	12	300
VI	Core Course IX: Inorganic Chemistry-IV	3	75
	Core Course X: Organic Chemistry-III	3	75
	Core Course XI: Physical Chemistry-III	3	75
	Core Course XII: Advanced and Applied Chemistry	3	75
	Core Course XIII: Elective	2	75
	Core Course XIV: Physical Chemistry Practical	4	100
	Core Course XV: Organic Chemistry Practical	4	100
	Core Course XVI: Inorganic Chemistry Practical-II	4	100
	Core Course XVII: Inorganic Chemistry Practical-III	4	100
	Core Course XVIII: Project Work	2	75
	Total	32	850

SYLLABUS

FOR

CORE COURSE

Core Course Structure - Total Credits: 55 (Internal: 20%; External: 80%)

Semester	Code No	Course Title	Hrs/ Week	Total Hrs	Credit	Marks	
I	CHE1B01	Core Course I: Theoretical and Inorganic Chemistry- I	2	32	2	75	
	-	Core Course V : Inorganic Chemistry Practical-I	2	32	-*	-	
II	CHE2B02	Core Course II: Theoretical and Inorganic Chemistry- II	2	32	2	75	
	-	Core Course V : Inorganic Chemistry Practical-I	2	32	-*	-	
III	CHE3B03	Core Course III: Physical Chemistry-I	3	48	3	75	
	-	Core Course V : Inorganic Chemistry Practical-I	2	32	-*	-	
IV	CHE4B04	Core Course IV: Organic Chemistry-I	3	48	3	75	
	CHE4B05(P)	Core Course V : Inorganic Chemistry Practical-I	2	32	4	100	
V	CHE5B06	Core Course VI: Inorganic Chemistry-III	3	48	3	75	
	CHE5B07	Core Course VII: Organic Chemistry-II	4	64	3	75	
	CHE5B08	Core Course VIII: Physical Chemistry-II	3	48	3	75	
	-	Core Course XIV: Physical Chemistry Practical	5	80	-**	-	
	-	Core Course XV: Organic Chemistry Practical	5	80	-**	-	
	-	Core Course XVIII: Project Work	2	32	-**	-	
VI	CHE6B09	Core Course IX: Inorganic Chemistry-IV	3	48	3	75	
	CHE6B10	Core Course X: Organic Chemistry-III	3	48	3	75	
	CHE6B11	Core Course XI: Physical Chemistry-III	3	48	3	75	
	CHE6B12	Core Course XII: Advanced and Applied Chemistry	3	48	3	75	
	CHE6B13(E1)	Core Course XIII: Elective ***	1. Industrial Chemistry	3	48	2	75
	CHE6B13(E2)		2. Polymer Chemistry				
	CHE6B13(E3)		3. Medicinal and Environmental Chemistry				
	CHE6B14(P)	Core Course XIV: Physical Chemistry Practical	-	-	4**	100	
	CHE6B15(P)	Core Course XV: Organic Chemistry Practical	-	-	4**	100	
	CHE6B16(P)	Core Course XVI: Inorganic Chemistry Practical-II #	5	80	4	100	
	CHE6B17(P)	Core Course XVII: Inorganic Chemistry Practical-III	5	80	4	100	
	CHE6B18(Pr)	Core Course XVIII: Project Work	-	-	2**	75	
Total					55	1475	

* Exam will be held at the end of 4th semester

** Exam will be held at the end of 6th semester

*** An institution can choose any one among the three courses.

Includes industrial visit also. Marks: 85 (Inorganic Chemistry Practical-II) + 15 (Industrial visit).

SEMESTER VI**Course Code: CHE6B18(Pr)****Core Course XVIII: PROJECT WORK**

Total Hours: 32; Credits: 2; Hours/Week: 2 (Semester V); Total Marks 75 (Internal 15 & External 60)

CHE6B18(Pr)	PROJECT WORK	L	T	P	C
		0	0	2	2
Objective (s)	To develop skill in scientific research, critical thinking and reasoning.				
Course outcome (s)					
CO1	To understand the scientific methods of research project.				
CO2	To apply the scientific method in life situations.				
CO3	To analyse scientific problems systematically.				

Guidelines

1. Students shall undertake the project work related to chemistry only.
2. The UG level project work is a group activity, maximum number of students being limited to five. However, each student shall prepare and submit the project report separately.
3. Head of the department must provide the service of a teacher for supervising the project work of each group. A teacher can guide more than one group, if necessary.
4. The students must complete the project in semester V. However, the evaluation of the project report will be carried out at the end of semester VI.
5. **Project work can be experimental, theoretical or both.**
6. No two groups in the same institution are permitted to do project work on the same problem. Also the project must not be a repetition of the work done by students of previous batches.
7. Each group must submit a copy of the project report to be kept in the department.
8. The project report must be hard bound, spiral bound or paper back.
9. The project report shall be divided as, Chapter I: Introduction, Chapter II: Review of literature, Chapter III: Scope of the research problem, Chapter IV: Materials and methods, Chapter V: Results and discussion, Chapter VI: Conclusion and suggestions, if any, and Chapter VII: Bibliography.
10. Each student must present the project report before the external examiner during project evaluation.

CORE COURSE THEORY: EVALUATION SCHEME

The evaluation scheme for each course contains two parts: viz., internal evaluation and external evaluation. 20% weightage shall be given to the internal assessment. The remaining 80% weightage shall be for the external evaluation.

1. INTERNAL EVALUATION

20% of the total marks in each course are for internal evaluation. The colleges shall send only the marks obtained for internal examination to the university. The internal assessment shall be based on a predetermined transparent system involving written test, class room participation based on attendance, assignment and seminar/viva in respect of theory courses. For practical courses it is based on lab involvement and records.

Table 1: Components of Evaluation

<i>Sl. No.</i>	<i>Component</i>	<i>Marks</i>
1	Class room participation based on attendance (20%)	3
2	Test papers I (40%)	6
3	Assignment (20%)	3
4	Seminar/ Viva* (20%)	3
<i>Total Marks</i>		15

*Viva: CHE1B01, CHE2B02, CHE3B03, CHE4B04, CHE5B06, CHE6B10, CHE6B11, CHE6B12 and elective course; Seminar: CHE5B07, CHE5B08 and CHE6B09.

Table 2: Percentage of attendance based on class room participation and Eligible Marks

<i>% of attendance</i>	<i>Marks</i>
85% and above	3
75 - <85%	2
50 - <75%	1

Table 3: Pattern of Test Papers

<i>Duration</i>	<i>Pattern</i>	<i>Total number</i>	<i>Number of questions to be answered</i>	<i>Marks for each question</i>	<i>Ceiling of Marks</i>
1 Hour	Short answer	6	Up to 6	2	10
	Paragraph	4	Up to 4	5	15
	Essay	2	1	10	10
<i>Total Marks*</i>					35

*85% and above = 6, 65 to below 85% = 5, 55 to below 65% = 4, 45 to below 55% = 3, 35 to below 45% = 2, below 35% = 1

2. EXTERNAL EVALUATION

External evaluation carries 80% marks. University examinations will be conducted at the end of each semester. Duration of each external examination is two hours for 2/3 credit.

Table 1: Pattern of Question Paper

<i>Duration</i>	<i>Pattern</i>	<i>Total number of questions</i>	<i>Number of questions to be answered</i>	<i>Marks for each question</i>	<i>Ceiling of Marks</i>
2 Hours	Short answer	12	Up to 12	2	20
	Paragraph	7	Up to 7	5	30
	Essay	2	1	10	10
<i>Total Marks</i>					60

CORE COURSE PRACTICAL: EVALUATION SCHEME

The evaluation scheme for each course contains two parts: viz., internal evaluation and external evaluation.

1. INTERNAL EVALUATION

20% of the total marks in each course are for internal evaluation. The colleges shall send only the marks obtained for internal examination to the university.

Table 1: Components of Evaluation

<i>Sl. No.</i>	<i>Components</i>	<i>Marks</i>
1	Record (60%)	12
2	Lab involvement (40%)	8
<i>Total Marks</i>		20

Table 2: Lab involvement

Component	Mark
Viva	4
Performance	2
Punctuality	2
Total	8

Table 3: Number of Experiments and Marks for Practical Records

<i>Number of Experiments (Marks in brackets)</i>						
<i>Inorganic Chemistry Practical-I</i>		<i>Physical Chemistry Practical</i>	<i>Organic Chemistry Practical</i>		<i>Inorganic Chemistry Practical –II</i>	<i>Inorganic Chemistry Practical –III</i>
<i>Volumetry</i>	<i>Preparation</i>		<i>Analysis</i>	<i>Preparation</i>		
19-20 (9)	6 (3)	14 (12)	10 (8)	8 (4)	10-11 (12)	10 (12)
18 (8)	5 (2)	13 (11)	9 (7)	7 (3)	9 (11)	9 (11)
17 (7)	4 (1)	12 (10)	8 (6)	6 (2)	8 (10)	8 (10)
16 (6)		11 (9)	7 (5)		7 (9)	7 (9)
15 (5)		10 (8)				

2. EXTERNAL EVALUATION

External evaluation carries 80% marks. Practical examinations along with viva-voce will be conducted at the end of IVth and VIth semesters.

PATTERN OF QUESTION PAPERS**Table 1: Inorganic Chemistry Practical – I**

<i>Duration</i>	<i>Pattern</i>	<i>Marks</i>	<i>Total Marks</i>
3 Hours	Question on volumetric analysis	8	80
	Procedure for volumetry	8	
	Procedure for inorganic preparation	4	
	Inorganic preparation	5	
	Result	35	
	Calculation	4	
	Record	8	
	Viva-Voce	8	

Guidelines

1. *Valuation of Volumetric Procedure:* Eight points – 8 marks. 1. Correct intermediate; 2. Preparation of standard solution; 3. Standardisation of intermediate; 4. Indicator and end point of standardization; 5. Making up of given solution; 6. Titration of made up solution; 7. Indicator and end point of estimation; 8. Any other relevant points.

2. *Marks for Result:* For calculating the error percentage both theoretical value and skilled value are considered. The reported values (RV) of the students are compared with theoretical value (TV) and skilled value (SV) to calculate the error percentage. Up to 1.5% error: 35 marks; between 1.51 – 2%: 30 marks; between 2.1 – 2.5%: 25 marks; between 2.51– 3%: 15 marks; greater than 3%: 4 marks.

3. *Marks for Calculation:* Eight points – 4 marks. 1. Equivalent mass of the primary standard substance; 2. Calculation of normality of primary standard; 3. Table for standardization of intermediate with standard substance and indicator at the top; 4. Calculation of normality of the link solution; 5. Table for estimation including standard substance and indicator; 6. Calculation of normality of the given solution; 7. Equivalent mass of the compound/ion in the given solution; 8. Calculation of weight in the whole of the given solution.

4. Marks for inorganic preparation procedure: Six to seven points – 4 marks. 1) Balanced equation of the reaction; 2) Requirements; 3) Solvent used; 4) Reaction condition; 5) Precipitating agent; 6) Recrystallisation; 7) Solvent for recrystallisation.

5. Marks for inorganic preparation: The students shall exhibit the prepared compound for inspection. Yield: 3 marks; colour: 2 marks.

Table 2: Physical Chemistry Practical

<i>Duration</i>	<i>Pattern</i>	<i>Marks</i>	<i>Total Marks</i>
3 Hours	Principle and procedure	4 + 4	80
	Result	40	
	Graph	8	
	Duplicate/ other particulars	4	
	Calculation	4	
	Record	8	
	Viva-Voce	8	

Guidelines

1. *Valuation of Principle and procedure:* 8 marks (4 marks for principle and 4 marks for procedure).

2. *Marks for Result:* The mark distribution may vary for different experiments.

Table 3: Organic Chemistry Practical

<i>Duration</i>	<i>Pattern</i>	<i>Marks</i>	<i>Total Marks</i>
3 Hours	Question on organic analysis & preparation	8	80
	Procedure for organic preparation	8	
	Organic Preparation	12	
	Organic Analysis	36	
	Record	8	
	Viva-Voce	8	

Guidelines

1. *Procedure for Organic Preparation*: Eight points – 8 marks. 1) Type of reaction; 2) Balanced equation of the reaction; 3) Requirements; 4) Solvent used; 5) Reaction condition; 6) Precipitating agent; 7) Recrystallisation; 8) Solvent for recrystallisation.

2. *Organic Preparation*: The students shall exhibit the crude and recrystallized samples of the prepared organic compound for inspection. Yield: 3 marks; colour: 3 marks; dryness: 3 marks; crystalline shape: 3 marks.

3. *Organic Analysis*: Aliphatic/aromatic: 2 marks, saturated/unsaturated: 2 marks, detection of elements: 3 marks, identification test of functional group: 5 marks, chemistry of identification test: 3 marks, confirmation test of functional group: 5 marks, chemistry of confirmation test: 3 marks, suggestion of derivative: 1 mark, method of preparation of the derivative: 2 marks, preparation of derivative suggested by the examiner: 3 marks, chemistry of the derivative preparation: 3 marks, systematic procedure: 4 marks.

Table 4: Inorganic Chemistry Practical – II

<i>Duration</i>	<i>Pattern</i>	<i>Marks</i>	<i>Total Marks</i>
3 Hours	Gravimetry and Colorimetry		65
	Procedure of colorimetry	4	
	Procedure of gravimetry	8	
	Result	35	
	Calculation	2	
	Record	8	
	Viva-Voce	8	
	Industrial Visit		15
	Report	8	
	Viva-Voce	7	

Guidelines

1. *Points for Evaluation of Colorimetry Procedure*: Four points – 4 marks. 1) Preparation of standard solutions; 2) Addition of appropriate reagents to develop colour; 3) Determination of absorbance using a colorimeter; 4) Plot the graph and find out the concentration of the unknown.

2. *Points for Evaluation of Gravimetry Procedure*: Eight points – 8 marks. 1) Making up of the given solution 2) Transferring a definite volume of the made up solution in to a

beaker 3) Addition of appropriate reagents 4) Dilution and heating to boiling 5) Precipitation by appropriate reagent and heating to make the precipitate granular 6) Allowing to settle and filtering through quantitative filter paper or previously weighed sintered crucible till the washings are free from ions 7) Incineration in a previously weighed silica crucible or drying the sintered crucible in an air oven 8) Repeating heating, cooling and weighing to constant weight 9) From the weight of precipitate the weight of metal in the given solution can be calculated.

3. *Marks for Gravimetry Result:* The reported value of the student is compared with theoretical value and one skilled value (closer to theoretical value) and error percentage is calculated. Up to 1.5% error: 35 marks; between 1.51 – 2%: 25 marks; between 2.1– 2.5%: 15 marks; greater than 2.51%: 4 marks.

4. *Industrial Visit:* Good presentation of any one Chemical Factory / Research centre visit is considered for a maximum of 8 marks. Students are expected to make individual report. So variety must be appreciated. Viva-voce shall be conducted based on the industrial visit.

Table 5: Inorganic Chemistry Practical – III

<i>Duration</i>	<i>Pattern</i>	<i>Marks</i>	<i>Total Marks</i>
3 Hours	Question on qualitative analysis	4	80
	Identification tests for ions	16	
	Confirmation tests for ions	16	
	Identification of cation group	4	
	Chemistry of identification tests	8	
	Chemistry of confirmation tests	8	
	Systematic procedure	8	
	Record	8	
	Viva-Voce	8	

Guidelines

1. *Identification Tests:* 4 Marks each for two anions two cations.
2. *Identification of Cation Group:* 2 Mark each.
3. *Confirmation Tests:* 4 Marks each for two anions and two cations.
4. *Chemistry of Identification Tests:* 2 Marks each for two anions and two cations.
5. *Chemistry of Confirmation Tests:* 2 Marks each for two anions and two cations.

Table 6: Evaluation of Records

<i>Number of Experiments (Marks in brackets)</i>						
<i>Inorganic Chemistry Practical – I</i>		<i>Physical Chemistry Practical</i>	<i>Organic Chemistry Practical</i>		<i>Inorganic Chemistry Practical –II</i>	<i>Inorganic Chemistry Practical –III</i>
<i>Volumetry</i>	<i>Preparation</i>		<i>Analysis</i>	<i>Preparation</i>		
19-20 (6)	6 (2)	14 (8)	10 (4)	8 (4)	10-11 (8)	10 (8)
18 (5)	5 (1)	13 (7)	9 (3)	7 (3)	9 (7)	9 (7)
17 (4)		12 (6)	8 (2)	6 (2)	8 (6)	8 (6)
16 (3)		11 (5)			7 (5)	7 (5)
						6 (4)

CORE COURSE PROJECT: EVALUATION SCHEME

Project evaluation will be conducted at the end of sixth semester. Evaluation of the project report shall be done under mark system.

a) Supervising teachers will assess the project and award internal marks.

b) External evaluation by examiner appointed by university.

c) Grade for the project will be awarded to candidates, combining the internal and external marks.

Table 1: Internal Evaluation

<i>Sl. No</i>	<i>Criteria</i>	<i>Marks</i>
1	Originality of content (20%)	3
2	Methodology of presentation (20%)	3
3	Organization of report and conclusion (30%)	4.5
4	Viva-voce (30%)	4.5
<i>Total Marks</i>		15

Table 2: External Evaluation

<i>Sl. No</i>	<i>Criteria</i>	<i>Marks</i>
1	Content and relevance of the project (20%)	12
2	Presentation and quality of analysis (20%)	12
3	Findings and recommendations (30%)	18
4	Viva-voce (30%)	18
<i>Total Marks</i>		60

- 1) Submission of the project report and presence of the student for viva are compulsory for internal evaluation. No marks shall be awarded to a candidate if she/he fails to submit the project report for external evaluation
- 2) The student should get a minimum P grade in aggregate of external and internal.
- 3) There shall be no improvement chance for the marks obtained in the project report.
- 4) In the extent of student failing to obtain a minimum of pass grade, the project work may be re-done and a new internal mark may be submitted by the parent department. External examination may be conducted along with the subsequent batch.