File Ref.No.23552/GA - IV - J2/2013/CU

UNIVERSITY OF CALICUT

Abstract

BSc in Chemistry-CUCBCSS UG 2014-Scheme and Syllabus- approved-implemented-w.e.f 2014 Admissions-Orders issued.

G & A - IV - J

U.O.No. 6824/2014/Admn Dated, Calicut University.P.O, 16.07.2014

Read:-1. U.O. No. 3797/2013/CU, dated 07.09.2013 (CBCSS UG Modified Regulations) (File.ref.no. 13752/GA IV J SO/2013/CU).

2. U.O. No. 5180/2014/Admn, dated 29.05.2014 (CBCSS UG Revised Regulations) (File.ref.no. 13752/GA IV J SO/2013/CU).

3. Item no. 8 of the minutes of the meeting of the Board of Studies in Chemistry UG held on 03.04.2014.

4.Item no. 21 of the minutes of the meeting of the Faculty of Science held on 27.06.2014.

5.Orders of the VC on 14.07.2014, in the file no, 18602/GA IV /J1/2013/CU.

ORDER

The Modified Regulations of Choice Based Credit Semester System for UG Curriculum w.e.f 2014 was implemented under the University of Calicut vide paper read as (1).

The Revised CUCBCSS UG Regulations has been implemented w.e.f 2014 admission, for all UG programme under CUCBCSS in the University, vide paper read as (2).

The Board of Studies in Chemistry UG finalized the revised syllabus of Chemistry UG for implementation w.e.f the Academic Year 2014-2015. vide paper read as (3).

The Faculty of Science has also approved the minutes of the Board vide paper read as (4).

The Hon'ble Vice Chancellor, considering the exigency, exercising the powers of the Academic Council has approved the items regarding syllbus implementation in the minutes of the concerned Boards of Studies mentioned in the minutes of the Faculty of Science, subject to ratification by the Academic Council, vide paper read as (5).

Sanction has, therefore, been accorded for implementing the Scheme and Syllabus of BSc. in Chemistry under CUCBCSS UG 2014, in the University, w.e.f 2014 Admissions.

Orders are issued accordingly.

(The syllabus is available in the website: universityofcalicut.info)

Muhammed S

Deputy Registrar

To

1. All Affiliated Colleges/SDE/Dept.s/Institutions under University of Calicut.
2. The Controller of Examinations, University of Calicut.
3. The Director SDE, University of Calicut.

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

B.Sc. DEGREE PROGRAMME
IN
CHEMISTRY

UNDER CHOICE BASED CREDIT AND SEMESTER SYSTEM

SCHEME AND SYLLABI

2014 ADMISSION ONWARDS

CORE COURSES, COMPLEMENTARY COURSES & OPEN COURSES

COURSE STRUCTURE

Credit Distribution

Semester	*Common course*		*Core course*	*Complementary course*		*Open course*	*Total*
	English	*Additional Language*		*Mathematics*	*Physics*		
I	4+3	4	2	3	2	-	18
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	-	-	2	11
VI	-	-	3+3+3+3+3 +4*+4*+4*+ 4*+2**	-	-	-	33
Total	**22**	**16**	**56**	**12**	**12**	**2**	**120**

*Practical **Project

Mark Distribution 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 7 point scale is followed. Each course is evaluated by assigning marks with a letter grade (A^+, A, B, C, D, E or F) to that course by the method of indirect grading.

Mark Distribution

Sl. No.	*Course*	*Marks*
1	English	600
2	Additional Language	400
3	Core course: Chemistry	1750
4	Complementary course: Mathematics	400
5	Complementary course: Physics	400
6	Open Course	50
	Total Marks	**3600**

Seven point Indirect Grading System

% of Marks	*Grade*	*Interpretation*	*Grade Point Average*	*Range of Grade points*	*Class*
90 and above	A^+	Outstanding	6	5.5 - 6	First Class with distinction
80 to below 90	A	Excellent	5	4.5 – 5.49	
70 to below 80	B	Very good	4	3.5 – 4.49	First Class
60 to below 70	C	Good	3	2.5 – 3.49	
50 to below 60	D	Satisfactory	2	1.5 – 2.49	Second Class
40 to below 50	E	Pass/Adequate	1	0.5 – 1.49	Pass
Below 40	F	Failure	0	0 – 0.49	Fail

Core Course Structure
Total Credits: 56 (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	36	2	100
	-	Core Course V : Inorganic Chemistry Practical-I	2	36	-*	-
II	CHE2B02	Core Course II: Theoretical and Inorganic Chemistry-II	2	36	2	100
	-	Core Course V : Inorganic Chemistry Practical-I	2	36	-*	-
III	CHE3B03	Core Course III: Physical Chemistry-I	3	54	3	100
	-	Core Course V : Inorganic Chemistry Practical-I	2	36	-*	-
IV	CHE4B04	Core Course IV: Organic Chemistry-I	3	54	3	100
	CHE4B05(P)	Core Course V : Inorganic Chemistry Practical-I	2	36	4	100
V	CHE5B06	Core Course VI: Inorganic Chemistry-III	3	54	3	100
	CHE5B07	Core Course VII: Organic Chemistry-II	4	72	3	100
	CHE5B08	Core Course VIII: Physical Chemistry-II	4	72	3	100
	-	Core Course XIV: Physical Chemistry Practical	5	90	-**	-
	-	Core Course XV: Organic Chemistry Practical	5	90	-**	-
	-	Core Course XVIII: Project Work	2	36	-**	-
VI	CHE6B09	Core Course IX: Inorganic Chemistry-IV	3	54	3	100
	CHE6B10	Core Course X: Organic Chemistry-III	3	54	3	100
	CHE6B11	Core Course XI: Physical Chemistry-III	3	54	3	100
	CHE6B12	Core Course XII: Advanced and Applied Chemistry	3	54	3	100
	CHE6B13(E1)	Core Course XIII: Elective*** — 1. Industrial Chemistry	3	54	3	100
	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	90	4	100
	CHE6B17(P)	Core Course XVII: Inorganic Chemistry Practical-III	5	90	4	100
	CHE6B18(Pr)	Core Course XVIII: Project Work	-	-	2**	50
				Total	**56**	**1750**

* 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: 36; Credits: 2; Hours/Week: 2 (Semester V)

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 the 5^{th} semester. However, the evaluation of the project report will be carried out at the end of 6^{th} semester.
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 keep 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.

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

Sl. No.	*Components*	*Marks*
1	Attendance	5
2	Test papers: I & II	5 + 5
3	Assignment	2
4	Seminar/ Viva*	3
	Total Marks	20

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

Table 2: Percentage of Attendance and Eligible Marks

% of attendance	*Marks*
Above 90%	5
85-89%	4
80-84%	3
76-79%	2
75%	1

Table 3: Pattern of Test Papers

Duration	*Pattern*	*Total number of questions*	*Number of questions to be answered*	*Marks for each question*	*Marks*
1.5 Hours	One word	4	4	1	4
	Short answer	5	4	2	8
	Paragraph	5	3	6	18
	Essay	2	1	10	10
				*Total Marks**	40

*90% and above = 5, 80 to below 90% = 4.5, 70 to below 80% = 4, 60 to below 70% = 3.5, 50 to below 60% = 3, 40 to below 50% = 2, 35 to below 40% = 1, below 35% = 0

2. EXTERNAL EVALUATION

External evaluation carries 80% marks. University examinations will be conducted at the end of each semester.

Table 1: Pattern of Question Paper

Duration	*Pattern*	*Total number of questions*	*Number of questions to be answered*	*Marks for each question*	*Marks*
3 Hours	One word	10	10	1	10
	Short answer	12	10	2	20
	Paragraph	8	5	6	30
	Essay	4	2	10	20
				Total Marks	80

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

Sl. No.	*Components*	*Marks*
1	Attendance in the lab	5
2	Punctuality, performance and discipline	4
3	Model tests: I & II	2 + 2
4	Practical Record: Required number of experiments and neatness	4
5	Viva-Voce	3
	Total Marks	20

Table 2: Percentage of Attendance and Eligible Marks

% of attendance	*Marks*
Above 90%	5
85-89%	4
80-84%	3
76-79%	2
75%	1

Table 3: Number of Experiments and Marks for Practical Records

<table>
<tr><td colspan="6">Number of Experiments (Marks in brackets)</td></tr>
<tr><td rowspan="2">Inorganic Chemistry Practical-I</td><td rowspan="2">Physical Chemistry Practical</td><td colspan="2">Organic Chemistry Practical</td><td rowspan="2">Inorganic Chemistry Practical -II</td><td colspan="2">Inorganic Chemistry Practical -III</td></tr>
<tr><td>Analysis</td><td>Preparation</td><td>Mixture</td><td>Preparation</td></tr>
<tr><td>25-28 (4)</td><td>17-18 (4)</td><td>10 (3)</td><td rowspan="5">7-10 (1)</td><td>13-14 (4)</td><td>8 (3)</td><td rowspan="5">8-10 (1)</td></tr>
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<tr><td>21 (1)</td><td>13 (1)</td></tr>
</table>

2. EXTERNAL EVALUATION

External evaluation carries 80% marks. Practical examinations along with viva-voce will be conducted at the end of 4th and 6th semesters.

PATTERN OF QUESTION PAPERS

Table 1: Inorganic Chemistry Practical - I

Duration	*Pattern*	*Marks*	*Total Marks*
3 Hours	Question on volumetric analysis	8	80
	Procedure	8	
	Result	40	
	Calculation	8	
	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: 40 marks; between 1.51 – 2%: 30 marks; between 2.1 – 2.5%: 20 marks; between 2.51– 3%: 10 marks; greater than 3%: 4 marks.
3. *Marks for Calculation:* Eight points – 8 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.

Table 2: Physical Chemistry Practical

Duration	*Pattern*	*Marks*	*Total Marks*
3 Hours	Procedure	8	80
	Result	40	
	Graph	8	
	Duplicate/ other particulars	4	
	Calculation	4	
	Record	8	
	Viva-Voce	8	

Guidelines

1. *Valuation of Procedure:* Eight points – 8 marks.
2. *Marks for Result:* The mark distribution may vary for different experiments.

Table 3: Organic Chemistry Practical

Duration	*Pattern*	*Marks*	*Total Marks*
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

Duration	*Pattern*	*Marks*	*Total Marks*
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		
	Report	8	15
	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

Duration	*Pattern*	*Marks*	*Total Marks*
3 Hours	Question on qualitative analysis	4	80
	Procedure for inorganic preparation	4	
	Identification tests for ions	16	
	Confirmation tests for ions	16	
	Identification of cation group	2	
	Chemistry of identification tests	8	
	Chemistry of confirmation tests	8	
	Systematic procedure & elimination	4	
	Chemistry of elimination	2	
	Record	8	
	Viva-Voce	8	

Guidelines

1. *Identification Tests:* 4 Marks each for two anions two cations.
2. *Identification of Cation Group:* 1 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

<table>
<tr><td colspan="7">Number of Experiments (Marks in brackets)</td></tr>
<tr><td rowspan="2">Inorganic Chemistry Practical - I</td><td rowspan="2">Physical Chemistry Practical</td><td colspan="2">Organic Chemistry Practical</td><td rowspan="2">Inorganic Chemistry Practical -II</td><td colspan="2">Inorganic Chemistry Practical -III</td></tr>
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<tr><td>21 (4)</td><td>13 (4)</td></tr>
</table>

CORE COURSE PROJECT: EVALUATION SCHEME

Project evaluation will be conducted at the end of sixth semester.

Table 1: Internal Evaluation

Sl. No	*Criteria*	*Marks*
1	Punctuality	2
2	Skill in doing project work	2
3	Project presentation	3
4	Viva-Voce	3
	Total Marks	10

Table 2: External Evaluation

Sl. No	*Criteria*	*Marks*
1	Content and relevance of the project	10
2	Project report	10
3	Project presentation	10
4	Viva-voce	10
	Total Marks	40