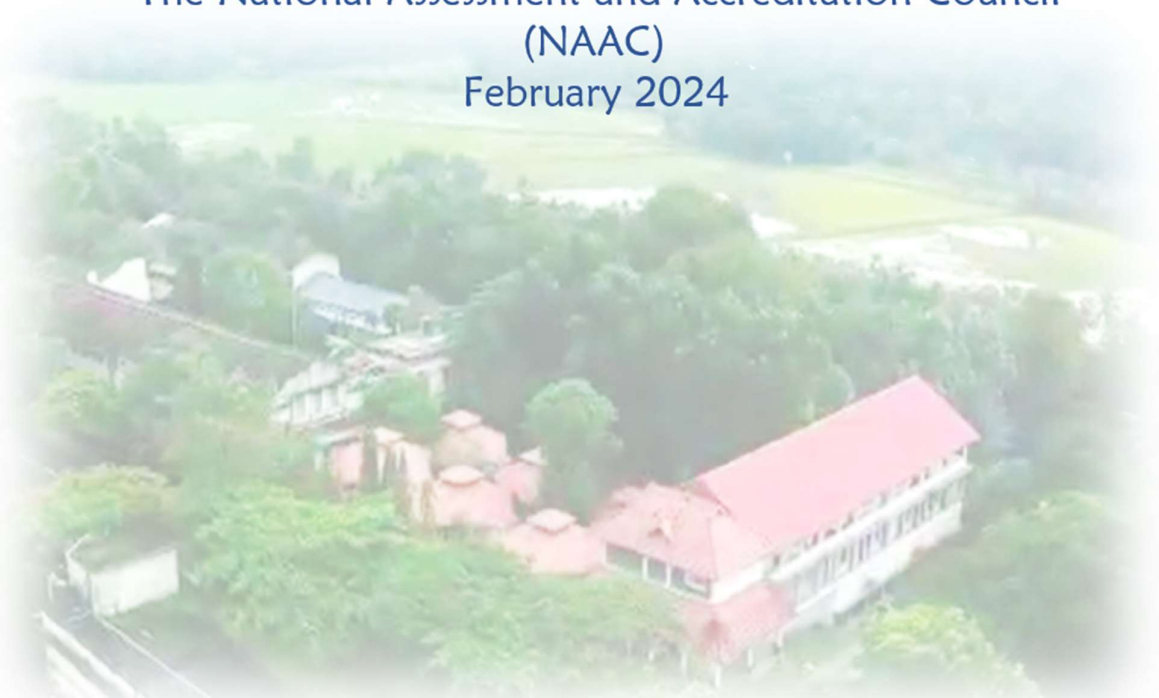




DEVASWOM BOARD COLLEGE
THALAYOLAPARAMBU
(Affiliated to Mahatma Gandhi University, Kottayam)

CRITERION II
Teaching Learning and Evaluation

Submitted to
The National Assessment and Accreditation Council
(NAAC)
February 2024



Midayikunnu P.O.Thalayolaparambu, Kottayam, Kerala - 686605

2.6.2

Attainment of POs and COs

Sample of mapping of COs to POs of MSc Chemistry course

Programme Outcomes for MSc programme

On completion of the programme, the student will achieve the following programme outcomes

PO1	Domain Knowledge	Construct deeper knowledge and expertise in specialized fields and integrate knowledge across subject areas.
PO2	Creative and Interdisciplinary Thinking	Develop a passion for experimentation, critical appraisal and an engagement with others' perspectives; enhance interdisciplinary thinking skills to formulate creative solutions to real life problems.
PO3	Communication and Competency	Communicate effectively, critically assess and review ideas and then present new perspectives in seminar and project presentations.
PO4	Research skills & Ethical practices	Acquire research skills in concerned subjects and allied fields; apply domain-specific ethical principles and practices in academic, professional and social engagements.
PO5	Leadership Skills	Demonstrate democratic values, commitment to social service, employ effective team-building and management strategies; work constructively and lead diverse teams; develop strategic thinking with people skills.
PO6	Career readiness and higher education	Choose from diverse career options available in local, national and international realms; pursue higher education in multidisciplinary fields.
PO7	Lifelong Learning	Inculcate a habit of self-learning throughout life, through self-paced and self-directed learning aimed at personal development; adapting to the changing demands of the work place through reskilling.

Course Outcome for the course – Quantum Chemistry and Group Theory

On completion of the course, the student will be able to

CH500103	Quantum Chemistry and Group Theory	Credits: 4
CO1	Deduce various symmetry elements in molecules and classify them into different point groups	
CO2	Apply the concept of GOT to construct character tables of simple point groups and also to deduce the bonding of simple molecules	
CO3	Demonstrate the fundamental concepts of quantum mechanics	
CO4	Apply the concepts to simple systems	
CO5	Summarize on the concept of quantization of angular momentum	

Sample question paper
DEPARTMENT OF CHEMISTRY,
DEVASWOM BOARD COLLEGE, THALAYOLAPARAMABU
MSc CHEMISTRY SEMESTER I MODEL EXAM, MARCH 2023
CH500103 - QUANTUM CHEMISTRY AND GROUP THEORY

Time: 3 hrs

Weight: 30

Course Outcomes

CO1	Deduce various symmetry elements in molecules and classify them into different point groups	Analyse	PO1,PO2
CO2	Apply the concept of GOT to construct character tables of simple point groups and also to deduce the bonding of simple molecules	Apply	PO4, PO6
CO3	Demonstrate the fundamental concepts of quantum mechanics	Understand	PO1
CO4	Apply the concepts to simple systems	Apply	PO1
CO5	Summarize on the concept of quantization of angular momentum	Understand	PO1

SECTION A (Answer any 8 questions, each carries a weight of 1)

1. What are block factored matrices? CO1
2. Formulate the matrix representation for centre of inversion. CO1
3. What are isomorphic groups? CO1
4. What are the classes C_{3v} and C_{2h} point groups? CO1
5. State the Identity rule and inverse rule for point groups. CO1
6. Discuss briefly on Blackbody radiation. CO3
7. Plot the radial distribution curve for 2s and 2p orbitals. CO4
8. What are symmetric and antisymmetric wave functions? CO5
9. Write a note on spin functions. CO5
10. Verify Uncertainty principle using commutative relation in quantum mechanics. CO3

SECTION B (Answer any 6 questions, each carries a weight of 2)

11. What are the symmetry operations generated by S_7 and S_8 ? Identify the distinct operations. CO1
12. Discuss on the point groups associated with molecules of high symmetry? CO1
13. Write a note on Hermann Mauguin symbols. CO1
14. Write short notes on screw axis and glide plane. CO1
15. Derive the energy for a particle in a 3-D box. Write the wave function of an electron of energy $E = (1.125 h^2/ml^2)$ present in a cubic box. CO4
16. Set up the Schrödinger equation and find eigen values and eigen functions for a particle on a ring. CO4
17. Explain the relationship between Cartesian and Cylindrical polar coordinates. Convert the Cartesian coordinates (1,1,3) into Cylindrical polar coordinates. CO3
18. What are ladder operators? Evaluate $[L_x L_y]$. CO5

SECTION C (Answer any 2 questions, each carries a weight of 5)

19. How will you construct the SALCs of BF_3 molecule? CO2
20. What are character tables? Apply the GOT to derive the character table of C_{4v} point group. CO2
21. Derive the complete wave function and energy for a particle on a sphere. CO4
22. Set up the Schrodinger equation for hydrogen atom, in spherical polar coordinates and separate it into three ordinary differential equations by the method of separation of variables. CO4

Mark sheet (excel format)

Shamna Ashraf
1st nsc. Chemistry

MARK SHEET

Course name: Quantum Chemistry and Group Theory

Question Number	Grade	Grade Point	Taxonomy	CO
1	A+	5	Analyze	CO1
2	A	4	Analyze	CO1
3	A	4	Analyze	CO1
4			Analyze	CO1
5	A+	5	Analyze	CO1
6	A	4	Analyze	CO1
7	B	3	Understand	CO3
8	A+	5	Apply	CO4
9			Understand	CO5
10	A+	5	Understand	CO5
11	A+	10	Understand	CO3
12	A	8	Analyze	CO1
13	A	8	Analyze	CO1
14			Analyze	CO1
15	B	6	Analyze	CO1
16	A	8	Apply	CO4
17	A	8	Apply	CO4
18			Understand	CO3
19	A	20	Understand	CO5
20			Apply	CO2
21			Apply	CO2
22	A+	25	Apply	CO4

Total - 128; GPA - 4.26

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A.S.A.

CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2					
CO2				1		2	
CO3	3						
CO4	2						
CO5	1						

Class Performance

Name of Programme	MSc Chemistry				
Name of Course with code	CH500103 – Quantum Chemistry and Group Theory				
Name of faculty	Dr. Remalakshmy Poduval				
Semester	I				
No. of students	15				
Course Outcome	% of attainment				
	Model exam	Seminar	Assignment	Class involvement	Average
CO1	68	85	100	95	87
CO2	64	63	100	85	78
CO3	82	88	100	100	92.5
CO4	47	54	100	67	67
CO5	38	43	100	54	58.75
Average	59.8	66.6	100	80.2	76.65

Attained