MAHATMA GANDHI UNIVERSITY, KERALA

Abstract

Bachelor of Science (Honours) Chemistry - Fifth Semester - Modifications to the Course Outcomes, Course Content and pattern for End Semester Evaluation - Approved - Orders Issued.

ACA 16

No. 5341/ACA 16/2026/MGU Priyadarsini Hills,Dated: 29.05.2026

Read:-1. U.O.No.5797/AC A16/2024/MGU, dated.27.06.2024.

2. Minutes of the meeting of the Expert Committee on Chemistry (UG)

4. Orders of the Vice Chancellor under Section 10 (17), Chapter III of the Mahatma Gandhi University Act 1985, dated 23.05.2026.

ORDER

The syllabi of various Honours Under Graduate Programmes coming under The MGU-UGP (Honours) Regulations, 2024, have been approved vide paper read as (1) above and published on the website of the University.

The Expert Committee on Chemistry (UG), deliberated on modifying the **Course Outcomes, Course Content and pattern for End Semester Evaluation of the DSC, DSE and SEC** type courses in the **Fifth Semester** syllabus of **Bachelor of Science (Honours) Chemistry** programme and has submitted recommendations, vide paper read as (2) above. **(Recommendations are attached as Annexure).**

Considering the urgency of the matter, sanction has been accorded by the Vice Chancellor, in exercise of the powers of the Academic Council vested upon him under Section 10(17), Chapter III of the Mahatma Gandhi University Act 1985, vide paper read as (3) above, to approve the aforementioned recommendations.

Hence, the **Course Outcomes**, **Course Content and pattern for End Semester Evaluation** of the said courses in the **Fifth Semester** syllabus of **Bachelor of Science (Honours) Chemistry** programme stands modified to this extent.

Orders are issued accordingly.

SUDHA MENON J

ASSISTANT REGISTRAR III
(ACADEMIC)
For REGISTRAR

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2. PA to Registrar/CE
3. Convenor, Expert Committee, Chemistry(UG)
4. JR 2 (Admin)/DR 2, AR 3 (Academic)
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Section Officer

The document is digitally approved. Hence signature is not needed.

ANNEXURE

SEMESTER V

Course Name: Organic Chemistry – 3

Course Code : MG5DSCCHE300

Course Content

Content for Classroom transaction (Units)

Module	Units	Course description (Modified)	Hrs	CO No.	Page No.
1	**Nitrogen Containing Compounds**				
		No change	No change	No Change	100
2	**Ethers, Epoxides and Heterocyclic Compounds**				
		No Change	No change	No Change	100-101
3	**Active Methylene Compounds and Organic Photochemistry**				
		No change	No change	No Change	101
4		**Organic Chemistry – 3 Practicals**			101
		Qualitative Microscale analysis of organic compounds- Identification and preparation of derivatives of amines, amides and nitro-compounds, diamides. Preparation of m-dinitro benzene from nitro benzene Synthesis of methyl orange Synthesis of dihydropyrimidones using Biginelli Reaction	No change	No change	
5		**Teacher-Specific content**			

Mode of Assessment

End Semester Evaluation (Modified) **Practical** **Total Marks: 35** **Duration: 3 Hr**	**Page No.**
Lab report: 5 Marks Viva : 10 Marks Analysis and Procedure : 20 Marks	102

Course Name: Physical Chemistry- 2

Course Code: MG5DSCCHE301

Course Outcomes (CO)

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No. (Modified)	Page No.
1	Illustrate different aspects of structural, optical and electronic properties of ionic solids and liquid crystals.	No Change	No Change	104
2	Apply the fundamental principles of photochemistry to photochemical reactions			
3	Explain the fundamental laws of thermodynamics and its application in isothermal, adiabatic and Joule-Thomson expansion processes.			
4	Apply the principles of chemical thermodynamics to thermochemical processes and systems of variable compositions	A		
5	Apply principles of physical chemistry to conduct laboratory experiments.	A, S	1, 2, 4, 10	
6	Removed			

Course Content
Content for Classroom Transaction (units)

Module	Units	Course description (Modified)	Hrs	CO No. (Modified)	Page No.
1	1.1 1.2 1.3	No Change	No Change	1	105-106
2	2.1 2.2	No Change	No change	2	
3	3.1 3.2	No Change	No change	3	
	3.3 3.4	No Change	No Change	4	
4		1. Heat of neutralization 2. Heat of solution – KNO_3, NH_4Cl (Determination of heat of solution from solubility measurements) 3. Conductometric titrations – Strong acid against strong base and weak acid against strong base. 4. Surface tension - Determination of Parachor values 5. Determination of the composition of two liquids by surface tension measurements 6. Determination of CMC of surfactants by surface tension measurements	No change	5	
5		**Teacher-Specific content**			

Mode of Assessment

End Semester Evaluation (Modified) **Practical** **Total Marks: 35** **Duration: 3 Hr**	**Page No.**
Lab report: 5 Marks Viva : 10 Marks Analysis and Procedure : 20 Marks	107

Course Name: Quantum Mechanics, Spectroscopy & Group Theory

Course Code: MG5DSECHE300

Course Outcomes (CO)

CO No.	Course Outcome (Modified)	Learning Domains (Modified)	PO No (Modified)	Page No.
1	Demonstrate fundamental concepts of quantum mechanics and analyse how angular and radial wave functions collectively determine the shapes of atomic orbitals in simple systems.	An	1,2	109
2	Explain the principles of molecular spectroscopy and analyse rotational and vibrational spectra to determine molecular properties.	No Change	1,2	
3	Explain the principles of electronic and NMR spectroscopy, and analyse spectral features to interpret electronic transitions, molecular orbitals, and nuclear environments in molecules		1,2	
4	Deduce symmetry elements and assign point groups in molecules, and develop group theoretical rules to construct multiplication tables, matrix representations, and classes.	A	1,2,4,5, 10	
5	Removed			

Course Content
Content for Classroom Transaction (Units)

Module	Units	Course description	Hrs	CO No. (Modified)	Page No.
		Quantum Mechanics			
1	1.1	No Change	No Change	1	110
	1.2				
	1.3				
	1.4				
	1.5				
	1.6				

2	2.1	No Change	No change	2	110-111
	2.2				
	2.3				
3	3.1	No Change	No change	3	
	3.2				
4	4.1	No Change	No change	4	
	4.2				
	4.3				
	4.4				
5		**Teacher-Specific content**			

Course Name: Green Chemistry for Sustainable Development

Course Code: MG5DSECHE301

Course Outcomes (CO)

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No. (Modified)	Page No.
1	Familiarize the basic concepts and importance of green chemistry and recognize its twelve principles	No Change	No Change	114
2	Evaluate the adverse effects of chemicals to environment, select safer green methods for synthesis and apply suitable energy efficient processes.	E		
3	Identify alternative methods and solvents for green synthesis using green reagents	No Change		
4	Deduce the importance of green technologies in sustainable growth and develop cleaner production and treatment mechanisms for pollution prevention.	U		
5	Removed			
6				
7				

Course Content

Content for Classroom Transaction (Units)

Module	Units	Course Description	Hrs.	CO No. (Modified)	Page No.
1	**Introduction to Green Chemistry**				115-116
	1.1	No Change	No change	1	
	1.2			1	
2	**Prevention and minimization of toxic materials (green alternatives)**				
	2.1	No Change	No change	2	
	2.2			2	
	2.3			2	
	2.4			2	
3	**Green Synthesis**				
	3.1	No Change	No change	3	
	3.2			3	
4	**Phase transfer catalysts and green industrial processes**				
	4.1	No Change	No change	4	
	4.2			4	
5	**Teacher Specific Content**				

Course Name: Environmental Chemistry

Course Code: MG5DSECHE302

Course Outcomes (CO)

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No (Modified)	Page No.
1	Develop a comprehensive understanding of environmental planning principles, energy conservation and sources, environmental pollution, impact assessment methods, environmental management systems, and the toxicity of	A	No Change	

	environmental pollutants on living systems.			118-119
2	Understand the types, sources, and effects of water and thermal pollution, and illustrate appropriate methods for sampling and measurement of water quality.	U	No Change	
3	Explain the concepts of primary air pollutants, their effects of atmospheric pollution such as acid rain, ozone layer depletion and accidents, and understand the basic techniques of sampling and analysis of air pollutants.	U		
4	Analyse the soil composition, reactions, soil sampling techniques and management of sustainable agricultural and environmental practices.	An		
5	Build a comprehensive idea about effluent, and wastewater treatment methods, biological agents in pollution control and waste management principles	A		
6	Removed			
7				
8				

Course Content

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No. (Modified)	Page No.
1	**Environmental Management, Impact Assessment and Chemical Toxicology**				119
	1.1	No change	No change	1	
	1.2				
	1.3				
2	**Water Pollution**				
	2.1	No change	No change	2	
	2.2				
3	**Air Pollution and Lithosphere**				
	3.1	No change	No change	3	

	3.2	No change	No change	3	119-120
	3.3			4	
4	**Effluent and Waste Management**				
	4.1	No change	No change	5	
	4.2				
	4.3				
5	**Teacher Specific Content**				

Course Name: Nanotechnology for Energy Applications

Course Code: MG5DSECHE303

Course Outcomes (CO)

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No	Page no
1	Analyze global energy requirements, classify conventional and non-conventional energy sources, and examine challenges in energy conversion, transport, and sustainability.	An	No Change	122
2	Analyze the principles and working of photovoltaic systems and fuel cells, including different types of solar cells and nanomaterial-based energy conversion technologies.	No Change		
3	Understand the working principles, materials, and design of energy storage systems such as batteries, capacitors, and hydrogen storage technologies.	U		
4	Understand the structure and role of advanced nanomaterials, including carbon-based materials, MOFs, COFs, and two-dimensional materials in energy storage and conversion	No Change		
5	Removed			
6				
7				

Course Content

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No. (Modified)	Page No.
1		**Introduction to energy technologies**			123-124
	1.1	No Change	No Change	1	
	1.2				
	1.3				
2		**Nanomaterials for Energy Conversion**			
	2.1	No Change	No Change	2	
	2.2				
	2.3				
3		**Nanomaterials for Storage Technology**			
	3.1	No Change	No Change	3	
	3.2				
	3.3				
4		**State-of-the-art materials in Energy storage and conversion**			
	4.1	No Change	No Change	4	
	4.2				
	4.3				
5	**Teacher Specific content**				

Mode of Assessment

A. Continuous Comprehensive Assessment (CCA) **Theory** **Total Marks: 30 (Included)**	**Page No. 124**

Course Name: Main Group Elements
Course Code: MG5DSECHE305

Semester	V	Credits	4 (Included)	Page No. 130

Course Name: Analytical Techniques and Chemistry of Cosmetics (Modified)
Course Code: MG5SECCHE300

Course Name (Modified)	Analytical Techniques and Chemistry of Cosmetics	Page No. 134

Syllabus Index (Modified) Page No.9

Course Code	Title of the Course (Modified)	Type of Course DSC,DSE,MDC etc.	Credit	Hours/ Week	Hour Distribution/ Week			
					L	T	P	O
MG5SECCHE300	Analytical Techniques and Chemistry of Cosmetics	SEC	3	3	3		0	

Course Outcomes (CO)

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No (Modified)	Page No.
1	Apply fundamental principles of analytical chemistry to perform sampling, analyze soil and water quality.	A	1,2,4,10	134
2	Understand the principles of chromatography and apply different chromatographic techniques to separate, analyze, and interpret chemical components.	A	1,2,10	
3	Explain the classification, preparation, properties, physiological effects, quality control, and regulatory aspects of cosmetics and hand care products.	U	4,9, 10	
4	Explain the structure of hair, classification and formulation of hair care products such as hair dyes, shampoos, and conditioners, and understand industrial practices.	U	4,9,10	
5	Removed			

Course Content
(Content for Classroom Transaction (Units))

Module	Units	Course description (Modified)	Hrs (Modified)	CO No. (Modified)	Page No.
		Analytical Chemistry			
1	1.1 1.2 1.3	No Change	No Change	1	
		Chromatographic techniques			
2	2.1 2.2 2.3	No Change	No change	2	
		Chemistry of Cosmetics			
3	3.1	Cosmetics- Definition, Classification, significance, quality control and Regulations.	3	3	135
	3.2	Introduction to skin care cosmetics: Classification, chemicals, properties, physiological effects. General Ingredients and Preparation of -creams, powder.	4		
	3.3	Chemistry of Hand care products- Nail preparation Structure of nail, Nail lacquers, Nail polish remover.	4		
	3.4	Chemistry of hair care products- Structure of hair, Hair dye- classification – temporary, semipermanent, permanent, formulation, Shampoo- types of shampoo, conditioners. ● Industrial visit ● Interaction with industrial experts	4	4	
4		**Teacher-Specific content**			

Mode of Assessment

All DSC type Courses

End Semester Evaluation : Theory (Modified) **Total Marks: 50** **Duration: 1.5 Hrs**			
Course Code & Course Name	**Type of Questions**	**Number of Questions to be Answered**	**Total Marks**
MG5DSCCHE300: Organic Chemistry-3 MG5DSCCHE301: Physical Chemistry-2	Multiple Choice Questions	10 out of 10	10 x 1 =10
	Short Answer Questions	4 out of 6	4 x 5 = 20
	Short Essay	2 out of 4	2 x 10 = 20

All DSE Type Courses

End Semester Evaluation : Theory (Modified) **Total Marks: 70** **Duration: 2 Hrs**			
Course Code & Course Name	**Type of Questions**	**Number of Questions to be Answered**	**Total Marks**
MG5DSECHE300: Quantum Mechanics, Spectroscopy & Group Theory MG5DSECHE301: Green Chemistry for Sustainable Development MG5DSECHE302: Environmental Chemistry MG5DSECHE303: Nanotechnology for Energy Applications MG5DSECHE304: Medicinal Chemistry MG5DSECHE305: Main Group Elements	Very Short Answer Questions	10 out of 12	10 x 2 =20
	Short Answer Questions	6 out of 8	6 x 5 = 30
	Short Essay	2 out of 4	2 x 10 = 20