SEMESTER S3

CHEMISTRY LAB

Course Code	PCPOL307	CIE Marks	50
Teaching Hours/Week (L: T:P: R)	0:0:3:0	ESE Marks	50
Credits	2	Exam Hours	2 Hrs. 30 Mins
Prerequisites (if any)	Basic Engineering Chemistry	Course Type	Lab

Course Objectives:

1. The chemistry lab is structured to teach skills in organic synthesis and analytical techniques.

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Expt. No.	Experiments
A	**Organic Synthesis:**
1	Synthesis of ethyl n- butyl acetoacetate by the acetoacetic ester condensation
2	Synthesis of 3- 3-nitrobenzoic acid from benzoic acid
3	Nitration of aromatic hydrocarbons.
4	Side-chain oxidation of aromatic hydrocarbons.
5	Benzoylation of phenols.
6	Preparation of solid esters.
7	Bromination of amines
B.	**Purification and characterization of organic compounds**
	Purification of organic compounds by fractionation, crystallization, and chromatography.
C.	**Separation of the components of a binary organic mixture**
D.	Liquid-liquid, liquid-solid, and solid-solid **Identify the components of the given binary mixture**

Course Assessment Method

(CIE: 50 marks, ESE: 50 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Internal Examination	Total
5	25	20	50

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	15	10	10	5	50

Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.

Endorsement by External Examiner: *The external examiner shall endorse the record*

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Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Examine and evaluate parameters for creating organic materials	**K4**
CO2	Utilize the analytical and chemical techniques to purify organic compounds.	**K3**
CO3	Develop precision in assessing organic compounds and mixtures	**K6**
CO4	Evaluate the characteristic features of organic mixtures	**K5**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO- PO Mapping (Mapping of Course Outcomes with Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO2	3	3										
CO3	2			2					1			
CO4		2							1			

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Advanced Organic Chemistry: A Practical Guide	Michael C. Pirrung	Wiley	2016
2	Organic Chemistry Laboratory Manual	John W. Lehman	Prentice Hall	4th edition, 2002
3	Vogel's Textbook of Practical Organic Chemistry	A.I. Vogel, B.S. Furniss, A. J. Hannaford, P.W.G. Smith, A. R. Tatchell	Longman Scientific &Technical	5th edition,1989
4	Organic Chemistry Laboratory Manual	R.K. Harris, J.R. Everett	Pergamon Press	1988

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Organic Chemistry: a Laboratory Manual	S. Mumtazuddin	Alpha Science International	2013
2	Practical Chemistry	A.O. Thomas	Scientific Book Centre	2003
3	Qualitative Organic Chemical Analysis	W.J. Criddle	Springer	2013
4	Comprehensive Practical Organic Chemistry: Qualitative Analysis	Universities Press	V.K. Ahluwalia, S. Dhingra	2004

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Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://youtu.be/KfWnDGDWWVI?si=0ShDF17241GMzfCb
2	https://onlinecourses.nptel.ac.in/noc22_cy42/preview
3	https://youtu.be/OPXs0u40GCY?si=C0YhuE6OzFfRrjKW
4	https://youtu.be/99-LEzfCn5I?si=l5JoRVPj73l_zgS_

Continuous Assessment (25 Marks)

Preparation and Pre-Lab Work (7 Marks)

- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
- Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

Conduct of Experiments (7 Marks)

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- Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
- Teamwork: Collaboration and participation in group experiments.

Lab Reports and Record Keeping (6 Marks)

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

Viva Voce (5 Marks)

- Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

Final Marks Averaging: The final marks for preparation, conduct of experiments, viva, and record are the average of all the specified experiments in the syllabus.

Evaluation Pattern for End Semester Examination (50 Marks)

Procedure/Preliminary Work/Design/Algorithm (10 Marks)

- Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
- Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
- Creativity and logic in algorithm or experimental design.

Conduct of Experiment/Execution of Work/Programming (15 Marks)

- Setup and Execution: Proper setup and accurate execution of the experiment or programming task.

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Result with Valid Inference/Quality of Output (10 Marks)

- Accuracy of Results: Precision and correctness of the obtained results.
- Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.

Viva Voce (10 Marks)

- Ability to explain the experiment, procedure results and answer related questions
- Proficiency in answering questions related to theoretical and practical aspects of the subject.

Record (5 Marks)

- Completeness, clarity, and accuracy of the lab record submitted