COURSE MODULE

Program Title	B. Pharmacy
Department	Pharmaceutical Chemistry
Course Title	Pharmaceutical Organic Chemistry -I

1. **NAME OF INSTITUTION** : Y. B. CHAVAN COLLEGE OF PHARMACY, AURANGABAD

2. **AFFILIATED UNIVERSITY** : DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

3. **DEPARTMENT** : Pharmaceutical Chemistry

4. **PROGRAM TITLE** : B. PHARM.

4.1. Program Outcomes (PO):

PO 01: Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO 02: Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO 03: Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO 04: Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 05: Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

PO 06: Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

PO 07: Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO 08: Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

PO 09: The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO 10: Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 11: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

5. COURSE SPECIFICATION :

5.1.Course Identification and General Information

a. Course Title:	Pharmaceutical Organic Chemistry-I	
b. Course Number/Code	BP 202T (Theory)	
c. Credit Hours	Theory	Practical
	45(3 Hrs/Week	60 (4Hrs. / Week)
d. Study level/semester at which this course is offered	B. Pharm II semester	
e. Pre-requisite	11^{th} & 12^{th} Chemistry	
f. Co-requisite	NA	
g. Program in which the course is offered	B Pharm	
h. Language of teaching the course	English	
i. Prepared by	Dr. Qazi Yasar	
j. Approved by HOD	Dr. K. G. Baheti	

5.2. Course Description:

This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and

methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

5.3. Course Objectives:

Upon completion of the course the student shall be able to

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds,
4. identify/confirm the identification of organic compound

6.0.Course Outcomes (COs) : (Min. 4 and Max. 6)

(Use Bloom's Taxonomy words)

After completion of course, the student should be able to

CO Code	Course outcome
CO 202.01	Classify organic compounds and write their nomenclature
CO 202.02	Write the method for the preparation of organic compound
CO 202.03	Recite the physical properties, qualitative test & uses of the organic compound as per course
CO 202.04	Explain the organic reaction mechanism
CO 202.05	Summarize factors affecting the rate of reaction

6.1. Knowledge and Understanding

(Alignment of POs to COs)

Course code (CO)	Program Outcome (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11
CO 202.01	H	--	H	L	L	--	L	L	--	M	M
CO 202.02	H	H	M	M	--	--	--	L	L	--	M
CO 202.03	L	H	L	L	M	--	--	L	L	L	M
CO 202.04	M	--	M	M	L	M	L	L	H	H	M
CO 202.05	H	M	M	H	--	L	--	L	L	L	M

Correlation levels 1, 2 or 3 as defined below:1: Slight (Low); 2: Moderate (Medium); 3: Substantial (High); If there is no correlation, put '-'

Teaching and Assessment Methods for achieving learning outcome:

Teaching Strategies(methods)/Tools used	Methods of Assessment
1. Display of detail study plan for each topic lectures 3. Power point Presentations 4. Discussions in class 5. Demonstrations 6. Problem Solving Sessions 7. Interactive Sessions 8. Brain storming 9. Assessment driven individual teaching . Providing the details of practical in the beginning of experiment 11. Hands on practical tech 12. Self and Independent learning method 13. Small group work (max 2/3 students) 14. Instructions and live demonstration 15. Oral presentation 16. Observations and analysis 17. Demonstration and experimental work 18. Self and Independent learning method 19. Small group work (max 2/3 students 20. Teaching with stereo models	1. Class test after completion of topic 2. Puzzle solving 3. Question answer discussion 4. Surprise test 5. Open book examination 6. Experiment evaluation 7. Practical performance 8. Viva voce examination 9. Tutorials 10. Laboratory Experimental Reports (daily assessment). 11. Written Examinations 12. Synopsis

6.2.Tools for the Teaching and learning

Theory subjects	Practical Subjects
1. PowerPoints presentation 2. Videos 3. Flash Card 4. Models 5. Software 6. Charts 7. Smart Boards 8. White boards 9. Online Platform	1. White boards 2. Glassware 3. Chemicals 4. Instruments 5. Equipment 6. Software 7. Models 8. Plants/Crude Drugs 9. Animal

6.3.COURSE CONTENT

6.1. Theoretical Aspect:

Order	Topic list/units	Subtopics list	Number of Weeks	Contact Hours
1	**Nomenclature and Isomerism**	• Common and IUPAC nomenclature of Alkanes, Alkenes, Alkynes • Common and IUPAC nomenclature of Alkyl halide, Alcohols, Amines • Common and IUPAC nomenclature of Carbonyl Compound, Carboxylic acid and functional derivative • Common and IUPAC nomenclature of Ethers, Polyfunctional compound • Structural Isomerism in organic compounds • Structural Isomerism in organic compounds	**1**	**2**
2	**Alkanes, Alkenes and Conjugated dienes**	• Hybridization in alkanes and alkenes; Stabilities of alkenes • Preparation Methods of alkanes • Chemical Property of alkanes; Halogenation of alkanes; uses of paraffin • Preparation Methods of alkenes: E1 and E2 reactions; Saytzeffs orientation; rearrangement of carbocation; E1 verses E2 reactions • Factors affecting E1 and E2 reactions • Chemical Property of alkenes: Addition reactions of alkenes Electrophilic & free radical addition reactions (Markownikoff's orientation,Anti Markownikoff's orientation.) • Chemical Property of alkenes: free radical addition reactions • (Anti Markownikoff's orientation.); Ozonolysis • Conjugated dienes: Dines type; Structure; Stability • Preparation Methods of Conjugated dienes • Chemical Property of Conjugated dienes: Diel-Alder, electrophilic addition, free radical addition reactions	**2**	**9**
3	**Alkyl halides and Alcohols**	• Stereochemistry; rearrangement of carbocations; Factors affecting SN1 • SN2:Mechanism; stereochemistry; Factors affecting SN2; SN1 versus SN2 reactions. • Preparation Methods of Alkyl halides • Chemical Property of Alkyl halides	**2**	**9**

		• Structure and uses of list of various alkyl halide • Preparation Methods of Alcohols • Chemical Property of Alcohols • Qualitative tests of Alcohols • Distinguish/ Identification of 1^0 ,2^0 and 3^0 alcohols		
4	**Carbonylcompounds**	• Preparation Methods of Aldehyde • Preparation Methods of Ketone • Structure and Electromeric effect in Carbonyl compounds • Chemical Property of Carbonyl compounds • Mechanism of Nucleophilic addition • Reactivity of Carbonyl compounds • Aldol condensation, Crossed Aldol condensation, • Benzoin condensation, Perkin condensation, • Cannizzaro reaction and Crossed Cannizzaro reaction • Qualitative tests of Carbonyl compounds	**2**	**8**
5	**Carboxylic acids and Aliphatic amines**	• Preparation Methods of Carboxylic acids • Chemical Property of Carboxylic acids: Acidity of carboxylic acids and factor affecting Acidity of Carboxylic acids • Chemical reaction of Carboxylic acids • Preparation Methods of Functional derivative of Carboxylic acids • Structure and uses of list of various Carboxylic acids • Preparation Methods of Aliphatic amines • Chemical Property of Aliphatic amines: Basicity, effect of substituent on Basicity; reaction with various reagent; Distinguish/ Identification of 1^0 ,2^0 and 3^0 • Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine	**2**	**6**
	TOTAL			**45**

6.2.Practical Aspects

Order	Name of Experiment	Number of Weeks
01	To study safety & general hazards in chemical laboratory & use of aid in accidental cases	one week
02	To study Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.	one week
03	To study elements detection like Nitrogen, Sulphur and Halogen by Lassaigne's test and perform solubility test for Identification of Nature of unknown organic compound.	one week

04	To perform systematic qualitative analysis test for Identification of unknown organic compound. (Acidic Compound)	one week
05	To perform systematic qualitative analysis test for Identification of unknown organic compound. (Basic compound)	one week
06	To perform systematic qualitative analysis test for Identification of unknown organic compound. (Neutral compound)	one week
07	To perform systematic qualitative analysis test for Identification of unknown organic compound. (Phenolic compound)	one week
08	Determination of Melting Point and Boiling Point of unknown organic compound.	one week
09	To Synthesize Aspirin from Salicylic Acid	one week
10	To synthesize Benzil from Benzoin.	one week
11	To synthesize Phthalimide from Phthalic anhydride.	one week
12	To synthesize 1-Nitronaphthalene from naphthalene.	one week
13	To synthesize Acetanilide from Aniline	one week
14	To synthesize p-nitroacetanilide from Acetanilide	one week
15	Construction of molecular models of Organic Compound	one week

7.0. ASSESSMENT MECHANISM:

Sr. No.	Assessment Mechanism	Week due	Marks	Proportion of Final Assessment
1	Assignments, Exercises & Home works	2nd week of every month	10	6%
2	Sessional (Internal Theory exam)	As per scheduled examination	15	10%
3	Continuous Practical Assessment (Sessional Practical exam)	Weekly during practical's	15	10%
4	Final exam (theory)	As per University at end of course	75	50%
5	Final exam (practical)		35	24%
Total			150	**100%**

8.0.STUDENT SUPPORT:

Office hours/week	Other procedures
Two hours minimum	

9.0.TEACHER'S AVAILABILITY FOR STUDENT SUPPORT:

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Time	Available whole day (specially 4.00 to 5.00 pm)	Available whole day (specially 4.00 to 5.00 pm)	Available whole day (specially 4.00 to 5.00 pm)	Available whole day (specially 4.00 to 5.00 pm)	Available whole day (specially 4.00 to 5.00 pm)	Available whole day (specially 4.00 to 5.00 pm)

10.0. LEARNING RESOURCES:

Sr.No.	Title of Learning Material	Details
1	Text books	1. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl. 2. Organic Chemistry by Morrison and Boyd 3. Organic Chemistry by P.L.Soni 4. Organic Chemistry by I.L. Finar, Volume-I
2	Essential references (as per syllabus)	1. Practical Organic Chemistry by Mann and Saunders. 2. Vogel's text book of Practical Organic Chemistry 3. Advanced Practical organic chemistry by N.K.Vishnoi. 4. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz. **5.** Reaction and reaction mechanism by Ahluwaliah/Chatwal.
3	Reference material	Hand Written Notes.
4	E-materials and websites	Soft copies (word/Pdf files), PPT's.
5	Other learning material	Handouts

11.0. FACILITIES REQUIRED:

Sr.No.	Particular of Facility Required
1	Lecture Rooms (capacity for 60 students)
2	Laboratory (capacity for 20 students)

3	Computing resources: PC with latest version and hardware/software and utilization of open source and licensed application software
4	Other resources: Appropriate laboratory tools, Chemicals, Glass ware, Apparatus, Instrumentation

12.0. COURSE IMPROVEMENT PROCESSES:

12.1. Strategies for obtaining student feedback on effectiveness of teaching:

Course delivery evaluation by students using: Questionnaire forms and online questionnaires

12.2. Other strategies for evaluation of teaching by the instructor or by the department:

Periodic review by Academic Planning & Monitoring Committee and departmental review committee, Observations and assistance of colleagues, External assessments by advisors/ examiners and auditors.

12.3. Process for improvement of teaching:

Use of ICT tools, teaching aids, Simultaneous practical orientation and theory classes (SPOT), Adoption of reflective teaching.

12.4. Describe the planning procedures for periodically reviewing of course effectiveness and planning for improvement:

Periodic review by departmental meeting, Review of course delivery and outcome through assessment and feedback from all stake holders.

12.5. Course development plans:

Provide inputs for course improvement and update to University Course development Committees (Board of Studies)

13.0. INFORMATION ABOUT FACULTY MEMBER RESPONSIBLE FOR THE COURSE:

Name	Dr. Qazi Yasar
Location	Pharm. Organic Chemistry Lab., Ground Floor.
Contact Detail (e-mail &cell no.)	ykkazi@gmail.com 8975608874
Office Hours	10:00 AM to 5:00 PM