# SCHOOL OF ARCHITECTURE, SCIENCE AND TECHNOLOGY YASHWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY



AST, YCMOU, Nasik - 422 222, MS, India

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- **♦ Publication** : 30/09/ 2021,
- ◆ Price: <u>Free Download from Website</u>. No Print Copy.
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Programme Objective and Scope	7
Mode of Education	7
Mode of Examination	7
Basic Information	7
Eligibility and Fees	8
Programme Structure	8
Teaching-Learning Scheme:	9
Years and Courses	
Grading System	
Evaluation Pattern	
Successful Completion of Course or Programme	12
Year 1	
CHE011: INORGANIC CHEMISTRY	
Programme Information	
Course Information	
Presumed Knowledge and Learning Objectives	
Units	13
Detailed Syllabus	14
Learning Resource Details	
CHE012: ORGANIC CHEMISTRY	17
Programme Information	
Course Information	
Presumed Knowledge and Learning Objectives	
Units	
Detailed Syllabus	
Learning Resource Details	
CHE013: Physical Chemistry	22
Programme Information	
Course Information	22
Presumed Knowledge and Learning Objectives	22
Units	
Detailed Syllabus	
CHEU14: MATHEMATICS, BIOLOGY, SPECTROSCOPY & COMPUTERS	
Programme Information	

# CONTENTS

Course Information	26
Presumed Knowledge and Learning Objectives	26
Units	26
Detailed Syllabus	27
Learning Resource Details	29
CHE015- Inorganic Chemistry( Practical)	
Programme Information	
Course Information	
Presumed Knowledge and Learning Objectives	
Units	
Detailed Syllabus	
Learning Resource Details	
CHE016: Organic Chemitry( Practical)	
Programme Information	
Course Information	
Presumed Knowledge and Learning Objectives	
Units	
Detailed Syllabus	
Learning Resource Details	
CHE017: Physical Chemistry( Practical)	
Course Information	
Presumed Knowledge and Learning Objectives	
Units	
Detailed Syllabus	
Learning Resource Details	
CHE018 :Spectroscopy & Computers (Practical)	41
V132:MSc.(Chemistry)	
Course Information	41
Presumed Knowledge and Learning Objectives	41
Units	41
Detailed Syllabus: CHE018	42
Learning Resource Details	42
Year 2	44
CHE021: ORGANIC Reaction Mechanisms- II ,Pericyclic Reactions, Org	ganic Photochemistry 
Programme Information	ΔΔ
Course Information	44
Presumed Knowledge and Learning Objectives	

Units	
Detailed Syllabus	
Learning Resource Details	47
CHE022: Organic Chemistry-Synthetic Organic Chemistry	49
Programme Information	
Course Information	
Presumed Knowledge and Learning Objectives	
Units	
Detailed Syllabus	51
Learning Resource Details	
CHE023: Organic Chemistry-Natural Products, Hetrocycles, Biogenesis	And Spectroscopy54
Programme Information	
Course Information	54
Presumed Knowledge and Learning Objectives	54
Units	54
Detailed Syllabus	
Learning Resource Details	57
CHE024: Organic Chemistry-Drugs And Pharmaceuticals.	
Programme Information	
Course Information	
Presumed Knowledge and Learning Objectives	
Units	
Detailed Syllabus	60
Learning Resource Details	61
CHE025 :Organic Chemistry- Separation & Identification Of Organic C	ompounds(Practical)62
Programme Information	62
Course Information	62
Presumed Knowledge and Learning Objectives	62
Units	62
Detailed Syllabus	63
Learning Resource Details	64
CHE026: ORGANIC CHEMISTRY - Separation And Identification Of Org Chromatography(Practical)	anic Compounds And
Programme Information	65
Course Information	65
Presumed Knowledge and Learning Objectives	65
Detailed Syllabus	
Learning Resource Details	67
<u> </u>	-

CHE027: Synthesis Of Organic Compound And Isolation Of Natural Products (Pr	actical)69
Programme Information	69
Course Information	69
Presumed Knowledge and Learning Objectives	69
Units	69
Detailed Syllabus	71
Learning Resource Details	71
CHE028 : ORGANIC CHEMISTRY- SYNTHESIS AND ANALYSIS OF DRUGS(PRACTIC	AL)73
Programme Information	73
Course Information	73
Presumed Knowledge and Learning Objectives	73
Units	73
Detailed Syllabus	75
Learning Resource Details	75
END OF DOCUMENT	76

# SYLLABUS FOR

# V132: M.Sc. (CHEMISTRY){2021 PATTERN}

## PROGRAMME OBJECTIVE AND SCOPE

This programme is designed to achieve following objectives and scope.

**Objectives**: After successful completion of this programme, students will be able to

- Inculcate critical thinking and analytical skills to enable students to pursue higher studies and research in Chemistry.
- Provide a strong foundation for a better understanding of current advances in Chemistry and its practical significance.
- Expose students to current trends in research about Chemistry.

**Scope of the programmes:** After successful completion of this programme, students may get opportunities in various fields/sectors to work as

- Career opportunities in both private and government sector/ in India and abroad
- Job opportunities in sectors like chemical, pharma & petroleum industries, Indian Forest Services, National Chemical Laboratories, Scientist, etc
- Inculcation of research attitude
- Inculcation of entrepreneurship
- Perceive higher education and research in the same or allied fields
- Candidates who have advanced qualifications can pursue either an academic career in institutions as **lecturers and professors or a scientific career** in various scientific positions
- They can also go and work **as Researchers and as administrators.**

## MODE OF EDUCATION

This Programme will be offered in Open and Distance Learning (ODL) Mode as defined in "UGC Open and Distance Learning Programmes and Online Programmes Regulations, 2020" published in the gazette notification by dated 4<sup>th</sup> Sept 2020 by the UGC as specified below.

"Open and Distance Learning Mode means a mode of providing flexible learning opportunities by overcoming separation of teacher and learner using a variety of media, including print, electronic, online and occasional interactive face-to-face meetings with the learners or Learner Support Services to deliver teaching-learning experiences, including practical or work experiences"

## MODE OF EXAMINATION

Continuous Assessment is conducted at recognized learner support centres/ study centres and End Examination for all type of courses is conducted at recognized Exam Centres of the University under supervision.

## **BASIC INFORMATION**

- 1. Mode of Education: Open and Distance Learning (ODL) Mode
- **2. Minimum Programme Duration**: 2 years/ 4 semesters after Candidates with B.Sc. (PCM)/ B.Sc. Pass with Chemistry at FY and SY or Equivalent pass
- 3. Learner Support Centers/ Study Centers: University approved/ recognized Senior Science Colleges/ Institutes
- 4. Medium of Instruction: English

- 5. Attendance: Minimum 80% attendance for all type of courses.
- 6. Minimum Programme Duration:2 years after Graduation
- 7. Teaching-Learning: 36 working weeks per year
- 8. Total Teaching-Learning Support: 960 Hours in each year
- 9. Total Courses: 16 courses (subjects) at year 01-02
- **10. Total Credits:** 48 Credits. As per UGC norms 1 Credit means 30 hours of study efforts required to gain learning of particular content of each credit.
- 11. Year Credits: 24 Credits in each year (16 credits for Theory and 08 credits for Practical).

#### 12. Total Courses and Credit Points:

in iour courses a						
Year	Theory	Practical	Credits			
01	4	4	24			
02	4	4	24			
Total credits			48			

**13.Passing:** Minimum 40% or better marks

#### 14. Credit Transfer:

- **15. Continuous Assessment:**Continuous Assessment conducted for Continuous evaluation during teachinglearning for 20% Weightage
- 16. End Exam:End Examination conducted for Summative evaluation of the student for80% Weightage
- **17. Degree Certification:** Aggregate performance and Class in the programme reported on the basis of performance.
- **18.** Curriculum Design: Student centric curriculum is designed to enable professional ability, employability and skill enhancement.
- 19. Approval/Equivalence Status: UGC Approved. UGC-DEB Approval is available on UGC Website

### ELIGIBILITY AND FEES

Admission Eligibility	Certification Eligibility	<b>Fees and Deposit / Year</b> UF is payable for a year to the university at the time of online admission			
	Min 40% or better	Description	INR ₹		
B.Sc. (PCM)/ B.Sc. with Chemistry at	marks, in all Theory type of courses, with total 48 credits at Year 01 to 02	University Fee (UF)	8000		
FY and SY or equi Passed or Equivalent pass		Study Center/ Learner Support Center Fee (LSCF)	12,000		
		Total ≈	20000		
		<b>Refundable LD</b> (Payable only when student choose to avail Library Facility at the SC)	1,500		

## **PROGRAMME STRUCTURE**

	V132:M.Sc.(CHEMISTRY){2021 Pattern}					
Course 🗲	Course 01,	Course 02,	Course 03,	Course 04,		
year♥	4 CR, T	4 CR, T	4 CR, T	4 CR, T		
Year 1	CHE011: Inorganic	CHE012: Organic	CHE013: Physical Chemistry	CHE014: Mathematics,		
Theory	Chemistry	Chemistry		Biology, Spectroscopy and		
16 CR				Computers		
Course 🗲	Course 05,	Course 06,	Course 07,	Course 08,		
	2 CR, P	2 CR, P	2 CR, P	2 CR, P		

Year 1	CHE015: Inorganic	CHE016: Organic	CHE017: Physical Chemistry	CHE018: Spectroscopy and		
Practical	Chemistry (Practical)	Chemistry (Practical)	(Practical)	Computers (Practical)		
8 CR						
Course 🗲	Course 01,	Course 02,	Course 03,	Course 04,		
	4 CR, T	4 CR, T	4 CR, T	4 CR, T		
Year 2	CHE021: Organic	CHE022: Organic	CHE023: Organic Chemistry -	CHE024: Organic Chemistry -		
Theory	Reaction Mechanisms-	Chemistry - Synthetic	Natural	Drugs and Pharmaceuticals		
16 CR	II, Pericylic	Organic Chemistry	Products, Heterocycles, Bioge			
	Reactions,Organic		nesis and Spectroscopy			
	Photochemistry,					
	Stereochemistry-II					
Course 🗲	Course 05,	Course 06,	Course 07,	Course 08,		
	2 CR, P	2 CR, P	2 CR, P	2 CR, P		
Year 2	CHE025: Organic	CHE026: Organic	CHE027: Synthesis of	CHE028: Organic Chemistry -		
Practical	Chemistry - Separation	tion Chemistry - Separation and Organic Compounds and	Organic Compounds and	Synthesis and Analysis of		
8 CR	and Identification of	Identification of Organic	Isolation of Natural Products	Drugs (Practical)		
	Organic Compounds	Compounds and	(Practical)			
	(Practical)	Chromatography(Practical)				

# TEACHING-LEARNING SCHEME:

Description	Total 8 (Twelve) Theory Courses in Programme Total 8 (Eight)Practical Courses in Programme
Face-to-face Counselling Sessions for interaction, problem solving	12 hrs each of 01 clock hour duration for each Theory Course of 4 Credits, Study Hours – 60
and conduction of practical activities at Study Centre	12 hrs each of 02 clock hour duration for each Practical/ Activity Course of 2 Credits, Study Hours – 60
Delivery of Information	<b>o8</b> Books in SLM format: <b>30</b> Hours/ for each <b>o8</b> WorkBooks in SLM format: <b>60</b> Hours/ for each
Self-Study, Learning Evaluation and Feedback	(1) Solving Problems, Self-Tests, SAQs and Exploring more Details on Text-Book: <b>30</b> Hours
Total Study Hours	(8 x 60 = <b>480</b> Hours + 8 x 60 = <b>480</b> Hours) = 960 Hours

## YEARS AND COURSES

SN	Code	Name	CAT	EE	тм	Туре	Credits	Min %
	Year 01: 24 Credits							
01	CHE011	CHE011 Inorganic Chemistry 20 80 100		100	Т	4	40%	
02	CHE012	Organic Chemistry	20	80	100	Т	4	40%
03	CHE013	Physical Chemistry	20	80	100	Т	4	40%
04	CHE014	Mathematics, Biology, Spectroscopy and Computers	20	80	100	Т	4	40%
05	CHE015	Inorganic Chemistry (Practical)	10	40	50	Р	2	40%
06	CHE016	Organic Chemistry (Practical)	10	40	50	Р	2	40%
07	CHE017	Physical Chemistry (Practical)	10	40	50	Р	2	40%
08	CHE018	Spectroscopy and Computers (Practical)	10	40	50	Р	2	40%
		Year 02: 24 Credits						
01	CHE021	Organic Reaction Mechanisms-II, Pericylic Reactions,Organic Photochemistry, Stereochemistry-II	20	80	100	т	4	40%
02	CHE022	Organic Chemistry - Synthetic Organic Chemistry	20	80	100	Т	4	40%
03	CHE023	Organic Chemistry - Natural Products ,Heterocycles,Biogenesis and Spectroscopy	20	80	100	Т	4	40%
04	CHE024	Organic Chemistry - Drugs and Pharmaceuticals	20	80	100	Т	4	40%
05	CHE025	Organic Chemistry - Separation and Identification of Organic Compounds (Practical)	10	40	50	Ρ	2	40%
06	CHE026	Organic Chemistry - Separation and Identification of Organic Compounds and Chromatography(Practical)	10	40	50	Ρ	2	40%
07	CHE027	Synthesis of Organic Compounds and Isolation of Natural Products (Practical)	10	40	50	Р	2	40%
08	CHE028	Organic Chemistry - Synthesis and Analysis of Drugs (Practical)	10	40	50	Р	2	40%

## **GRADING SYSTEM**

- 1. "Absolute Grading": the marks are converted to grades based on pre-determined class intervals.
- 2. **"Letter Grade**": It is an index of the performance of students in a said programme. Grades are denoted by letters O, A+, A, B+, B, C, P and F.
- 3. "**Grade Point**": It is a numerical weight allotted to each letter grade on a 10-point scale. Grade Point shall be "o (Zero)" for Letter Grade "Ab" and "F". The marks scored by the examinee shall be converted into grade points by dividing the marks scored in the aggregate and dividing the resulting number by maximum marks, multiplying the result by ten, retaining the integer part (ignore the fractional part). Thus if a person has secured 56 marks out of 100 marks in aggregate for a course, we get (56/100) x 10 which is 5.6. Ignoring the fraction, we get 5 as the grade point.

Letter Grade	Grade Point	Class
0	10	Outstanding
A+	9	Excellent
А	8	Very Good
B+	7	Good

Letter Grade	Grade Point	Class
В	6	Above Average
С	5	Average
Р	4	Pass
F	0	Fail
Ab	0	Absent

- 4. **"Credit Point**": It is the product of grade point and number of credits for a course.
- 5. **"Semester Grade Point Average (SGPA)**": It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
- 6. **"Cumulative Grade Point Average (CGPA)**": It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
- 7. **"Transcript or Grade Card or Certificate**": Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

## **EVALUATION PATTERN**

SN	Type of Course	Continuous Assessment	End Examination
1	Theory (T)	"Continuous Assessment ( <b>CA</b> )" of total 20marks and total 4 SAQs, each of 5 marks, 1 SAQ on each CB in a Single	"End Examination (EE)" of total 80Marks and 16 "Short Answer Questions (SAQs)" each of 05 marks (4 out of 5 SAQs on each Credit), during 150
		attempt only	Minutes. (80%)

- 1. Separate <u>and</u> independent passing @ 40% in EE and (CAT+EE) shall be essential for Theory and Practical component of <u>each</u> course. "CA, EE and Total marks" shall be separately reported for each course in the transcript or mark-statement.
- 2. **Only 1 attempt** for EE for **each**course shall be allowed in **each**semester. **Maximum 2 attempts**, for CAT for **each**course, shall be allowed in **each**semester.
- 3. Only best of past performance shall be reported in transcript or mark statement.
- 4. Total student evaluation for
  - a. **Each**semester shall be for **500** marks.
  - b. Eachyear shall be for 1000 marks
  - c. **Each**regularPG degree shall be for **2000** marks.

## SUCCESSFUL COMPLETION OF COURSE OR PROGRAMME

- 1. "Successful Completion of the Course" means either course is exempted or student gets minimum specified or better grade, either in end examination of that course or by credit transfer. A student obtaining grade "F" shall be considered failed and will be required to reappear in the examination. The student obtained minimum "P" (Pass) letter grade required for successful completion of the each course.
- 2. "Successful Completion of the Programme" means all courses at all semesters are successfully completed and the student obtained "P" (Pass) letter grade for all courses at all semesters along with minimum specified SGPA and CGPA.

# CHE011: INORGANIC CHEMISTRY

### **PROGRAMME INFORMATION**

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(CHEMISTRY)

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	CA	EE	ТМ	Туре
01	CHE011	INORGANIC CHEMISTRY	4	8	120	20	80	100	Т

## PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives		
For successful completion of this course, student should have successfully complete: • B.Sc. with CHEMISTRY or equivalent from a recognized University/Board	<ul> <li>After successful completion of this course, student should be able to</li> <li>Name specialize structure, systems and functions presented for each specimen.</li> </ul>		
recognized oniversity, bound.	· Introduction between iving and non iving.		

UN	Name of the Unit	CSs	Questions		
01-01	Symmetrical operations and symmetry elements		Student is required to answer		
	Mathematical Rules of Groups		4 of 5 SAQ, eachof 5 marks,		
01-02			on eachCR		
	Molecular Point Groups				
01-03		CR 01			
	Group multiplication Tables				
01-04					
01-05	Symmetry and Properties of molecules				
01.00					
02-06	Crystal Field Theory		Student is required to answer 4 of 5 SAQ, eachof 5 marks,		
	Ligand field Parameters		on <mark>each</mark> CR		
02-07		CR 02			
02-08	Molecular Orbital Theory				
02-09	Free Ion Terms and Energy Levels.				

	Orgel Diagrams		
02-10			
03-11	Labile and Inert Complexes		Student is required to answer 4 of 5 SAQ, eachof 5 marks,
03-12	Substitution Reaction Mechanisms of octahedral Complex		on <mark>each</mark> CR
03-13	Substitution Reaction Mechanisms of Square Planar	CR 03	
03-14	Electron Trasfer Reaction Mechanisms.		
03-15	Reaction Mechanisms of Organometallic Compounds		
04-16	Stability constants of Metal complexes		Student is required to answer 4 of 5 SAQ, eachof 5 marks,
04-17	Methods of Determination of stability constants	CR 04	on <b>each</b> CR
04-18	Ligational aspects of Diatomic Molecules		
04-19	Metal Clusters		
04-20	Coordination Chemistry of Metal Ions in Biomolecules		

UN	Detailed Syllabus of the Unit	CR		
01-01	<b>Symmetry operations and Symmetry elements:</b> Aims and objectives, concepts of symmetry in molecules,Symmetry operations-Definition, types of symmetry operations, Symmetry Elements,Rotational axis of symmetry (CN), Types of rotational axes, Plane of symmetry, Types of planes of symmetry, Types of planes of symmetry, Types of planes of symmetry, molecules with vertical and dihedral planes, Distinction between vertical and dihedral planes, Horizontal planes, Improper rotational axis, Center of symmetry /center of inversion, Identity element, summary, Terminal Examination Model Questions.	CR 01		
01-02	Mathematical Rules of Groups Abelian and Non-Abelian: Aims and Objectives, Group Generating elements, Important relations in symmetry elements, Properties of a point group Inverses of elements, summary, Terminal Examination Model Questions.			
01-03	Molecular Point Groups: Aims and objectives, molecular point groups, Labeling the point groups, Classification of molecules into point groups, molecules of low symmetry, molecules of high symmetry, molecules of special symmetry, systematic classification of molecules into point groups, Flow-chart for classification of molecules into point groups, Exercises onpoint groups summary Terminal examination Model Questions			
01-04	<b>Group Multiplication Tables:</b> Aims and Objectives, what are Group Multiplication tables, Rules for construction of GMTs ,Types of GMTs, Subgroups ,Classes of elements, more on classes, summary, Terminal Examination Model Questions.			
01-05	Symmetry Properties Of Molecules- Molecular Polarity, Chirality and optical Activity: Aims and Objectives, molecular Polarity and Symmetry, Polar Diatomic Molecules, Polar Polyatomic Molecules, Symmetry Criteria for Molecular Polarity, Polar Molecules, Non polar Molecules, Molecular chirality and Symmetry, Optical Isomerism & Non-super impossibility Criteria, Symmetry and Optical Isomerism inOrganic Compounds, Symmetry and Optical Activity of Simple Inorganic Compounds, Symmetry and Optical Questions.			

02-06	<ul> <li>Crystal Field Theory-Splitting Of Metal d-Orbitals in Different Geometries: Aims and objectives, Introducation to crytal field theory, Sailent features of crystal field theory, Crystal field splitting of metal d- orbitals in an octahedral geometry, crystal field splitting in tetragonal geometry, Crystal field splitting in square planar geometry, Crystal field Splitting in tetrahedral geometry, Crystal field splitting in square pyramidal geometry, Crystal field splitting in trigonal bipyramidal geometry, Crystal field splitting in trigonal planar geometry, Crystal Field splitting in trigonal planar geometry, Crystal Field splitting in trigonal bipyramidal geometry, Crystal field splitting in trigonal planar geometry, Crystal Field splitting in linear geometry, Summary, Terminal examination model questions.</li> <li>Ligand Field Parameters: Aims and Objectives, Crystal field splitting energy and its determination, Crystal field stabilization energy and its calculation, Crystal field Stabilization energies for octahedral complexes: high-spin and low-spin complexes, Crystal field Stabilization energies for tetrahedral complexes , Factors affecting the magnitude of crystal field splitting, Spectrochemical series, Jahn-Teller effect, Limitations of Crystal field theory, Experimental evidence for metal-ligand bond covalency, Summary, Terminal examination model questions.</li> </ul>	CR 02
02-08	<b>Molecular Orbital Theory:</b> Aims and Objectives, Molecular Orbital Theory as applied to metal complexes, Molecular orbital diagrams of octahedral complexes, Molecular orbital diagrams of tetrahedral and square planar complexes, Summary, Terminal Examination model Questions.	
02-09	<b>Free Ion Terms Energy Levels:</b> Aims and Objectives, Electronic Configuration, Mirostates and Terms, L-S coupling, Terms for pN and dN configurations, Hole formulation, Hunds rule and Interelecton repulsion parameters, Summary, Terminal examination Model questions.	
02-10	<b>Electronic Spectra Of Transition Metal Complexes And Orgel Diagrams:</b> Aims and Objectives, Eletronic spectra of transition metal complexes-an introduction, Selection rules to electronic trasitions, Orgel diagrams, Summary, Terminal examination model questions.	
03-11	<b>Labile And Inert Complexes :</b> Aims and Objectives, Mechanism of a reaction ,Energy Profile of a Reaction, Intermediates, Trasition States , Energy profile of a catalyzed reaction, Labile and inert complexes, thermodynamic stability, Reactivity in terms of Valence Bond Theory, Reactivity in terms of Crystal Field Theory, Summary ,Terminal examination Model Questions.	
03-12	Sustitution Reaction Mechanisms Of Octahedral Complexes: Aims and Objectives, Substitution Reactions, Desiganation of Mechanisms, Langford-Gray Mechanistic Labels, Hughes-Ingold Mechanistic Labels, Substitution reactions of Octahedral Complexes, Acid Hydrolysis, Factors affecting Acid Hydrolysis, Base Hydrolysis,Sn1CB Mechanism or Dcb Mechanism, Reactions without Metal –Ligand Bond Cleavage, Summary, Terminal examination Model Questions.	CR 03
03-13	<b>Substitution Reaction Mechanisms of Square Planar Complexes:</b> AimAndObjectives, The Trans- Effect, Definition Of Trans-Effect, Trans-Effect Series, Application Of Trans-Effect, Theories Of Trans-Effect, Mechanism Of Substitution Reaction In Square Planer Complexes, Summary, Terminal Examination Model Questions.	
03-14	Electron transfer reaction mechanism: Aim And Objectives, Outer-Sphere Mechanism, Marcuss- Hush Theory, Inner-Space Mechanism, Nature Of The Bridging Ligand, Complementary Reactions, Non-Complementary Reactions, Summary, Terminal Examination Model Questions.	
03-15	<b>Reaction Mechanisms Of Organometallic Compounds:</b> Aim And Objectives, Isomerization Reactions, Oxidative Addition Reactions, Reductive Addition Reactions, Insertion Reactions, Reactions Of Alkenes, Hydrogenation, Oxidation, Hydroformylation, Polymerization, Metathesis, Monsanto Acetic Acid Process, Summary, Terminal Examination Model Questions.	
04-16	<b>Stability Constants Of Metal Complexes And Factors Influencing Stability::</b> Aim And Objectives, Stability Of Metal Complexes- Types Of Stability, Stepwise And Overall Stability, Constanty Trend In Stepwise Stability Constants, Pearson's Hard And Soft Acids And Bases (HSAB) Rule And Its Application, Factors Influencing Stability Of Metal Complexes, Pearson's Hard And Soft Acids And Bases (HSAB) Rule, Application Of HSAB Rule, Factors Affecting Stability Metal Complexes, Summary, Terminal Examination Model Questions.	CR 04
04-17	Methods Of Determination Of Stability Constants: Aim And Objectives, Determination Of	

	Stability Constants Of Metal Complexes, Spectrophotometric Methods, pH-Metric Method, Polarographic Method, Summary, Terminal Examination Model Questions.		
04-18	<b>Ligational Aspects Of Diatomic Molecules:</b> Aim And Objectives, Bonding Modes Of Carbon Monoxide To Metals, Bonding Modes Of Nitric Oxide To Metals, Bonding Modes Of Dinitrogen And Dioxygen To Metals, Summary, Terminal Examination Model Questions.		
04-19	9 Metal Clusters: Aim And Objectives, Metal Carbonyl Clusters, Metal Halide Clusters, Metal Carboxylate Clusters, Summary, Terminal Examination Model Questions.		
04-20	<b>Coordination Chemistry Of Metal Ions In Biomolecules:</b> Aim And Objectives, Metal Ions In Biological Systems, Principles Underlying Biological Selection Of Elements, Biochemistry Of Iron, Transport And Storage Proteins Of Irons, Respiratory Proteins- O2 Carriers, Electron Carriers-Cytochromes And Fe-S Proteins, Enzymes Of Iron, Biochemistry Of Copper, Types Of Copper Centers, Respiratory Proteins- O2 Carrier (Hemocyanin, Hc), Biochemistry Of Zinc, Photosynthesis And Chlorophyll, Nitrogen Fixation, Summary, Terminal Examination Model Questions.		

LR Code	Title	Edition	ISBN			
	Author	Year	Publisher			
Course Websit	e Link for (1) Mobile and Online Lectures, (2) Discussion Foru	m for onlir	ne interaction and (3)			
Self-Test for ea	ch CR Block, Continuous Assessment Test and End Examination					
CHE011	Inorganic Chemistry					
Text-Books						
CHE011	Inorganic Chemistry Prof.K.Veera Reddy,Prof.S.SriHari,K. Prameela Prof. G. Ramchandraiah ,M. Ramesh	Reprint 2017	Dr. B.R.Ambedkar Open University, Hyderabad			
Reference-Boo	oks: Explore additional details and reinforce learning, with this op	otional lear	ning resource!			
CHE011-RB1	Advanced Inorganic Chemistry by F.Albert Cotton	2015	A wiley-interscience publication			
CHE011-RB2	Concise Inorganic chemistry by J D Lee	2010	Chapman& hall			
CHE011-RB3	Inorganic Chemistry by Shriver Atkins/Gray L Miessler					
CHE011-RB4	Introduction Of Co-ordination Chemistry by Geoffrey A .Lawrance					
CD / DVD: Expl	CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!					
CHE011 -CD1						
Web Links: Exp	olore additional details and reinforce learning, with this optional	learning re	esource!			
CHE011-WL1						

## CHE012: ORGANIC CHEMISTRY

#### **PROGRAMME INFORMATION**

SN	Description	Details		
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/		
2	School	School of Architecture, Science and Technology		
3	Discipline	Science		
4	Level	PG		
5	Course Used in	V132: M.Sc.(chemistry)		

### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	СА	EE	ТМ	Туре
01	CHE012	Organic chemistry	4	8	120	20	80	100	Т

## PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete:	After successful completion of this course, student should be able to
<ul> <li>B.Sc. with Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>Students will understand how this cellular components are sued to generate to utilized energy in cell</li> <li>Student will understand nucleic acid &amp; proteins and how this molecules interact with in cell to promote growth, division &amp; development</li> </ul>

UN	Name of the Unit	CSs	Questions
01-01	Molecular Representations and Classification of Stereoisomers.		
01-02	Molecular Symmetry and Chirality: Enantiomers and Diastereoisomers.		
01-03	Molecules with one and more than one chiral centers.	CR 01	
01-04	Absolute configurational Nomenclature Determination of Absolute Configuration and Resolution of racemates		Student is required to answe
01-05	Axial, Planar and helical Chirality and II- or E,Z- Diastereoisomerism.		on eachCR
02-06	Basic concepts, electronic effects, electronegativity resonance, acid and basic characters of organic compounds	CR 02	
02-07	Reaction pathways		
02-08	Electrophilic Addition to Carbon-carbon double bonds		
02-09	Aliphatic nucleophilic Substitution		

	Neighbouring group participation,Ambident	
02-10	nucleophiles, Aromatic Nucleophilic Substitution and	
	Aliphatic electrophilic Substitution.	
03-11	Concepts of armoaticity	
02 12	Nonbenzenoid aromatic compounds synthesis and	
03-12	reactions of 3,5,7 membered carbocyclic system	CD 03
03-13	Azulenes and polucyclic aromatic compounds	CK U3
03-14	-14 Heterocyclic compounds	
02.15	Fused hetero bicyclic and tricyclic systems: carbazole,	
03-15	quinolone, isoquinoline and acridine	
04-16	Natural products terpenes and terpenoids	
04-17	Alkaloids	<b>CD 04</b>
04-18	-18 Carbohydrates monosaccharides	
04-19	Carbohydrates disaccharides	
04-20	Carbohydrates polysaccharides	

UN	Detailed Syllabus of the Unit	CR			
01-01	<b>Molecular Representations And Classification Of Stereoisomers:</b> Aims And Objectives, Introduction, Molecular Models And Molecular Representations, 2-Dimensional Representation Of 3-Dimensional Structures, Fischers Projections, Saw Horse Projections, Newmann Representations, Zig-Zag (Syn-Anti) Reprenstations, Classification Of Isomers, Classification Of Stereoisomers Based On Symmetry, Classification Of Stereoisomers Based On Energy Barrier, Classification Based On Internal Energy, Summary, Terminal Examination Model Questions In Unit 1				
01-02	<b>Molecular symmetry and chirality: enantiomers and diastereoisomers:</b> Aims And Objectives, Symmetry Elements And Symmetry Operations, Point Groups, Chirality, Chiral Molecules And Stereogenic Center, Achiral Molecules, Desymmetrization, Enatiotopic, Homotopic And Diastereotopic Ligands, Properties Of Enantiomers, Properties Of Diastereoisomers, Summary, Terminal Examination Model Questions In Unit 2	CR 01			
01-03	<b>Molecules with one and more than one chiral centers:</b> Aims And Objectives,, Molecules With Onw Chiral Centers, Chiral Tricoordinate Center, Molecules With Two Or More Chiral Centers, Molecules With Non Identical Chiral Centers, Molecules With Identical Chiral Centers, Summary, Terminal Examination Model Questions In Unit 3				
01-04	Absolute configurational nomenclature, determination of absolute configuration and resolution of racemates: Aims And Objectives, Configurationally Nomenclature For Molecules With Centers Of Chirality, R,S Absolute Configurationally Nomenclature, D,L Absolute Configurational Nomenclature, R,S Nomenclature At Pseudoasymmetric Centers, Determination Of Absolute Configuration, Chemical Correlation Methods, Physical Methods, Chiroptical Methods, Resolution Of Racemates, Summary, Terminal Examination Model Questions In Unit 4				
01-05	<b>Axial, planar and helical chirality and pi or E, Z-diastereoisomerism:</b> Aims And Objectives, Axial, Planar And Helical Chirality, Axial Chirality, Chiral Spiranes, Chiral Alkylidene Cycloalkanes, Chiral Adamantine, Atropoisomerism, Planar Chirality, Helical Chirality, E, Z-Diastereoisomerism, Physical Properties Of E, Z-Diastereoisomerism, Chemical Properties Of E, Z- Diastereoisomerism, Biological Properties Of E, Z-Diastereoisomerism, Oximes And Azo Compounds, Summary, Terminal Examination Model Questions In Unit 5				
02-06	Basic concepts, electronic effects, electro negativity, resonance, acid and basic character of organic compound: Aims And Objectives, Introduction, Electronic Effects In Organic Molecules And Factors Affecting The Availability Of Electrons, Electro negativity, Hybridization And	CR 02			

	Polarization Effects, Inductive Field And Resonance (Mesomeric) Effects, Delocalization Of Electrons Involving Pi-Pi And Pi-P And Hyperconjugation, Acidic And Basic Character Of Organic Compounds, Summary, Terminal Examination Model Questions In Unit 6				
02-07	<b>Reaction Pathways:</b> Aims And Objectives, Introduction, Thermodynamics And Kinetics Of Chemical Reactions, Transition States, Reaction Intermediates And Energy Profile Diagrams, Kinetic And Other Methods Of Determination Of Reaction Mechanisms, Summary, Terminal Examination Model Questions In Unit 7				
02-08	<b>Electrophilic Addition To Carbon-Carbon Double Bonds:</b> Aims And Objectives, Introduction, Addition To Symmetrical Reagents: Addition Of Halogens And Hydrogenation, Addition Of Unsymmetrical Reagents- Addition Of HX And Hydrocarboration-Oxidation, Syn Dihydroxylation: Kmno <sub>4</sub> And Oso <sub>4</sub> , Epoxidation, Ozonolysis, Summary, Terminal Examination Model Questions In Unit 8				
02-09	Aliphatic nucleophilic substitution: Aims And Objectives, Introduction, $S_N 2$ Aliphatic Nucleophilic Substitution, $S_N 1$ Aliphatic Nucleophilic Substitution, Factors Affecting Reactivity In Substitution Reactions, Substitution And Elimination As Competing Reactions, $S_N i$ Mechanism, Summary, Terminal Examination Model Questions In Unit 9				
02-10	<b>Neighbouring Group Participation, Ambident Nucleophiles, Aromatic Nucleophilic</b> <b>Substitution And Aliphatic Electrophilic Substitution:</b> Aims And Objectives, Introduction, Introduction to Neighbouring Group Participation Reactions, Neighbouring Group Participating Reactions: Examples, Ambident Molecules, Aromatic Nucleophilic Substitutions, Aliphatic Substitutions, Aliphatic, Summary, Terminal Examination Model Questions In Unit 10				
03-11	<b>Concept Of Aromaticity:</b> Aims And Objectives, Introduction, Criteria For Aromaticity, The 4n+2 Rule, Characteristic Features Of Aromaticity, Nonbenzenoid Aromatic Compunds, Larger Ring Annulenes, Heteroyclic Compounds, Polynuclear Aromatic Hydrocarbons, Limitations Of Huckel's Rule, Alternant And Non-Alternant Hydrocarbons, Craig's rule, Summary, Terminal Examination Model Questions In Unit 11				
03-12	Nonbenzenoid Aromatic Compounds Synthesis And Reactions Of 3,5,7-Membered Carbocyclic Systems: Aims And Objectives, Introduction, Synthesis, Properties, Chemical Reactivity, 5- Membered Carbocyclic Systems (Cyclopentadienide Anion) Introduction, Synthesis, Properties, Chemical Reactivity, FerroceneIntroduction, Synthesis, Properties, Chemical Reactivity, 7- Membered Aromatic CompoundsIntroduction, Synthesis, Properties, Chemical Reactivity, Summary, Terminal Examination Model Questions In Unit 12.				
03-13	<b>Azulenes And Polycyclic Aromatic Compounds:</b> Aims And Objectives, Introduction, Structure, Isolation, Synthesis, Physical Properties, Chemical Reactivity AnthracenceIsolation, Synthesis, Physical Properties, Chemical Reactivity PhenanthreneIntroduction, Structure, Isolation, Synthesis, Physical Properties, Chemical Reactivity,Summary, Terminal Examination Model Questions In Unit 13.	CR 03			
03-14	<b>Heterocyclic compounds:</b> Aims And Objectives, Nomenclature, pi-excessive and pi- deficientheterocyclic systemsIntroduction, trivial names of common ring system, systematic nomenclature for monocyclic compounds, nomenclature for fused ring systems, replacement nomenclature, pi-Electron excessive and deficient system, importance of heterocyclic compounds, Benzofuran, Introduction, synthesis, physical properties, chemical reactivity, IndoleIntroduction, synthesis, physical properties, Summary, Terminal Examination Model Questions In Unit 14.				
03-15	<b>Fused hetero bicyclic and tricyclic systems, carbazole, quinolone, isoquinoline and acridine:</b> Aims And Objectives, CarbazoleIntroduction, synthesis, physical properties, chemical reactivityQuinoline,Introduction, synthesis, physical properties, chemical reactivity IsoquinolineIntroduction, synthesis, physical properties, chemical reactivity ,AcridineIntroduction, synthesis, physical properties, chemical reactivity Examination Model Questions In Unit 15.				

04-16	<b>Natural product tenpins and terpenoids :</b> Aims And Objectives, introduction to natural products, terpense and terpenoides, General rule of terpenoide chemistry, Isolation of monoterpenoids, structure determination of alphaterpenoil, structure determination of limo name, structure determination of camphor, biogenesis og monoterpenoids, Summary, Terminal Examination Model Questions In Unit 16	
04-17	<b>Alkaloids : :</b> Aims And Objectives, introduction, tests for detection of alkaloids, methods of extraction and isolation of alkaloids, classification of alkaloids, alkaloid nomenclature, general methods of structure determination of alkaloids, structure determination of palavering, structure determination of quinine, Summary, Terminal Examination Model Questions In Unit 17	
04-18	<b>Carbohydrates – monoacids,</b> Aims And Objectives, introduction, monoacids, Fischer projection, Stereochemical nomenclature in monosaccharide, general reaction of monosaccharide, determination of configuration of glucose, determination of relative configuration in glucose, absolute configuration of glucose, cyclic form glucose, alpha and beta enamors, Fisher projection and HGAworth projection of cyclic form of glucose, determination of ring size in glucose, conformationipnal analysis of glucose, structure determination of fructose, confirmation of sugars and their derivatives, monoacids containing other functional groups , Summary, Terminal Examination Model Questions In Unit 18	CR 04
04-19	<b>Carbohydrates disaccharide : ,</b> Aims And Objectives, introduction, structural determination of sucrose, synthesis of sucrose, conformational structural of sucrose, maltose, calaboose and antibioses, strategies in oligosaccharides of synthesis Summary, Terminal Examination Model Questions In Unit 19	
04-20	<b>Carbohydrates polysaccharide :</b> Aims And Objectives, introduction, structural determination of unbar ached and branched polysaccharide, structural determination of starch, structure of cellulose, structure of glycogen, structure of chitin, Summary, Terminal Examination Model Questions In Unit 20	

LR Code	Title Author	Edition Year	ISBN Publisher
Course Websit Self-Test for ea	e Link for (1) Mobile and Online Lectures, (2) Discussion Foru ch CR Block, Continuous Assessment Test and End Examination	m for onlir	ne interaction and (3)
CHE012	Organic Chemistry .		
Text-Books		•	
CHE012	Oraganic Chemistry . Prof. G. L. David Krupadanam, Prof.K. Rajmohan, Prof.Ramachandraiah, Dr. P.Srinivas, Dr. K . Santosh Kumar. Smt. K.Prameela , S.M.Ghouse Mohiuddin.	Reprint 2017	Dr.B.R.Ambedkar Open University Hydrabad
Reference-Boo	ks: Explore additional details and reinforce learning, with this op	tional lear	ning resource!
CHE012-RB1	Advanced Organic Chemistry Part-A & B by Carey, Francis A, Sundberg, Richard J.	2017	
CHE012-RB2	Advanced Organic Chemistry by Jerry March	2015	Willy & sons
CHE012-RB3	Organic Chemistry by Gene Davis	2006	
CHE012-RB4	Organic Chemistry by Clayden Greeves, Warren & wothers.	2014	
CHE012-RB5	Organic Structures from Spectra by L D field, S Sternhell, J R Kalman	2015	
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CHE012 -CD1			
Web Links: Exp	plore additional details and reinforce learning, with this optional	learning re	esource!
CHE012-WL1			

# CHE013: PHYSICAL CHEMISTRY

## **PROGRAMME INFORMATION**

SN	Description	Details	
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/	
2	School	School of Architecture, Science and Technology	
3	Discipline	Science	
4	Level	PG	
5	Course Used in	V132: M.Sc.(Chemistry)	

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	СА	EE	ТМ	Туре
01	CHE013	PHYSICAL CHEMISTRY	4	8	120	20	80	100	т

### PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>B.Sc. with Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>Students will able to study basic understanding of fundamental process and mechanism that serve &amp; control of various function of body</li> </ul>

UN	Name of the Unit	CSs	Questions			
01-01	Basic Quantum Chemistry					
01.02	Wave Mechanics Of Some Simple Systems With Constant					
01-02	Potential Energy					
01-03	Hydrogen-Like Atoms	CR 01				
01.04	Approximation Methods And Interaction Of Radiation And					
01-04	Matter					
01-05	Theories Of Chemical Bonding- Diatomic Molecules					
02.06	Concept Of Thermodynamics Laws- First Law Of					
02-00	Thermodynamics		Student is required to answer			
02-07	The Second Law Of Thermodynamics	CP 02	an each CP			
02-08	Spontaneity And Equilibrium					
02-09	Ideal And Non-Ideal Solutions And Activity Coefficients					
02-10	Nerst Heat Theorem And Third Law Of Thermodynamics					
03-11	Electrochemical Cells First Law Of Thermodynamics					
03-12	Polarization					
03-13	Electro Analytical Techniques	CR 03				
03-14	Activity					
03-15	Corrosion					

04-16	Theories Of Reactions Rates		
04-17	Kinetics Of Complex Reactions		
04-18	Reactions In Solutions	CR 04	
04-19	Photochemistry		
04-20	Photochemical Reaction Mechanisms		

UN	Detailed Syllabus of the Unit	CR
01-01	<b>Basic Quantum Chemistry:</b> Aims And Objectives, Introduction, Schrodinger Wave Equation And Its Derivation, Operator Concept In Quantum Chemistry, Postulates Of Quantum Mechanics, Some Important Theorems, Summary, Model Questions	
	Some important medicins, summary, model Questions	
01-02	Objectives, Introduction, Particle In A One Dimensional Box, Three-Dimensional Box, Rigid Rotator, Wave Mechanics Of Some Simple Systems Where The Potential Energy Is Not Constant,	
	Summary, Model Questions	CR 01
01-03	Wave Functions Of An Hydrogen-Like Atoms, Shapes Of Atomic Orbital's, Electron Spin, Summary, Model Questions	
	Approximation Methods And Interaction Of Radiation And Matter: Aims And Objectives,	
01-04	Introduction, Time- Independent Perturbation Theory, Variation Method, Many- Electron Atoms: The Wave Function Of Many- Electron Systems, Hartree Self-Consistent Field Method, Summary, Model Questions	
	Theories Of Chemical Bonding- Diatomic Molecules: Aims And Objectives, Introduction, The	
01-05	Molecular Orbital Theory (The LCAO Approximation), MO Theory Of The Hydrogen Molecule Ion, Valence-Bond Method Of Chemical Bonding, Hybridization, Summary, Model Questions	
	Concept Of Thermodynamics Laws- First Law Of Thermodynamics: Aims And Objectives,	
02-06	Introduction, Definitions And Terminology Of Thermodynamics Principles, Energy And First Law Of Thermodynamics, Relation Between C <sub>p</sub> And C <sub>v</sub> And Joule-Thomson Effect, Summary, Terminal Examination Model Questions And Answers	
	The Second Law Of Thermodynamics: Aims And Objectives, Introduction, Carnot Cycle-Cyclic	
02-07	Transformations, Entropy Function And Its Properties, Entropy And Probability, Summary, Terminal Examination Model Questions And Answers	
02-08	<b>Spontaneity And Equilibrium:</b> Aims And Objectives, Introduction, Clausius Inequality And Spontaneity, Fundamental Equations Of Thermodynamics And Maxwell's Relations, Properties Of Gibb's Free Energy Function, Free Energy And Entropy Of Mixing, Chemical Equilibrium In A Mixture Of Ideal Gases-Vant Hoff Isochore, Temperature Dependence Of Equilibrium Constant, Lechatelier Principle, Criterion For Phase Equilibrium-Gibbs-Duhem Equation, Summary, Model Questions, Problems	CR 02
	Ideal And Non-Ideal Solutions And Activity Coefficients: Aims And Objectives, Introduction,	
02-09	Ideal Solutions And Raoult's Law, Non-Ideal Solutions And Activity Coefficients, Liquid-	
<u> </u>	Vapour Jona-Eiguna Equilibrium-Clapeyron Equation, Summary, Model Questions, Problems	
02-10	Nerst Heat Theorem, Third Law Of Thermodynamics, Entropy Changes In Chemical Reactions, Exceptions To Third Law Of Thermodynamics, Summary, , Terminal Examination Model Questions, Problems And Answers	
		L

	Electrochemical Cells First Law Of Thermodynamics: Aims And Objectives, Introduction, Nernst	
	Equation, Representation Of Electrodes And Cells, Types Of Electrodes, Chemical Cells And	
	Concentration Cells, Concentration Cell Without Transference, Concentration Cell With	
03-11	Transference Liquid Junction Potential And Its Determination Determination Of Transport	
	Number Extermination Of Ph From emf Data, Solubility Product From emf Data, Potentiometric	
	Titrations Summary Model Questions	
	Pelavisetian, Aine And Objectives, Juster duction, John Delavised And Nennelavised Electrodes	
	And Colle Courses of Polorization, Over Valtage, Effect of Courset Density (CD) on Overveltage	
	And Cells, Sources of Polarization, Over voltage- Effect of current Density (CD) on Overvoltage,	
03-12	Influence Of Ph On Overvoltage, Theories Of Overvoltage- Bubble Formation Of The Slow	CR 03
	Process, Combination Of Atom As The Slow Process, Ion Discharge As The Slow Process, Proton	
	Transfer As The Slow Process, Fick's Law And Determination Of Thickness Of The Diffusion Layer,	
	Summary, Model Questions	
	Electro Analytical Techniques: Aims And Objectives, Introduction, Polaogram, Ilkovic Equation,	
03-13	Dropping Mercury Electrode (DME), Half-Wave Potentials, Application Of Polarography, Cyclic	
	Voltammentry, Amperometric Titrations, Summary, Model Questions	
	Activity: Aims And Objectives, Introduction, Mean Activity Coefficient Of Electrolyte, Debye-	
03-14	Huckel Limiting Law, Extended DHLL, Debye-Huckel Theory, Debye-Huckel-Onsagar Equation, Ion	
	Association, Determination Of Activity Coefficient By EMF Method, Summary, Model Questions	
	Corrosion: Aims And Objectives, Introduction, Theories Of Corrosion- Dry Or Chemical	
	Corrosion. Wet Or Electro-Chemical Corrosion. Forms Of Corrosion- Uniform Corrosion. Galvanic	
	Corrosion, Concentration-Cell Corrosion, Pitting Corrosion, Intergranular Corrosion, Stress	
03-15	Corrosion Deploying Corrosion Frosion Corrosion Protection Against Corrosion (Mitigation)-	
05-15	Proper Designing And Material Selection, Modifying The Corrosive Environment, Application Of	
	Toper Designing And Waterial Detection, Mounying The corrosive Environment, Application of	
	Inhibitors Purification And Anodic Protection Application Of Protective Coatings Summary	
	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions	
	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions	
	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Protections Paters Aims And Objectives, Introduction, Collicion Theory, Storie Factor	
	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition, State, Theory, Thermodynamic Formulation, Of Transition, State, Theory, Deaction	
	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Geograficate Activities Complex Act Transition	
04-16	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their	
04-16	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary,	
04-16	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions	
04-16	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel	
04-16	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions	
04-16	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt	
04-16 04-17 04-18	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy	CR 04
04-16 04-17 04-18	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions	CR 04
04-16 04-17 04-18	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical	CR 04
04-16 04-17 04-18	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram,	CR 04
04-16 04-17 04-18	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram, Relation less Transitions, Fluorescence & Phosphorescence, Quantum Yield, Quantum Yield And	CR 04
04-16 04-17 04-18 04-19	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram, Relation less Transitions, Fluorescence & Phosphorescence, Quantum Yield, Quantum Yield And Its Determination. Experimental Determination Of Quantum Yields, Photochemical Reactions	CR 04
04-16 04-17 04-18 04-19	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram, Relation less Transitions, Fluorescence & Phosphorescence, Quantum Yield, Quantum Yield And Its Determination. Experimental Determination Of Quantum Yields, Photochemical Reactions With High And Low Quantum Yields, Sensitization, Quenching, Actinometrical, Uranyloxalate	CR 04
04-16 04-17 04-18 04-19	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions (All First Order Type), Chain Reactions Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram, Relation less Transitions, Fluorescence & Phosphorescence, Quantum Yield, Quantum Yield And Its Determination. Experimental Determination Of Quantum Yields, Photochemical Reactions With High And Low Quantum Yields, Sensitization, Quenching, Actinometrical, Uranyloxalate Acidometer, Solved Examples, Summary, Model Questions	CR 04
04-16 04-17 04-18 04-19	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram, Relation less Transitions, Fluorescence & Phosphorescence, Quantum Yield, Quantum Yield And Its Determination. Experimental Determination Of Quantum Yields, Photochemical Reactions With High And Low Quantum Yields, Sensitization, Quenching, Actinometrical, Uranyloxalate Acidometer, Solved Examples, Summary, Model Questions	CR 04
04-16 04-17 04-18 04-19	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram, Relation less Transitions, Fluorescence & Phosphorescence, Quantum Yield, Quantum Yield And Its Determination. Experimental Determination Of Quantum Yields, Photochemical Reactions With High And Low Quantum Yields, Sensitization, Quenching, Actinometrical, Uranyloxalate Acidometer, Solved Examples, Summary, Model Questions Photochemical Reaction Mechanisms: Aims And Objectives, Introduction, Mechanism Of Photochemical Reaction Mechanisms: Aims And Objectives, Introduction, Mechanism Of	CR 04
04-16 04-17 04-18 04-19	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram, Relation less Transitions, Fluorescence & Phosphorescence, Quantum Yield, Quantum Yield And Its Determination. Experimental Determination Of Quantum Yields, Photochemical Reactions With High And Low Quantum Yields, Sensitization, Quenching, Actinometrical, Uranyloxalate Acidometer, Solved Examples, Summary, Model Questions Photochemical Reaction Between Hydrogen And Chlorines, Determination Of Rate Constants, Life Times Of Reactive Intermediates. Effect Of Light Intensity On The Rate Of Photochemical	CR 04
04-16 04-17 04-18 04-19 04-2 0	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram, Relation less Transitions, Fluorescence & Phosphorescence, Quantum Yield, Quantum Yield And Its Determination. Experimental Determination Of Quantum Yields, Photochemical Reactions With High And Low Quantum Yields, Sensitization, Quenching, Actinometrical, Uranyloxalate Acidometer, Solved Examples, Summary, Model Questions Photochemical Reaction Mechanisms: Aims And Objectives, Introduction, Mechanism Of Photochemical Reaction Between Hydrogen And Chlorines, Determination Of Rate Constants, Life Times Of Reactive Intermediates, Effect Of Light Intensity On The Rate Of Photochemical Reactives, There Solve Determination Reactions Photochemical Reactives, There Solve Determinediates, Effect Of Light Intensity On The Rate Of Photochemical Reactives, There Solve Photochemical	CR 04
04-16 04-17 04-18 04-19 04-2 0	Inhibitors, Purification And Anodic Protection, Application Of Protective Coatings, Summary, Model Questions Theories Of Reactions Rates: Aims And Objectives, Introduction, Collision Theory- Steric Factor, Transition State Theory, Thermodynamic Formulation Of Transition State Theory, Reaction Coordinate Activated Complex And Transition State, Activation Parameters And Their Significance- The Eyring Equation, Unimolecular Reactions And Lindaman's Theory, Summary, Model Questions Kinetics Of Complex Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions, Consecutive Reactions: Aims And Objectives, Introduction, Opposing Reactions, Parallel Reactions In Solutions: Aims And Objectives, Introduction, Primary Salt Effect, Secondary Salt Effect, Effect Of Dielectric Constant, Effect Of Structure On Reactivity- Linear Free Energy Relationships, The Taft Equation, Acid-Base Catalysis, Summary, Model Questions Photochemistry: Aims And Objectives, Introduction, Thermal Reactions, Photochemical Reactions, Lambert's Law, Beer's Law, Electronically Excited Molecules, Jablonski Diagram, Relation less Transitions, Fluorescence & Phosphorescence, Quantum Yield, Quantum Yield And Its Determination. Experimental Determination Of Quantum Yields, Photochemical Reactions With High And Low Quantum Yields, Sensitization, Quenching, Actinometrical, Uranyloxalate Acidometer, Solved Examples, Summary, Model Questions Photochemical Reaction Mechanisms: Aims And Objectives, Introduction, Mechanism Of Photochemical Reaction Between Hydrogen And Chlorines, Determination Of Rate Constants, Life Times Of Photochemical Reactions, Photodesciation, Gas Phase Photolysis, Cueladdition Reactive Intermediates, Effect Of Light Intensity On The Rate Of Photochemical Reaction, Types Of Photochemical Reactions, Photodissociation, Gas Phase Photolysis,	CR 04

Technique, Summary	

LR Code	Title Author	Edition Year	ISBN Publisher
Course Websit Self-Test for ea	e Link for (1) Mobile and Online Lectures, (2) Discussion Foru	m for onlir	ne interaction and (3)
CHE013	PHYSICAL CHEMISTRY.		
Text-Books		L	
CHE013	PHYSICAL CHEMISTRY Prof V Ananta Raman , Prof. P.V Krishna Rao , Prof.K .M .M Krishana , Dr. K. Ramakrishna	Reprint 2017	Dr. B.R.Ambedkar Open University Hyderabad
Reference-Boo	ks: Explore additional details and reinforce learning, with this op	tional lear	ning resource!
CHE013-RB1	Quantum Chemistry by Ira Levine	2017	Willy& sons
CHE013-RB2	Physical Chemistry by Peter Atkins	2015	
CHE013-RB3	Instrumental metods of chemical Analysis by Gurdeep Chatwal, Sham Anand.	2016	
CHE013-RB4	Basic Thermodynamics by Basavaraj H. Tilikoti	2017	
CD / DVD: Expl	ore additional details and reinforce learning, with this optional le	earning res	ource!
CHE013 -CD1			
Web Links: Ex	olore additional details and reinforce learning, with this optional	learning re	esource!
CHE013-WL1			

# CHE014: MATHEMATICS, BIOLOGY, SPECTROSCOPY & COMPUTERS.

#### **PROGRAMME INFORMATION**

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(Chemistry)

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	CA	EE	ТМ	Туре
01	CHE014	Mathematics, Biology, Spectroscopy and Computers.	4	8	120	20	80	100	Т

## PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>B.Sc. with Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>To understand transmission genetics problems, make accurate predictions about inheritance of traits, and map the location of gene</li> </ul>

UN	Name of the Unit	CSs	Questions			
01-01	Co-Ordinate System					
01-02	Differential Calculus					
01-03	Matrics.	CR 01				
01-04	Integral Calculus					
01-05	Differential Equations					
02-06	Cell Structure And Functions					
02-07	Carbohydrates					
02-08	Fatty Acids	CR 02	Student is required to answer 4 of 5 SAQ, eachof 5 marks, –on eachCR			
02-09	Amino Acids, Peptides And Proteins					
02-10	Nucleic Acids					
03-11	Rotational Spectra					
03-12	Vibrational Spectroscopy- 1					
03-13	Vibrational Spectroscopy- 2					
03-14	Vibrational Spectroscopy- 3					
03-15	Roman Spectroscopy	CR 03				
03-16	Electron Spectroscopy					
03-17	H NMR Spectroscopy- 1					
03-18	H NMR Spectroscopy- 2					

03-19	NMR Of Paramagnetic Compounds	
03-20	Mass Spectroscopy-1	
03-21	Mass Spectroscopy- 2	
04-22	Introduction To Computers	
04-23	Basic Language	
04-24	C Language	CR 04
04-25	Chemistry Application Using Basic Programme	
04-26	Chemistry Application Using C Language	

UN	Detailed Syllabus of the Unit	CR
01-01	<ul> <li>Co-Ordinate System: Aims And Objectives, Introduction, Coordinate Axes, Cartesian Coordinates, Polar Coordinates, Spherical Polar Coordinates, Relation Between Polar And Cartesian Coordinates, Relation Between Spherical Polar And Cartesian Coordinates, Straight Line- Slope Of Straight Line, Features Of Slope, Intercept Of Straight Line, Features Of Intercept, Equation Of Straight Line- Slope-Intercept Form, Intercept Form, Point-Slope Form, Two-Point Form, Graphical Representation Of Functions, Appendix: Trigonometric Relationships, Summary, Model Questions.</li> <li>Differential Calculus: Aims And Objectives, Functions, Types Of Functions- Constant Function, Identity Function, Injective Function, Surjective Function, Buinjective Function, Composite</li> </ul>	
01-02	Function, Inverse Function, Intervals, Neighborhood, Limit Of A Function, Certain Standard Limits, Continuity Of A Limits, Differentiation, Rules Of Differentiation, Derivatives Of Some Standard Functions, Special Methods Of Differentiation, Second And Higher Order Derivatives, Maxima And Minima- Finding Minimum And Maximum, Partial Differentiation, Differentiation Of Composite Functions, Summary, Model Questions.	CR 01
01-03	<b>Matrics:</b> Aims And Objectives, Introduction, Matrix, Order Of A Matrix, Square Matrix, Diagonal Matrix, Unit Matrix, Null Matrix, Addition Of Matrices, Scalar Multiplication Of A Matrix, Multiplication Of Matrices, Transpose Of A Matrix, Symmetric Of A Matrix, Determinant Of A Matrix- Minor Of An Element, Cofactor Of An Element, Definition Of Determinant, Properties Of Determinant, Adjoint Of A Matrix, Inverse Of A Matrix, Summary, Model Questions	
01-04	<b>Integral Calculus:</b> Aims And Objectives, Definition Of Integration, Indefinite Integral, Standard Form Of Integration, Properties Of Integrals, Integration By Method Of Substitution, Integration By Parts, Integration Of Rational Functions, Reduction Formula, Definite Integral- Method Of Substitution, Integration By Parts, Reduction Formula, Summary, Model Questions	
01-05	<b>Differential Equations:</b> Aims And Objectives, Definition Of Differential Equations, Order And Degree Of Differential Equations, Formation Of Differential Equations, First Order Differential Equations, Variable Separable Method, Homogeneous Differential Equations- Homogeneous Equation, Solving Homogeneous Differential Equation, Linear Differential Equation- Solving Linear Differential Equation, Partial Differential Equations- Formation Of Partial Differential Equations, Solutions Of Partial Differential Equations, Method Of Separation Of Variables, Summary, Model Questions	
02-06	<b>Cell Structure And Functions:</b> Aims And Objectives, Introduction, Structure Of Prokaryotic And Eukaryotic Cells, Intracellular Organelles And Their Functions, Comparison Of Plant And Animal Cells, Metabolic Processes- Catabolism And Anabolism, ATP- The Biological Energy Currency, Origin Of Life, Unique Properties Of Carbon, Chemical Evolution And Rise Of Living Systems, Introduction To Biomolecules, Building Blocks And Biomacro molecules, Summary, Model	CR 02

	Questions	
02-07	<b>Carbohydrates:</b> Aims And Objectives, Introduction, Classification, Structure And Functions Of Monosaccharides And Their Derivatives, Disaccharides And Polysaccharides, Mucopolysaccharides, Glycoproteins And Glycolipids, Blood Group Substances, Metabolism Of	
	Carbohydrates, Glycogen Metabolism, Glycolysis, TCA Cycle, Pentose Phosphate Pathway, Summary, Model Questions Fatty Acids: Aims And Objectives, Introduction, Essential Fatty Acids, Structure And Functions	
02-08	Of Triacylglycerols, Glycerophospholipids, Sphingolipids, Cholesterol Bile Acids, Prostanglandins, Lipoproteins Composition And Function, Role In Atherosclerosis, Summary, Model Questions	
02-09	Amino Acids, Peptides And Proteins: Aims And Objectives, Introduction, Chemical Hydrolysis Of Proteins, Structural Hydrolysis Of Proteins, Amino Acid Sequencing- Primary Structure Of Bovine Insulin, Secondary Structures Of Proteins, Tertiary Structure Of Proteins, Quaternary Structure Of Proteins, Amino Acid Metabolism, Summary, Model Questions	
02-10	Nucleic Acids: Aims And Objectives, Introduction, purine and pyrimidine bases of nucleic acids, nucleosides and nucleotides, base pairing via H-bonding, double helix model of DNA, properties of DNA, structure of RNA, forces stabilizing the nucleic acids, chemical and enzymatic hydrolysis of nucleic acids, Summary, Model Questions	
03-11	<b>Rotational Spectra:</b> Aims And Objectives, Introduction, types of molecular spectra – rotational spectroscopy, Classification of molecules based on movement of Inertia, Rotational spectra of Dia atomic molecules, Rotaional enery levels, Selection rules, Isotopic effects of rotational spectra, Calculation of bond lengh of diatomic molecules, Summary, Model Questions	
03-12	Vibrational Spectroscopy- 1:Objectives, Introduction, vibration emery levels of diatomic molecules, Selection rules, calculation of force constant, Anharmonic nature of vibrations, Fundamental bands oberstrones and hot bands, Summary, Model Questions	
03-13	<b>Vibrational Spectroscopy- 2:</b> Objectives, vibration rotation spectra of diatomic molecules, , vibration of polyatomic molecules normal modes of vibration, Combination bands, defense bands and fermiresonance, concept of group frequencies and characteristics of vibration frequencies of functional groups, structural and stereo chemicals effects on the absorption pattern in carbonyl group, absorption pattern in substitution benzene, sis-trance isomerism, Summary, Model Questions	
03-14	Vibration Spectroscopy- 3:objectives, effect of hydrogen bonding, totomerism and conformational analysis, metal ligand and bonding in biodentate ligands, , Summary, Model Questions	CR 03
03-15	<b>Roman Spectroscopy:</b> Objectives, Introduction, Principles of Raman Spectroscopy, pure rotational raman,vibrational raman,and vibrational rotational raman spectroscopy, complimentary nature of ir and Ramanspectra ,usualexclusion principle, summary and model question	
03-16	<b>Electron Spectroscopy:</b> Aims And Objectives, Introduction, Electron energy level of molecules, Selection rules for electronic transitions, Some terms in electronic spectra, UV spectra of unsaturated compounds, UV spectra of aromatic hydrocarbons, Solvent effects in U. V spectra, Stereo chemicalfactors in U.V spectra, UV spectra of transition metal aqua complexes, Quantitative applications of U,V spectroscopy Summary, Model Questions	
03-17	<b>H NMR Spectroscopy- 1</b> :Aims And Objectives, Introduction, Principles of magnetic resonance, Instrumentation, Shielding constant, Chemical shift, Factors affecting chemical shifts, Spin Spin coupling abed its types, coupling constant, selfassessment questions, higher order splitting, self assessment questions, magnitude of coupling constant, simplification of spectra, Nuclear	

	overhouser Enhancment, summary and model question				
03-18	<b>H NMR Spectroscopy- 2:</b> Aims And Objectives, Introduction, amylases of NMR spectrum, Study of dynamic process throw NMR spectroscopy, Restricted rotation of C-N bonds, Reaction mechanism by NMR, study of conformational changes through NMR, Summary, module question.				
03-19	<b>NMR Of Paramagnetic Compounds:</b> Aims And Objectives, Introduction, metal hydride complexes, Acetyl acton complexes, Floxional molecules, summary and model question.				
03-20	<ul> <li>Mass Spectroscopy-1: Aims And Objectives, Introduction, origin of mass spectrum, types of fragments, Nitrogen rules, isotopic picks, molecular formula from molecular ion peaks, met stable peaks, high resolution mass spectrometry, Ion production technices, Summry, model question.</li> </ul>				
03-21	<b>Mass Spectroscopy- 2:</b> Aims And Objectives, Introduction, Common fragmentation petter, one bond sigma bond cleavage, Tao bond sigma bond cleavage, fragmentation of cycle alkenes, fragmentation of akanol, fragmentation of cyclic/dial ether, fragmentation of carbonyl compounds, fragmentation of carboxylic acid, fragmentation of alkyl halides, fragmentation nitro compounds, fragmentation amines, interpretation of known compounds, Application of mass spectrometry to metal carbonyls, summary and model question.				
04-22	<b>Introduction To Computers:</b> Aims And Objectives, Introduction, classification of computers, digital computer, computer organization, input output devises, input devices, output devises, hardware and software, algawithers and flow charts, solve problems, summary and model question				
04-23	<b>Basic Language:</b> Aims And Objectives, Introduction, fundamental concept, BASIC statements, Branching and looping, additional feature of basis, function and subroutines, summary and model question				
04-24	<b>C Language:</b> Aims And Objectives, Introduction, fundamentals, porters and expression, library functions, input and output operations, control statement, Function, ayes, summary and modelquestion	CR 04			
04-25	<b>Chemistry Application Using Basic Programme:</b> Aims And Objectives, Introduction, summation of series, last square feet of XY data to strait line, calculation of activation energy using Arrhenius equation by least square feting, Determine of antis energy of Cristal, Determination of equivalent conductivity of electrolytes at definite concentration, Calculation of critical constant pf vender wall gaseous, summary and model question				
04-26	<b>Chemistry Application Using C Language:</b> Aims And Objectives, Introduction, Vander wale question for real gaseous, calculation of entry of activation Ea, calculation of lasts emery of crystals, First order rate constant from kinetic data, calculation of the average value of threat constant for second order reactions, calculation of desolation constant of weak acid, summary and model question.				

LR Code	Title Author	Edition Year	ISBN Publisher		
<b>Course Website Link</b> for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination					
CHE014	MATHEMATICS, BIOLOGY, SPECRTOSCOPY&COMPUTERS.				

Text-Books				
	MATHEMATICS, BIOLOGY, SPECRTOSCOPY&COMPUTERS		Dr. B.R. Ambedkar	
CHE014	Prof. G.Nageswara Rao ,Prof.t ramana,Prof. G Ramachandraiah	2007	Open University	
	Prof. A.Satyanarayana, Prof. Nittala S Sarma		Hyderabad	
Reference-Boo	ks: Explore additional details and reinforce learning, with this op	otional lear	ning resource!	
CHE014 – RB1	Mathematics for Physical Chemistry,by Donald A McQuarrie Mervin	2014		
CHE014 – RB2	Spectroscopy by Paiva	2015		
CHE014 – RB3	Spetroscopy of Organic Compounds by P.S kalsi	2015		
CD / DVD: Explo	ore additional details and reinforce learning, with this optional l	earning res	ource!	
CHE014 -CD1				
Web Links: Explore additional details and reinforce learning, with this optional learning resource!				
CHE014-WL1				

# PRACTICAL CHEMISTRY

# CHE015- INORGANIC CHEMISTRY( PRACTICAL)

#### **PROGRAMME INFORMATION**

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(CHEMISTRY)

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	СА	EE	ТМ	Туре
01	CHE015	INORGANIC CHEMISTRY( Practical)	2	8	120	20	80	100	р

#### PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
	After successful completion of this course, student
For successful completion of this course, student	should be able to
should have successfully complete:	Develop technical skill
B.Sc./ with Chemistry or equivalent from a	• To empower our students with practical skills
recognized University/Board.	to comprehend the physiology and other
	functions of each ad every vital systems

UN	Name of the Unit	CSs	Questions
01-01	Introduction to Semi Micro Analysis.		Student is required to answer
01-02	Classification of Cat ions Into Group for Qualitative Analysis.		4 of 5 SAQ, eachof 5 marks, on eachCR
01-03	Reactions of Cat ions.	CR 01	
01-04	General Group Separation and Analysis of Individual Group		
01-05	Model Semi-Micro Analysis of Captions mixture I		
01-06	Model Semi-Micro Analysis of Cations mixture II		
02-07	Sulphate.Hydrate, preparation of hexammine nickel (II) chloride. Preparation of Chloropentammine cobalt (III) chloride. Preparation of Diaminoethane Nickel(II). Preparation Of Sodium Oxalatoferrate (III).	CR 02	
02-08	Calibration of Analytical Apparatus.	CRUZ	
02-09	Estimation of Ca2+ by substitution Titration Using EDTA		
02-10	Estimation of Cu in So4 by EDTA		
02-11	Estimation of Cu2+ and Ni2+ Present in sample solution		

02-12	Estimation of Ag+ and Ca2+ in a sample solution.	

UN	Detailed Syllabus of the Unit	CR
1-1	Introduction to Semi Micro Analysis.: .: AIM, Objectives, Semi Micro Qualitative Analysis , General intructions and Guidelines. Classification of Cations Into Groups For Qualitative Analysis. : Aim:, Objectives, Classification	
1-2	of Cat ions into Groups.	
1-3	<b>Reactions Of Cations:</b> Aim ,Objectives, General Instructions', Reactions Group-IA Cations, Reactions Of Group-IB cations, Reactions of group IIA cations, Reactions of Group IIB Cations,Reactions Of Group III Cations, Reaction of Group IV Cations, Reaction of Group V Cations, Reaction Of Group VI Cation.	
1-4	General Group Separation and analysis of Individual Groups: Aim, Objectives , Preparation of Original Solution of the Salt Mixture ,Tests for NH4, General Group Separation and analysis Of Individual Group.	CR 01
1-5	<ul> <li>Model Semi-Micro Analysis of Cations(A Known Salt Mixture – I) : Aim, Objectives, Preliminary</li> <li>Examination, Examination for Cations, Report.</li> </ul>	
1-6	Model Semi-Micro Analysis Of Cations (A Known Salt Mixture – II) :Aim:, Objectives, Preliminary Examination:, Examination For Cations,Report.	
2-7	Preparation Of Tetrammine Copper(II) Sulphate.Hydrate: Aim, Principal, Procedure, Result.	
2-8	<b>Calibration Of Analytical Apparatus:</b> Aim, Objectives, Procedure, Calibration of Weights, calibration of pipette, calibration of burette.	
2-9	<b>Estimations Involving Volumetric:</b> Estimation of Ca2+,Ni2+,Mn2+ and Mg2+ by substitution titration using EDTA: Aim, principle, Requirements, procedure, observations, Calculations.	
2-10	<b>Estimations Involving Volumetric-II:</b> Aim, Principle, Requirements, Procedure, Observations, Calculations, determination of Ion exchange capacity of a resin, Aims, Principle, Requirements, Procedure observation, calculations.	CR 02
2-11	Estimation of Cu2+ and Ni2+ present in a Sample Solution: Aim, Principle, Requirements, Procedure, Observation, Calculations.	
2-12	Estimation of Ag+ and Ca2+ in a Sample Solution: Aim, Principle, Requirements, procedure ,Observations, Calculations.	

LR Code	Title Author	Edition Year	ISBN Publisher
Course Webs Self-Test for	i for online	interaction and (3)	
Text-Books			
CHE015	INORGANIC CHEMITRY( Practical ) Prof. P. manikamba. Smt. K. Prameela.	2007	Dr.B.R. Ambedkar Open University Hyderabad
Reference- Books :	Vogel's qualtitative inorganic analysis, 7 <sup>th</sup> edition revised by G. Svehala Longman	2010	

CHE015-RB1	Inoorganic semi micro qualtitative analysis 3 <sup>rd</sup> edition. V.V by Ramanujun	2014	National publication	
CHE015-RB2	Vogels textbook of quantitative chemical anylsis 6 <sup>th</sup> edition. J mendam	2015	Person education	
CHE015-RB3	Practical inorganic chemistry G. Marr and BWrocket von. Nonstrand rteilfold Co.	2017		
<b>Reference-Bool</b>	ks :			
CD / DVD: Explo	pre additional details and reinforce learning, with this optional l	earning res	ource!	
CHE015 -CD1				
Web Links: Explore additional details and reinforce learning, with this optional learning resource!				
CHE015-WL1				

# CHE016: ORGANIC CHEMITRY( PRACTICAL)

## **PROGRAMME INFORMATION**

SN	Description	Details	
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/	
2	School	School of Architecture, Science and Technology	
3	Discipline	Science	
4	Level	PG	
5	Course Used in	V132: M.Sc.(Chemistry)	

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	CA	EE	тм	Туре
01	CHE016	ORGANIC CHEMISTRY PRACTICAL.	2	8	120	20	80	100	р

#### PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives				
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>B.Sc. With Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>Develop technical skill</li> <li>To empower our students with practical skills to comprehend the physiology and other functions of each and every vital systems</li> </ul>				

UN	Name of the Unit	CSs	Questions
01-01	Safety in Chemical Laboratory.		Student is required to answer 4
01-02	Methods and manipulation laboratory Equipment & Technique.		of 5 SAQ, <b>each</b> of 5 marks, on <b>each</b> CR
01-03	Systematic Qualitative analysis of organic compounds.		
01-04	Systematic Qualitative analysis of a model organic compound.	CR 01	
01-05	Identification of organic compounds by systematic qualitative analysis.		
01-06	Preparation of organic compounds- preparation of 1,2,3,4,6- Penta O-acetyl-beta-D glucopyranose.		
01-07	Preparation of m-Nitro Aniline.		
02-08	Preparation of Benzoyl glycine.		
02-09	Estimation of Phenol.		
02-10	Estimation of Primary Aromatic Amine.		
02-11	Estimation of Methyl Ketone.	CR 02	
02-12	Estimation of reducing sugars.		
	Chromatography-separation technique Gas-liquid& paper.		
	Separation of a solid mixture by column chromatography.		

UN	Detailed Syllabus of the Unit	CR		
01- 01	<b>Safety in chemical Laboratory,Laboratory Equipment&amp; technique</b> : Introduction, objectives, multiple adapters, Condensers and Receiver Adapters Or connecters, Funnels, Hot water Funnels, Distillation, Fractional distillation, crystallization, Dissolution, Filtration, Drying the Crystals.			
01- 02	Systematic Qualitative Analysis of Organic Compounds : Aim,Objectives, Apparatus,Chemicals,Procedure, Preliminary Examination,Detection of Extra Elements,Detection of Functional Group.			
01- 03	<ol> <li>Systematic Qualitative analysis of A Model Organic Compound: Aim, Objective, Procedure,</li> <li>Report.</li> </ol>			
01- 04	Identification of organic compounds by systematic qualitative analysis :Physical state, physical constant, ignitions or flame test, detection of element, solubility class, functional group test, tests for carbohydrates, hydrooxymic acid test for esters, Derivatives.			
01- 05	- <b>1,2,3,4,6-penta-o-acetyle-B-D-glocopyranose(-B-D-glocopyranose penta acetate) :</b> Aim, principle, apparatus and chemicals, procedure, result. 2,4,6 tribromoanyline and 1,3,5 tribromobenezene.			
01- 06	- <b>m-nitro aniline</b> : aim, objectives, priciples, apprates, chemicals, procvedure, result and 2,4 dihydrooxy acetophenon, 4 methyl -7- hydroxy coumarin .			
01- 07	<b>Benzoyl glycine:</b> Aim, objectives, principles, apparatus', chemicals, procedure, result 1,2,3,4,-tetrahydrocarbazol. 9,10 dihydroanthracene-9,10 alpha,B-succinic anhdrinine			
02- 08	<b>Estimation of phenol</b> :estimation of primary aromatic amine; aims, principles, apparatusrequired, chemicals required, procedure, result, observation and calculation.			
02- 09	<b>Estimation of methyl ketone:</b> aim of the experiment, principle, apparatus', chemical required, procedure, result, preparation of reagent, observation and calculations.			
02- 10	<b>Estimation of reducing sugars:</b> aims, principles, apparatus, chemicals, procedure, precautions, observations, preparation of reagents.	CR 02		
02- 11	<b>Chromatography:</b> introduction, principles, classification. Columchromatography, elements, column, packing of column, procedure, thin layer chromatography, principles, procedure, application of TLC.	, ,		
02- 12	Separation of a solid mixture by column chromatography:aims, objectives, principles, apparatus required, chemicals required, procedure, result, precaution, advantages of column chromatography, limitations, questions.			

LR Code	Title Author	Edition Year	ISBN Publisher				
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3)							
Self-Test for ea	ch CR Block, Continuous Assessment Test and End Examination	1					
CHE016	ORGANIC CHEMISTRY (PRACTICAL)						
Text-Books							
CHE016	Dr K.raja mohan Prof G. Ramchandrajah	Reprint 2017	Dr. B.R. Ambedkar Open University Hyderabad				
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!							
CHE016-RB1	A text book or practical organic chemistry by man and saundres	2003					
CHE016-RB2	Text book of practical organic chemistry by A vogel	2010					

CHE016-RB3	Practical organic chemistry textbook for students by. V.K. Ahuliwalia and sunita dhingre.				
CHE016-RB4	Techniques in organic chemistry by JErrry R. Mohring C.N. Hanmond P.F. schatz, T.C. Morrill				
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!					
CHE016 -CD1					
Web Links: Explore additional details and reinforce learning, with this optional learning resource!					
CHE016-WL1					
# CHE017: PHYSICAL CHEMISTRY (PRACTICAL)

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.( <b>Chemistry</b> )

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	CA	EE	ТМ	Туре
01	CHE017	PHYSICAL CHEMISTRY (PRACTICAL)	2	8	120	20	80	100	р

## PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives				
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>B.Sc./ with Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>Develop technical skill</li> <li>To empower our students with practical skills to comprehend the physiology and other functions of each and every vital systems</li> </ul>				

UN	Name of the Unit	CSs	Questions		
01-01	Physical properties & disputation study		Student is required to answer		
01-02	Determination of density and viscosity of liquids		4 of 5 SAQ, each of 5 marks,		
01-03	Distribution of I2 between CCL4 and aqueous KI solution and calculation of formation constant of KI3	CR 01	on eachCR		
01-04	Adsorption of acetic acid on activated charcoal and verification of freundiation adsorption isotherm				
02-05	Kinetics of acids catalyzed hydrolysis of methyl acetate				
02-06	Kinetics of persulphate-iodide reaction				
02-07	Conductivity study titration of strong acid and strong base Titration of weak acid with strong base Titration of mixture of acids with strong base				
02-08	Determination of cell constant Determination of solubility product Determination of dissociation constant of acetic acid	CR 02			
02-09	Potentiomentry : titration of strong acid with strong base, titration of weak acid and strong base, redox titration of Fe2+ bwith KMno4,single electrode potential of Cu/Cu2+				
02-10	PHmetry : measurement of ph of the given solutions, preparation of buffers, determination of PKa of weak acid				
02-11	Colorimetry: verification of lambert-beer's law				

	Polarimerty : Determination of specific rotation of	
02-12	sucrose, study of kinetics of acids catalyzed hydrolysis of	
	sucrose	

UN	Detailed Syllabus of the Unit	CR		
01-01	<b>Density and viscosity liquids :</b> Aim, principle, requirements, procedure, observation, calculations & results.			
01-02	<b>Distribution of I2 between CCL4 and aqueous KI and calculation of formation constant of K3:</b> aim,requirement , procedure, calculation, result.	CD 01		
01-03	Adsorption of acetic acid on activated charcoal: aim, requirement, procedure, observation, calculation, result.			
01-04	<b>Kinetic study Acid catalyzed hydrolysis of methyl acetate :</b> aim, principle, requirement, procedure, observation, calculations, results.			
02-05	<b>Persulphate Iodide reactions, :</b> aim, principles, chemicals, procedure, calculations, results, observations,			
02-06	<b>Conductivity study</b> : Titration of strong acid with strong base : Aim, principles, requirement, procedure, calculations, result, observations,			
02-07	<b>Determination of cell constant :</b> Aim, principles, requirements, procedures, observations, calculations,			
02-08	<b>Potentiometry :</b> Titration of a strong acid with a strong base: titration of weak acid with a strong base : aim, principles, requirement, procedure, calculations, result, observations,	CR 02		
02-09	<b>PH metery :</b> measurement of ph of the given solution, preparation of buffers, determination of weak acid: aim, requirement , procedure, result,			
02-10	<b>Colorometry :</b> Verification of lamberts beers law: Aim, requirements, procedure, observations, result,			
02-11	<b>Polarimerty</b> : Determination of specific rotation of sucrose, Study of Kinetics of acid catalyzed hydrolysis of sucrose, kinetic of hydrolysis of sucrose, Aim, principle, requirements, procedure, results, observations.			

	Title	Edition	ISBN						
LK Code	Author	Year	Publisher						
Course Websit	Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3)								
Self-Test for ea	ch CR Block, Continuous Assessment Test and End Examination								
CHE017	Physical Chemistry( Practical)								
Text-Books									
CHE017	Physical Chemistry Practical Dr. P. Manikamba Prof. G. ramchandrah	2007	Dr. B.R. Ambedkar Open University Hyderabad						
Reference-Boo	ks: Explore additional details and reinforce learning, with this op	tional lear	ning resource!						
CHE017 RB-1	Experimental physical chemistry by V.D. athawale, Parul mathur.								
CHE017 RB-2	Practical in physical chemistry by p.s. sindhu								
CHE017 RB-3	Practical physical chemistry 8 <sup>th</sup> edition by Alexander Findlay								
CHE017 RB-4	Text book of physical chemistry by Jyotirmay lohini								
CD / DVD: Expl	ore additional details and reinforce learning, with this optional le	earning res	ource!						
CHE017 -CD1									

Web Links: Explore additional details and reinforce learning, with this optional learning resource!						
CHE017-WL1						

# CHE018 :SPECTROSCOPY & COMPUTERS (PRACTICAL)

SN	Description	Details
1       University       Yashwantrao Chavan Maharashtra Open U         1       University       Nasik - 422 222, Maharashtra, India         Website: <a href="http://www.yemou.ac.in/and-http://yemou">http://yemou</a>		Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132:MSc.(Chemistry)

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	СА	EE	ТМ	Туре
01	CHE018	SPECTROSCOPY & COMPUTERS(Practical)	2	8	120	20	80	100	р

## PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>B.Sc./ with Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>Develop technical skill</li> <li>To empower our students with practical skills to comprehend the physiology and other functions of each and every vital systems</li> </ul>

UN	Name of the Unit	CSs	Questions
01-01	Infrared spectroscopy		Student is required to answer
01-02	Analysis of the I.R Spectra Problems		4 of 5 SAQ, each of 5 marks,
01-03	Proton Magnetic reasonance spectroscopy		on eachCR
01-04	Analysis of HNMR spectrum problem		
01-05	Ultraviolet visible spectroscopy	CR 01	
01-06	Mass spectroscopy		
01-07	Analysis of Mass Spectra Problems		
01-08	Structural determination of organic compounds using the combine spectral data		
02-09	Computer applications in chemistry practices Basic language practical	CR 02	
02-10	C language Practical		

# DETAILED SYLLABUS: CHE018

UN	Detailed Syllabus of the Unit	CR
01-01	<b>Infrared Spectroscopy</b> : analysis of I.R Spectra problems, Aim, objectives, Range and principles of Infrared absorption, principle, introduction, instrumentation, interpretation, Guide lines, Division of I.R range.	
01-02	<b>Proton Magnetic resonance spectroscopy:</b> Aim, objective, introduction, Theory of nuclear magnetic resonance, Measurements of chemical shift, instrumentation, shielding and deshilding effects of electro negativity, spin spin coupling spin spin splitting: Coupling constant, analysis of NMR spectra, rules of the analysis of NMR spectra, Aromatic spine system: application of PMR spectroscopy, summery.	CR 01
01-03	<b>Ultraviolet visible spectroscopy</b> : Aim, objectives, introduction, principle, Electronic transaction, chromospheres, instrumentation, interpretation of the spectra, Aromatic compounds, nonbenzoid aromatic hydrocarbons, identification of phenols and amines, application of stereochemitry, summery	CNUI
01-04	<b>Mass spectrometry :</b> aim, objective, introduction, principle, instrumentation-mass spectrometer, fragmentation processes, nitrogenurule, isotopic peaks, recognition of the molecular ion, metastable peaks, mass spectra of different functional groups, interpretation of the mass spectrum, summary,	
02-05	Structural determination of organic compounds using the combined spectral data (IR, PMR, Mass & UV) data: aim, objective, introduction, spectrometric identification, spectrometric identification,	
02-06	Basic language practical : aim and objective, summation of series, Simple linear regression/ least squarefitting of two variables,	<b>60 00</b>
02-07	Calculation of activation energy using Arrhenius question by least squarefitting : aim, objectives, problems, program.	CK 02
02-08	Language practical's : aims, objective, roots of quadratic question	
02-09	<b>First order rate constant from kinetic data:</b> aim, objective, entering and executive program, calculation of dissociation constant of a acetic acid from conductancedata.	

LR Code	Title Author	Edition Year	ISBN Publisher				
Course Websit Self-Test for ea	Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination						
CHE018	Spectroscopy & Computers (Practical)						
Text-Books	•						
CHE018	Prof. K.raja mohan Fr. Krishna devulapalli	2007	Dr. B.R. Ambedkar Open University Hydrabad				
Reference-Boo	ks: Explore additional details and reinforce learning, with this op	tional learn	ing resource!				
CHE018 RB-1	Organic spectroscopy William kemp.	2014					
CHE018 RB-2	Spectranativfe identification of organic compnenets 6 <sup>th</sup> edition by R.M. Siberstine G.C. BASseler and T.C Morrile	2016					
CHE018 RB-3	Organic structures from spectra. By S.tenhell and J.K kalmon	2018					
CHE018 RB-4	Spectroswper methods in organic chemistry. by D.H. William and I.felming	2013					

	Modern NMR spectroscopy 2md edition practical JKm sanders				
	by and B.K.hunter.				
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!					
CHE018 -CD1					
Web Links: Explore additional details and reinforce learning, with this optional learning resource!					
CHE018-WL1					

# Year 2

# CHE021: ORGANIC REACTION MECHANISMS- II , PERICYCLIC REACTIONS, ORGANIC PHOTOCHEMISTRY STEREOCHEMISTRY - II

# PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(chemistry)

# **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	СА	EE	ТМ	Туре
02	CHE021	Organic Reaction Mechanisms- II,Pericyclic Reactions,Organic photochemistry, Stereochemistry-II	4	8	120	20	80	100	Т

## PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>B.Sc. with chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>An understanding of the characteristics of antigen and antibodies</li> <li>And understanding of the nature of antigen and antibody.</li> </ul>

UN	Name of the Unit	CSs	Questions	
01-01	Reaction intermediates –I		Student is required to answer	
01-02	Reaction intermediates –II		4 of 5 SAQ, eachof 5 marks,	
01-03	Molecular rearrangements I	CR 01	on eachCR	
01-04	Molecular rearrangements II			
01-05	Elimination reactions			
02-06	Classification and stereochemistry of pericyclic reactions	CR 02	Student is required to answer	
02-07	Molecular orbital and their symmetric properties		4 of 5 SAQ, eachof 5 marks, on eachCR	
02-08	Analysis of electrocyclic reactions			
02-09	Analysis of cycloaddition reactions			
02-10	Analysis of sigmatropic reactions			
03-11	Electronic transitions		Student is required to answer	
03-12	Photochemistry of carbonyl compounds	CR 03	4 of 5 SAQ, each of 5 marks,	
03-13	Photochemistry of alkenes and dienes		on eachCK	
03-14	Photochemistry of benzene derivatives			

03-15	Photochemistry of peroxides nitrites, hypohalites, azo compounds and diazo compounds			
04-16	Confirmation of some acyclic molecules		Student is required to answer	
04-17	Confirmation of cyclobutanes, cyclopentanes, cyclopentanes, cyclohexanes and monosubstituted cyclohexanes		4 of 5 SAQ, eachof 5 marks on eachCR	
04-18	Confirmation of disubstituted cyclohexanes and	CR 04		
04-19	cyclohexens and cyclohexanones			
04-20	Confirmation of a few other monocyclic and bicylic systems Confirmation and reactivity			

UN	Detailed Syllabus of the Unit	CR
01- 01	<b>Reaction intermediates I</b> : aims and objectives, introductions, 1)carbonium ions, 2)carbanions 3)free radicals summary, terminal examination model question in unit 1	CP 01
01- 02	<b>Reaction intermediates II :</b> aims and objectives, introductions, cabanas, Nirenes, arynes, summary, terminal examination model question in unit 2	CKUI
01- 03	<b>Molecular rearrangements 1</b> : aims and objectives, introductions, wagner-Meerwein rearrangements, pinacol-pinacolone rearrangement, acid catalyzes rearrangement of carbonyl compounds, the Woilff rearrangement, the Vaeyer-Villiger oxidation, Rearrangement of peroxides, transannular rearrangements, summary, terminal examination model question in unit 3	
01- 04	<b>Molecular rearrangements II</b> - aims and objectives, introductions, the hofman rearrangement, the lossen rearrangement, the curtius rearrangements, the schimidt rearrangements, the Beckmann rearrangements, Base catalysed rearrangements, the Fries rearrangements, Summary, terminal examination model question in unit 4	
01- 05	<b>Elimination reactions</b> : aims and objectives, introduction mechanism of B-elimination reaction, orientation in elimination reactions, elimination vs, substitution, summary, terminal examination model question in unit 5	
02- 06	<b>Classification and stereo chemistry of pericyclic reactions</b> : aims and objectives, introductions classification of pericylic reactions, stereochemistry of peri cyclic reactions, summary, terminal examination model question in unit 6	
02- 07	<b>Molecular orbital and their symmetry properties'</b> : aims and objectives, introduction, Molecular orbital of C-C bond, Molecular orbital of C=C bond, pi molecular orbital of conjugated pi system, pi molecular orbitals of conjugated polienes, pi molecular orbitals of conjugated Pi systems containing odd number of P atomic orbital, summary, terminal examination model question in unit 7	CR 02
02- 08	Analysis of electro cyclic reactions: aims and objectives, methods for the analysis of electro cyclic reactions, perturbanatinal molecular orbital method, Frontier molecular orbital method, orbital symmetry correlations diagram, some example of eletrocylic reactions, summary, terminal examination model question in unit 8.	
02- 09	Analysis of electro cyclicoaddition reactions : aims and objectives, methods for the anylsis of cycloaddition reactions, perturbation molecular orbital method, fronitr molecular method, orbital symmetry correlation diagram some examples of cycloaddition and cycloreversion reaction, summary, terminal examination model question in unit 9	
02- 10	Analysis of sigmatropic reactions: :aims and objectives, methods of anaylysis of sigmatropic reactrion, perturbational molecular orbital method, frontier molecular orbitals methods, some example of sigma tropic reactions, summary, terminal examination model question in unit10	
03- 11	<b>Electronic transition :</b> aims and objectives, , introduction, electronic transitions, Carbonyl chromophore, Sin gate and triplet state, Deactivation of excited states, Intersysyeam crossing efficiency, photosensitization and triplet energy transfer, intermolecular triplet energy transfer, confuration of T1 state in carbonyl compounds, reactivity of exited state, summary, terminal examination model question in unit 11	CR 03
03- 12	<b>Photochemistry of carbonyl compound</b> : aims and objectives, , introduction, photoreduction, paterno-buchi reactions, Norrish cleavages, Photochemical reactions of alpha-beta unsaturated carbonyl compounds, photochromisms, summary, terminal examination model question in unit 12	
03- 13	<b>Photochemistry of alkenes and dienes :</b> aims and objectives, introduction, Cis-trans isomerisation of alkenes, Acyclic additions of alkenes, photochemistry of conjugated dines, Di-Pi methane rearragemtns, Intramolecular crossed additions, Oxidations using singlet Oxygen,	

	summary, terminal examination model question in unit 13		
03- 14	<b>Photochemistry if benzene derivatives</b> :aims and objectives, , introduction, ring isomerisation reactions, addition reactions, cycloaddition reactions, substituation reactions, summary, terminal examination model question in unit 14.	CR 04	
03- 15	<b>Photochemistry of peroxides, nitrates, hypohalites, azocompounds, and Daizo compounds : :</b> aims and objectives, , introduction, photochemistry of peroxides, photochemistry of nitrate, photochemistry of hlphohalites, photochemistry of azo compounds, photochemistry of diazo compounds, summary, terminal examination model question in unit 15		
04- 16	<b>Conformations of some acyclic molecules :</b> aims and objectives, , introduction, Dihedral angle, designation of conformer, Klyne-prelog terminology for designation of conformers, stability of conformers, conformation of ethane's, conformation of N-butanes, conformation of 1,2 dihaloethenes, conformation of 1,1,2,2,tetrabromoehtene, conformations of 2,2,,3,3 tetracholobutane, conformations of ethylene cholohydrine, conformations of ethylene glycol conformations of diastereomers, , summary, terminal examination model question in unit 16.		
04- 17	<b>Conformation of cyclobutanes, cyclopentanes, cyclohexanes and monosubsituted cyclohexanes:</b> aims and objectives, , introduction, conformation of cyclobutane, conformation of monosubstitutaed cyclobutane, conformation of disubstituted cyclobutanes, conformation of cyclopentane, conformation of monosubstituted cyclopentanes, conformation of disbustituted cylopentanes, Half-chair cobnformations of cylopentane, conformation of monosubstitutaed cyclohexane, isolation andcharacterisation of conformationof monochlohexane, summary, terminal examination model question in unit 17		
04- 18	<b>Conformation of disubstitutaed cyclohexanes, cyclohexenes and cyclohexanones:</b> aims and objectives, , introduction, conformation of 1,1 disubstituted cyclohexanes, non-geminally disubstituted cyclohexanes, Boat conformations, conformation of cyclohexanes, conformation of cyclo hexamine, summary, terminal examination model question in unit 18.		
04- 19	<b>Confirmations of a few others monocylic and bicylic systems</b> : aims and objectives, introduction, confirmation of rings larger than 6-membered, confirmation of some saturated hetrocycles, conformation ofsome fused bicylic systems, conformation of some bridge bicylic system, summary, terminal examination model question in unit 19.		
04- 20	<b>conformation and reactivity</b> : aims and objectives, , introduction, reactions of conforamtionally rigid diastereomers, reaction of conforamtionally mobile system, summary, terminal examination model question in unit 20.		

_	Title	Edition	ISBN
LR Code	Author	Year	Publisher
Course Website	e Link for (1) Mobile and Online Lectures, (2) Discussion Foru	m for onlin	e interaction and (3)
Self-Test for ea	ch CR Block, Continuous Assessment Test and End Examination		
CHE021	Organic Reaction mechanisms-II,Pericyclic Reactions,Organic Photochemistry,Stereochemistry-II		
Text-Books			
CHE021	Organic Reaction Mechanisms-II, pericyclic Reaction,Stereochemistry-II Prof. K.Kondal reddy, Prof. G Ramachandrainh, Smt. K. Prameela Dr. B.R. Ambedkar Open University, Hyderabad.	2012 2017	Dr. B.R. Ambedkar Open University Hyderabad
<b>Reference-Boo</b>	ks: Explore additional details and reinforce learning, with this op	tional lear	ning resource!
CHE021 – RB1	Advanced Organic Chemistry Part-A &B by Carey,Francis A, Sundberg, Richard J	2013	
CHE021- RB2	Advanced Organic Chemistry by Michael B. Smith, Jerry March.	2010	

	Organic Chemistry	2014			
CHEUZI- KBS	byGene Davis				
	Organic Chemistry	2014			
CHEUZI KD-4	by Clayden Greeves, Warren & Wothers				
	Organic Structure From Spectra	2013			
CHEUZI KB-5	by L D Field, S Sternhell				
CD / DVD: Explo	CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!				
CHE021 -CD1					
Web Links: Explore additional details and reinforce learning, with this optional learning resource!					
CHE021-WL1					

# CHE022: ORGANIC CHEMISTRY-SYNTHETIC ORGANIC CHEMISTRY

# **PROGRAMME INFORMATION**

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(chemistry)

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	СА	EE	ТМ	Туре
02	CHE022	Organic Chemistry –Synthetic Organic Chemistry.	4	8	120	20	80	100	Т

# PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>B.Sc. with Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>Identification &amp; characterization of animal breeds.</li> <li>Developing DNA based diagnostics and genetically enquired various for animals.</li> </ul>

UN	Name of the Unit	CSs	Questions
01-01	A brief of functionalisation and functional group transformation reactions and oxidation of alkanes and alkenes.		Student is required to answer 4 of 5 SAQ, eachof 5 marks, on eachCR
01-02	Oxidation of alcohols.	CR 01	
01-03	Reductions of catalytic hydrogenation.		
01-04	Reduction by hydride transfer agents.		
01-05	Reductions by dissolving metals.		
02-06	Formation of C-C single bond.		Student is required to answer
02-07	Formation of C-C double bond.	CD 03	4 of 5 SAQ, each of 5 marks
02-08	-08 Synthetic applications of organoborenes.		on eachCR
02-09	synthetic applications of oranosilanes.		
02-10	protecting groups in organic synthesis.		
03-11	Introduction, target selection and terminology.		
03-12	Disconnection approach with example.		
03-13	Strategic bonds in carbocylic and hetrocylic systems.	CR 03	
03-14	Applications of some important strateges in organic synthesis.		
03-15	Some selected synthesis Dispalure, Z-jasmone.		

04-16	Topicity, configurational, descriptors and stereoselectivity.		
04-17	Principle of asymmetric synthesis and analysis of stereoisomer mixtures.	CR 04	
04-18	Substrate controlled methods.		
04-19	Auxilary controlled method.		
04-20	Reagents controlled and catalyzed controlled synthesis.		

UN	Detailed Syllabus of the Unit	CR		
01-01	Fictionalization and functional group interconversation & oxidation of alkanes and alkenes : Aims and Objective, Introduction, a brief review of functionalisation and functional group transformations, oxidations, summary, terminal examination model question in unit1			
01-02	Oxidations of alcohols :Aims and Objective, Introduction, oxidation of alcohols with chromic acid, oxidation of alcohols with chromium IV oxide, oxidation with pyridine complexes, oxidation 01-02 with alkoxy sulphonium salts, oxidation of alcoholsworth manages dioxide. oxidation of bsilvercarbonate Oppenure oxidation. summary, terminal examination model question in unit2			
01-03	<b>Reduction- catalytic hydrogenation : :</b> Aims and Objective, Introduction, catalytic hydrogenation, heterogeneous catalytic hydrogenation, homogenation hydrogenation, summary, terminal examination model question in unit3			
01-04	<b>Reduction by hydride transfer reagents:</b> Aims and Objective, Introduction, Reduction by hydride transfer reagents, summary, terminal examination model question in unit4			
01-05	<b>Dissolving metal reductions:</b> Aims and Objective, Introduction, dissolving metal reductions, ,summary, terminal examination model question in unit 5.			
02-06	Formation of carbon carbon single bonds: Aims and Objective, Introduction, Alkylation, The aldole reaction, Knovengel condensation, stork Enamine synthesis, Michel addition, Robinsone annulations, Use of Cabanas in C-C bond formation, Simmons-smith reactions, formation of C-C bonds using oranometalic compounds, summary, terminal examination model question in unit6.			
02-07	<b>Formation of carbon carbon double bonds:</b> Aims and Objective, Introduction, Elimination reactions, the Witting reactions, Alkenes from sulphoens, Decaboxylation of B-lactose, fragmentation reactions, oxidative decarboxilation of carboxylic acids, synthiesis of alkenes from dioles, Alkenes from arysulphonyl hydrazones-shapiro reactions, reductive domerisation of carnonyl compounds, summary, terminal examination model question in unit7			
02-08	Synthetic application of organoboranes : Aims and Objective, Introduction, hydroboration, some important organoboranes, synthetic applications of organo borane, summary, terminal examination model question in unit8			
02-09	<b>Synthetic application of organo silanes :</b> Aims and Objective, Introduction, synthesis of organo silicon compounds, applications of organo silances, silyl enol ethers and ketenes acetales, synthetic applications of iodotrimethyl silane, reductions using silicon hydrides, reactions involving silicon stabilized catboantion petron alkenes synthesi, reactions of binary silence, reactions involving ally silence, florid induced reactions of silicone, reactions of trimethylesilyslecyanide, summary, terminal examination model question in unit9.	CR 02		
02-10	<b>Protecting groups of organic chemistry :</b> Aims and Objective, Introduction, protection of alcholes, protections of diaoles, protection of aldehydes and ketones, protection of amines, summary, terminal examination model question in unit9			
03-11	<b>Introduction and target selection and terminology</b> : Aims and Objective, Introduction, target selections, Retrosynthetic analysis, terms used in retro synthetic analysis, Different strategies for retro synthetic analysis, summary, terminal examination model question in unit 10.			
03-12	<b>Disconnection approach with examples</b> : Aims and Objective, Introduction, Disconnection approach, synthesis of aromatic compounds, One group C-X Disconnections, synthesis of Ethers, Alkyl Halids and Sulphides, synthesis of alkenes, two Group of C-X Disconnections, summary, terminal examination model question in unit 10.	CR 03		
03-13	<b>Carbon- Carbon disconnections:</b> Aims and Objective, Introduction, one ground C-C disconnections, Two group -C disconnections, summary, terminal examination model questionin unit 11.			

3-14	Application of some important strategies in organic synthesis : Aims and Objective, Introduction,					
	chemo selectivity, regioselectivity, sterioselectivity, cyclisation reactions, reversal of polarity, summary, terminal examination model question in unit 14.					
03-15	Amine synthesis, consecutive and convergent synthesis & some selected synthesis: Aims and Objective, Introduction, Amine synthesis, consecutive synthesis and convergent synthesis, some selected synthesis, summary, terminal examination model question in unit 15.					
04-16	<b>Tropicity and prochirality :</b> Aims and Objective, Introduction, homomorphic ligandes, homomorphic faces, topicity, prichirality, prochiral symbols for enatiotropic ligandes, prochiral symbols for disteriotopic lifands, prochiral symbol for inhatiotopic faces, prochiral symbol for diasteriotopic faces, summary, terminal examination model question in unit 16					
04-17	7.7 sterioselectivity and strategies of asymmetric synthesis. : Aims and Objective, Introduction, sterioselectivity, product composition, determination of product compos ion, pinnacleof sterioselecticity, strategies if asymmetricsynthesis summary, terminal examination model question in unit 17					
04-18	<b>Substrate controlled methods:</b> : Aims and Objective, Introduction, reduction of cholestan 3-one, synthesis of diaestromeric-2mrhylnobornane2 ols, reduction of camphor, catalytic hydrogeniation, syn-hydroxlation of 2,3 cholestene, 1-2 asymmetric induction, summary, terminal examination model question in unit 18					
04-19	<b>Chiral auxiliary-controlled methods</b> : Aims and Objective, Introduction, Alkylation of chiral enolates, alkylation of chiral azenolates, alkylation of chiral hydragones and chiral imines, prelog rules1,4 asymmetric induction, asymmetric diaels alder reaction, summary, terminal examination model question in unit 19					
04-20	<b>Chiral eragent controlled and catalyst controlled method</b> : Aims and Objective, Introduction, chiral regent controlled methods, chiral catalyst-controlled methods, summary, terminal examination model question in unit 20					

LR Code	Title	Edition	ISBN Dublisher
	Author	Year	Publisher
<b>Course Websit</b>	e Link for (1) Mobile and Online Lectures, (2) Discussion Foru	m for onlir	ne interaction and (3)
Self-Test for ea	ch CR Block, Continuous Assessment Test and End Examination	l	
CHE022	Organic Chemistry –Synthetic Organic Chemistry.		
Text-Books			
CHE022	Organic Synthesis –I & II Synthetic Strategies Prof. K.Kondal reddy,Dr.G. Sridevi, Smt. K. Prameela.	2017	Dr. B.R. Ambedkar Open University, Hyderabad
<b>Reference-Boo</b>	ks: Explore additional details and reinforce learning, with this op	tional lear	ning resource!
CHE022 RB-1	Advanced Organic Chemistry Part-A &B by Carey, Francis A, Sundberg, Richard J	2013	
CHE022 RB-2	Advanced Organic Chemistry by Michael B. Smith, Jerry March.	2014	
CHE022 RB3	Organic Chemistry by Gene Davis	2016	
CHE022 RB-4	Organic Chemistry by Clayden Greeves, Warren & Wothers	2016	
CHE022 RB-5	Organic Structure From Spectra by L D Field, S Sternhell	2015	
.CD / DVD: Exp	lore additional details and reinforce learning, with this optional	learning re	source!
CHE022 - CD1			
Web Links: Ex	olore additional details and reinforce learning, with this optional	learning re	esource!

CHE022-WL1		

# CHE023: ORGANIC CHEMISTRY-NATURAL PRODUCTS, HETROCYCLES, BIOGENESIS AND SPECTROSCOPY

# **PROGRAMME INFORMATION**

SN	Description	Details			
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/			
2	School	School of Architecture, Science and Technology			
3	Discipline	Science			
4	Level	PG			
5	Course Used in	V132: M.Sc.(chemistry)			

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	CA	EE	ТМ	Туре
02	CHE023	Organic chemistry –Natural Products, Hetrocycles,Biogenesis and Spectroscopy.	4	8	120	20	80	100	Т

# PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>B.Sc./BA with Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>Identify various aspects of chemicals\ exposure &amp; identify method &amp; common application of toxicology in chemicals</li> </ul>

UN	Name of the Unit	CSs	Questions
01-01	Alkaloids		Student is required to answer
01-02	Steroids and hormones		4 of 5 SAQ, each of 5 marks,
01-03	Prostaglandins	CR 01	on eachCR
01-04	Vitamins		
01-05	Tortenoids and porphyries		
02-06	Enzyme and their reactivity		
02-07	Biochemical pathway 1		
02-08	Metabolism and fatty acids and proteins	CR 02	
02-09	Biosynthetic method, general methods, and feeding experiment		
02-10	Biosynthesis aromatic hydrocarbons by acetate malonate and shikmic acid pathway		
03-11	5 me bared hetrocycles containnf two hetro atoms		
03-12	5- member hetrocycle cotainng more than 2 hetro atoms	CR 03	
03-13	6 membrane hetrocycles containg 2 hetro atom		
03-14	Synthesis of pyridimines, purine and xanthine bases		

03-15	3 and 4 membered hetrocylic compounds		
04-16	13C NMR spectroscopy I.	CR 04	
04-17	13C NMR spectroscopy II.		
04-18	19F, 31P NMR spectroscopy.		
04-19	Multiple sequence in NMR spectroscopy.		
04-20	Optical rotator dispersion studies .		

UN	Detailed Syllabus of the Unit	CR
01-01	Alkaloids: Aims, objective, introductions. Morohine, reserpine, summary, terminal examination model question in unit 1.	CP 01
01-02	<b>Steroids and harmones :</b> Aims, objective, introductions, steroids, Hormones, summary, terminal examination model question in unit 2.	CKUI
01-03	<b>Prostaglandins :</b> Aims, objective, introductions, structure of Prostaglandins, Classification of Prostaglandins, physiological activity of Prostaglandins, structural elucidation of PGE1aplha, structural elucidation of PGE2aplha, structural elucidation of PGE3aplha, synthesis of prostaglandins, biosynthesis of prostaglandins, summary, terminal examination model question in unit 3.	
01-04	<b>Vitamins</b> :Aims, objective, introductions Vitamin A group I Vitamin B group, Vitamin H, Vitamin C Vitamin D Vitamin E group, Vitamin K group summary, terminal examination model question in unit 4.	
01-05	<b>Retinoid and popyrins</b> :Aims, objective, introductions, structural of rotenone, synthesis of rotenone, porphyrins summary, terminal examination model question in unit 5.	
02-06	<b>Enzymes and their reactivity</b> :Aims, objective, introductions, enzymes as catalyst, mechanism of enzyme catalyst, coenzymes classification and nomenclature of enzymes, Factors affecting the enzymatic catalysis, enzyme inhibitions, specific of enzymes catalyzed reactions, enzyme immobilization, summary, terminal examination model question in unit 6.	
02-07	<b>Biochemical pathways 1</b> : Aims, objective, introductions metabolism of carbohydarates, summary, terminal examination model question in unit 7.	
02-08	<b>Metabolism of fatty acids and proteins :</b> Aims, objective, introductions, fatty acid metabolism, proteins metabolism, summary, terminal examination model question in unit 8	CR 02
02-09	<b>Biosynthetic methods general methods, and feeding experiments</b> : Aims, objective, introductions biogenesis of natural products, difference between laboratory synthesis and biosynthesis, coenzymes, methods for determining biosynthesis mechanism, summary, terminal examination model question in unit 9.	Ch 02
02-10	<b>Biosyntheisi of aromatic hydro carbins by acetate/melonate and shikmic acid pathway :</b> Aims, objective, introductions, biosynthesis of aromatic compounds, biosynthesis of terfinopids by mevolonate patheay, biosynthesis of aromatic compounds by shicmic acids pathway, niosynthesis of alkaloids, summary, terminal examination model question in unit 10.	
03-11	<b>5 membrane hetrocycles contain two hetero atoms</b> :Aims, objective, introductions, isozolies, oxazoles, pyrazoles, imidazoles, isothizoles, thiozoles, summary, terminal examination model question in unit 10.	
03-12	<b>Synthesis of 5 membrane hetrocycles containing more than two hetro atoms:</b> Aims, objective, introductions, oxidizoles, thiadiazoles, triazoles, tetrazoles, summary, terminal examination model question in unit 11.	CR 03
03-13	<b>6 membraed hetrocycles containing two nitrogen atoms</b> :Aims, objective, introductions, pyridazines, pyrimidines, pyrazines, summary, terminal examination model question in unit 12.	
03-14	<b>Synthesis of pyramidine purine anf=d xanthenine bases</b> :Aims, objective, introductions, synthesis if pyramidine bases, synthesis of purine bases, synthesis of xanthamine bases, summary, terminal examination model question in unit 13.	
03-15	<b>Three and four membered hetrocylic compounds</b> :Aims, objective, introductions, oxiranes, thiranes, aziridines, oxetens, thietance, azetidiense, summary, terminal examination model question in unit 14.	

04-16	<b>13 C NMR spectroscopy I</b> :Aims, objective, introduction significance of 13 C NMR, fundamental difficulties, advantages of 13C NMR, Principle, recoding of spectra, continuous wave methods, PET methods, types of 13C NMR spectra, chemical shift, calculation of chemical shifts of alkanes, calculation of chemical shifts of alkanes, calculation of chemical shifts of aromatic compounds, summary, terminal examination model question in unit 16.	
04-17	<b>13 C NMR Spectroscopy II:</b> Aims, objective, introduction, factor affecting the chemical shifts of carbons, coupling in 13 C NMR spectroscopy, Application of 13 N NMR, summary, terminal examination model question in unit 17.	CR 04
04-18	<b>19F AND 31 BP NMR spectroscopy :</b> Aims, objective, introduction, 19 F NMR spectroscopy, 31P NMR spectroscopy, summary, terminal examination model question in unit 18	
04-19	Multiples techniques in NMR spectroscopy 2D NMR & APT, DEPT, and INEPT : Aims, objective, introduction, some important term used in 2D NMR. Types of experiments using multiple pulse sequences, 2D NMR, 13 CNMR spectra editing techniques, summary, terminal examination model question in unit 19.	
04-20	<b>Optical rotator dispersion studies</b> :Aims, objective, introduction, Circular birefringence, circular dichroism, Cotton effect, ORD curves, octant rules, application of octant rules, axial alpha keto rules, summary, terminal examination model question in unit 20	

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LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Self-Test for ea	e Link for (1) Mobile and Online Lectures, (2) Discussion Foru ch CR Block, Continuous Assessment Test and End Examinatior	m for onlir 1	ne interaction and (3)
CHE023	Organic Chemistry-Natural Products ,Hetrocycles , Biogenesis and Spectroscopy.		
Text-Books			
CHE023	Organic Chemistry Natural Products Biogenisis. Prof.Dr. G. Sridevi, Dr. T. Udaya Kumari., A k Bhavani , C.Kotaiah, Smt K. Prameela	2007	Dr. B.R. Ambedkar open university hydrabad
Reference-Boo	ks: Explore additional details and reinforce learning, with this or	ptional lear	ning resource!
CHE023 RB-1	Advanced Organic Chemistry Part-A &B by Carey,Francis A, Sundberg, Richard J	2014	
CHE023 RB-2	Advanced Organic Chemistry by Michael B. Smith, Jerry March.	2016	
CHE023 RB-3	Organic Chemistry by Gene Davis.	2015	
CHE023 RB-4	Organic Chemistry by Clayden Greeves, Warren & Wothers	2014	
CHE023 RB-5	Organic Structure From Spectra by L D Field, S Sternhell	2014	
CD / DVD: Explo	ore additional details and reinforce learning, with this optional l	earning res	ource!
CHE023 -CD1			
Web Links: Exp	plore additional details and reinforce learning, with this optional	learning re	esource!
CHE023-WL1			

# CHE024: ORGANIC CHEMISTRY-DRUGS AND PHARMACEUTICALS.

# **PROGRAMME INFORMATION**

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(chemistry)

#### **COURSE INFORMATION**

Year	Code	Course Name			CR	CST	ST	СА	EE	ТМ	Туре
02	CHE024	Organic Chemistry Pharmaceutical.	–Drugs	and	4	8	120	20	80	100	Т

# PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>B.Sc./with Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>The infirmary between insect and environment was emphasized to the entomological research in many dissection which later proved of immense value in the indigenous control measure so as to provide more food for growing population.</li> </ul>

UN	Name of the Unit	CSs	Questions
01-01	Drug discovery design and development.		Student is required to answer 4 of 5
01-02	Concept of receptors, agonists and antagonists.		SAQ, eachof 5 marks, on eachCR
01-03	Drug development of salbutamol, cimetidine and captopril.	CR 01	
01-04	Structure activity relationship studies I.		
01-05	SAR studies II, development of oxaminonquinon & SAR studies of sulphonamoides and benzodiazepins.		
02-06	Combinatorial synthesis		Student is required to answer 4 of 5
02-07	Quantitative structure Activity relationships		SAQ, eachof 5 marks, on eachCR
02-08	Pharmacokinetics, products and clinical trials	CR 02	
02-09	Drugs acting and metabolic process		
02-10	Drug acting and cell walls and cell membranes		
03-11	Drug citing on the nervous system.		Student is required to answer 4 of 5
03-12	Enzyme inhibitors.	CR 03	SAQ, eachof 5 marks, on eachCR
03-13	Drug effecting cholinergic nervous system.		
03-14	Drug acting on histamine receptors and ion channels.		

03-15	Drug acting on genetic materials.		
04-16	Introduction to chiral drugs.		Student is required to answer 4 of 5
04-17	Synthesis of chiral drugs.		SAQ, <mark>each</mark> of 5 marks, on <mark>each</mark> CR
04-18	Drug and intermediates from fermentation.	CR 04	
04-19	Drug analysis.		
04-20	Quality controls methods in drug manufacturing and formulation.		

UN	Detailed Syllabus of the Unit (Application Oriented problems)	CR
01-01	<b>Drug discovery design and development:</b> Aims, objective, introduction, drug discovery in the past, drug discovery at present, drug discovery without lead, drug discovery with lead. Random screening, non random screening, summary, terminal examination model question in unit 1	
01-02	<b>Concept of receptors, agonist and antagonists:</b> Aims, objective, introduction, receptors, Binding interactions between rhea receptors and the messengers, Neurotranmiters and harmones, Agonist, antagonist, The design of agonists, the design of antagonist summary, terminal examination model question in unit 2	
01-03	<b>Design of agonist and antagonist development of captoprilsalbutamol and cimetides:</b> Aims, objective, introduction, development of salbutamol, development of Cimetidine, X-ray crystallography studies in drug design, development of captrophile, summary, terminal examination model question in unit 3	CR 01
01-04	<b>Structural activities relationship studies I</b> : Aims, objective, introduction, Binding role of functional groups, synthesis of analogies', summary, terminal examination model question in unit 4	
01-05	<b>SAR studies II Developemnt of oxaminoquinon &amp; SAR studies of sulphjonamiteds and benzioidazepines :</b> Aims, objective, introduction, development of oxaminiquinon, strucral activity relationship of sulphoamides, Structural activity relationship studies of benzodiazepins summary, terminal examination model question in unit 5	
02-06	<b>Combinatorial synthesis :</b> Aims, objective, introduction, need odf combinatorial synthesis, solid phase techniques, methods of parallel synthesis, methods of mix combinatorial synthesis, structural determination of the active compounds, Examples of combinatorial synthesis, Automation in combination chemistry- high throughput screening, summary, terminal examination model question in unit 6	
02-07	<b>Quantitative structure activity relationship:</b> Aims, objective, introduction, what is QSAR?, overview of QSAR, condition for applicability of QSAR, QSAR steps, graphs and equations in QSAR studies, phsyiochewmical properties, Hench analysis, crag plots, Topips designation trees, cluster significance analysis, summary, terminal examination model question in unit 7	
02-08	<b>Pharmacokinetics prodrugs and clinical trials:</b> Aims, objective, introduction, pharmacokinetics, Principles of prodrugs design, clinical trials, summary, terminal examination model question in unit 8	CR 02
02-09	<b>Drug acting on metabolic process:</b> Aims, objective, introduction, history of sulfoniamides, Sulgonilamide drugs, mechanism of action of Sulgonilamide, adverse effects, method of synthesis of Sulgonilamide, synthesis of Sulgagunanides, Sulfasalizin, trimethoprism, sulphones, summary, terminal examination model question in unit 9	
02-10	<b>Drugs acting on cell wall and cell membrane</b> : Aims, objective, introduction, Bacterial cell wall, B-lacto me antibiotics, Broad spectrum antibiotics, action of some important penicillin, derivitives, B lacto me inhabitation, Drugs acting on cell membrane, summary, terminal examination model question in unit 10	
03-11	<b>Drug acting on nervous system</b> :Aims, objective, introduction, classification of nervous system, central nervous system, peripheral nervous system, definition of neurotrasmiter, summary, terminal examination model question in unit 8	
03-12	<b>Enzyme inhibitors:</b> Aims, objective, introduction Ace inhibitors, H+/k+ atpase inhibitors, Carbonic and hydride enzymes inhibitors, Glycosidase inhibitors, Drug acting on immune system, summary, terminal examination model question in unit9	CR 03
03-13	<b>Drugs affecting cholinergic nervous system</b> : Aims, objective, introduction, cholinergic receptors, cholinesterase inhibitors, ant cholinesterase drugs, summary, terminal examination modelquestion in unit 10	

03-14	<b>Drug acting on histamine receptors and ion channels:</b> Aims, objective, introduction, drug acting on histamine receptors, histamine receptors antagonist, drug acting on ion channels, summary, terminal examination model question in unit 11	
03-15	<b>Drugs acting on genetic materials</b> : Aims, objective, introduction DNA-Inetrcalaeting agents, DNA-binding and Nicking agents, DNA-Topoisomers inhibitors, DNA-Polyinhibitors, transcriptase enzyme inhibitors, Drug interfering with translation process, summary, terminal examination model question in unit 11	
04-16	<b>Introduction to chiral drugs :</b> Aims, objective, introduction, relationship between chirality and biological activity, eudismic ratio, Case study of eusio, ic ratio, Three pointcontact models, Classification chiral drugs, Pfeiffer's rule, terminal examination model question in unit 12	
04-17	<b>Synthesis of chiral drugs :</b> Aims, objective, introduction, synthesis of ibuprofen, synthesis of Naprozen, synthesis of propanodol, synthesis of Quinalpril, synthesis of Ramipril, synthesis of Digitization, synthesis of Indinavir sulfate, summary, terminal examination model question in unit 13	
04-18	<b>Drugs and drug intermediates from fermentation</b> : Aims, objective, introduction, history of fermentation, Basics of industrial fermentation, Fermentation products, summary, terminal examination model question in unit 14	CR 04
04-19	<b>Drug analysis:</b> Aims, objective, introduction, Bio analysis of drug, importance of radioactive isotopes, ADME studies drug, Use of stable of heavy isotopes in drug analysis, Bio availability studies, summary, terminal examination model question in unit 15	
04-20	Quality control methods in drug manufacturing and formulation: Aims, objective, introduction, spectroscopic methods for qualitative and quantitative analysis of drugs, Clinical and Forensics applications, Chromatography, Combination techniques, Quality control methods in drug analysis, summary, terminal examination model question in unit 20	

LR Code	Title	Edition	ISBN				
	Author	Year	Publisher				
Course Websi	Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3)						
Self-Test for ea	ach CR Block, Continuous Assessment Test and End Examination	on					
CHE024	Organic Chemistry –Drugs and Pharmaceuticals.						
Text-Books							
CHE024	Organic Chemistry Drugs and Pharmaceuticals Dr. G shirdevi, Dr. Y. jayprakashrao, Dr, T,Udayakumari, B.nupama	2007`	`Dr. B.R. Ambedkar Open university hydrabad				
<b>Reference-Boo</b>	oks: Explore additional details and reinforce learning, with this	optional learn	ing resource!				
CHE024 – RB 1	Advanced Organic Chemistry Part-A &B by Carey,Francis A, Sundberg, Richard J						
CHE024-RB2	Advanced Organic Chemistry by Michael B. Smith, Jerry March.						
CHE024 – RB3	Organic Chemistry by Gene Davis						
CHE024-RB4	Organic Chemistry by Clayden Greeves, Warren & Wothers						
CHE024-RB5	Organic Structure From Spectra by L D Field, S Sternhell						
CD / DVD: Exp	lore additional details and reinforce learning, with this optiona	l learning reso	ource!				
CHE024 -CD1							
Web Links: Ex	plore additional details and reinforce learning, with this option	al learning re	source!				
CHE024-WL1							

# CHE025 : ORGANIC CHEMISTRY- SEPARATION & IDENTIFICATION OF ORGANIC COMPOUNDS (PRACTICAL).

# **PROGRAMME INFORMATION**

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(chemistry)

## **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	CA	EE	ТМ	Туре
02	CHE025	Organic chemistry-separation and Identification of organic compounds (Practical)	2	8	120	20	80	100	р

#### PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
	After successful completion of this course, student
For successful completion of this course, student	should be able to
should have successfully complete:	Develop technical skill
<ul> <li>B.Sc./ with Chemistry or equivalent from a</li> </ul>	<ul> <li>To empower our students with practical skills</li> </ul>
recognized University/Board.	to comprehend the physiology and other functions of each and every vital systems.

UN	Name of the Unit	CSs	Questions
01-01	Separation and qualitative analysis general methods of binary organic mixture,		Student is required to answer 4 of 5 SAQ, each of 5 marks, on
01-02	Systematic procedure for the separation of diethylether in soluble organic mixture .		eachCR
01-03	Systematic procedure of separation of organic mixture based on salt formation I.	CR 01	
01-04	Systematic procedure of separation of organic mixture based on salt formation II.		
01-05	Systematic procedure of separation of organic mixture based on salt formation III.		
02-06	Systematic procedure for qualitative analysis of organic compounds.		
02-07	Separation and identification of unknown binary organic mixture .	CR 02	
02-08	Identification of unknown binary organic mixture I.		
02-09	Identification of unknown binary organic mixture II.		

02-10	Identification of unknown binary organic mixture III		
02-11	Identification of unknown binary organic mixture IV		
02-12	Identification of unknown binary organic mixture V		
02-13	Identification of unknown binary organic mixture VI		
02-14	Identification of unknown binary organic mixture VII		
02-15	Identification of unknown binary organic mixture VIII		
02-16	Identification of unknown binary organic mixture IX		
02-17	Identification of unknown binary organic mixture X		
02-18	Separation and identification of ternary organic mixture		
02-19	General separation procedure for ternary organic mixture		
02-20	Identification of unknown ternary mixture XVI		
02-21	Identification of unknown ternary mixture XVII		

UN	Detailed Syllabus of the Unit	CR
01-01	Systematic procedure for the separation of diethyl ether in soluble binary organic mixture : aim, objectives, apparatus, chemicals , preliminary examination Separation procedure, report	
01-02	Systematic procedure of separation of organic mixture based on salt formation I: Aim, objectives, apparatus, chemicals, preliminary examination Separation procedure, report.	
01-03	Systematic procedure of separation of organic mixture based on salt formation II : Aim, objectives, apparatus, chemicals, preliminary examination Separation procedure, report.	CR 01
01-04	Systematic procedure of separation of organic mixture based on salt formation III : Aim, objectives, apparatus, chemicals, preliminary examination Separation procedure, report.	
01-05	Systematic procedure for qualitative analysis of organic compounds formation III : Aim, objectives, apparatus, chemicals, preliminary examination, detection of extra element, solubility test, detection of functional group.	
02-06	Identification of unknown binary organic mixture I : aims, preliminary examination, separation of the mixture, identification of unknown compound 1, identification of unknown compound 2, final report	
02-07	Identification of unknown binary organic mixture II : aims, preliminary examination, separation of the mixture, identification of unknown compound 1, identification of unknown compound 2, final report	CR 02
02-08	<b>Identification of unknown binary organic mixture III</b> : aims, preliminary examination, separation of the mixture, identification of unknown compound 1, identification of unknown compound 2, final report.	

O2-10       General separation procedure for the ternary organic mixture : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,         02-11       Separation and identification of ternary organic mixture XVI : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,         02-12       Separation and identification of ternary organic mixture XVII : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,         02-12       Separation and identification of ternary organic mixture XVII : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,	02-09	<b>Identification of unknown binary organic mixture IV</b> : aims, preliminary examination, separation of the mixture, identification of unknown compound 1, identification of unknown compound 2, final report.	
02-11       Separation and identification of ternary organic mixture XVI : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,         02-12       Separation and identification of ternary organic mixture XVII : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,	02-10	General separation procedure for the ternary organic mixture : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,	
02-12 Separation and identification of ternary organic mixture XVII : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,	02-11	<b>Separation and identification of ternary organic mixture XVI</b> : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,	
	02-12	Separation and identification of ternary organic mixture XVII : aim, objectives, apparatus, chemicals, preliminary examination, separation procedure, report,	

	Title	Edition	ISBN
LK Code	Author	Year	Publisher
Course Websit	te Link for (1) Mobile and Online Lectures, (2) Discussion Foru	m for onlir	ne interaction and (3)
Self-Test for ea	ach CR Block, Continuous Assessment Test and End Examination	l	
CHE025	Organic Chemistry –Separation and Identification of Organic Compounds (practical).		
Text-Books			
CHE025	Organic Chemistry Dr. d. kmoteshwararao Prof. G.ramchandra	2007	Dr. B.R.Ambedkar Open university hydrabad
Reference-Boo	oks: Explore additional details and reinforce learning, with this op	tional lear	ning resource!
CHE025-RB1	Organic structure from spectra 4 <sup>th</sup> edition by L.D. field S.sternel JR kalman		
CHE025-RB2	Vogels textbook of practicle organic chemistry by brain furnish anotony hamford		
CHE025-RB3	Laboratry mannuak of organic chemistry by raj K. bansal		
CD / DVD: Exp	lore additional details and reinforce learning, with this optional l	earning res	ource!
CHE025 -CD1			
Web Links: Ex	plore additional details and reinforce learning, with this optional	learning re	source!
CHE025-WL1			

# CHE026: ORGANIC CHEMISTRY - SEPARATION AND IDENTIFICATION OF ORGANIC COMPOUNDS AND CHROMATOGRAPHY(PRACTICAL)

# **PROGRAMME INFORMATION**

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(Chemistry)

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	CA	EE	ТМ	Туре
02	CHE026	Organic chemistry Separation and Identification of Organic Compounds and Chromatography( practical).	2	8	120	20	80	100	р

#### PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
	After successful completion of this course, student
For successful completion of this course, student	should be able to
should have successfully complete:	Develop technical skill
B.Sc./ with Chemistry or equivalent from a	• To empower our students with practical skills
recognized University/Board.	to comprehend the physiology and other
	functions of each and every vital systems.

01-01	Spectrometric identification of organic compounds :IR, mass, NMR, UV spectroscopy for structure identification and Correlation table.		Student is required to answer 4 of 5 SAQ, each of 5 marks, on eachCR
01-02	Discusses solved problem		
01-03	Solved spectral problem 1	l	
01-04	Solved spectral problem 2		
01-05	Solved spectral problem 3	CR 01	
01-06	Provides practice problems		
01-07	Spectral problems 4		
01-08	Spectral problems 5		
01-09	Spectral problems 6		
01-10	Spectral problems 7		
01-11	Spectral problems 8		
01-12	Spectral problems 9		
01-13	Spectral problems 10		
02-14	Spectral problems 11	CP 03	
02-15	Spectral problems 12	CK UZ	

02-16	Spectral problems 13	
02-17	Spectral problems 14	
02-18	Spectral problems 15	
02-19	Spectral problems 16	
02-20	Spectral problems 17	
02-22	Spectral problems 18	
02-23	Spectral problems 19	
02-24	Spectral problems 20	
02-25	Spectral problems 21	
02-26	spectral problems 22	
02-27	Spectral problems 23	
02-28	Spectral problems 24	
02-29	Spectral problems 25	
02-30	Spectral problems 26	
02-31	Spectral problems 27	
02-32	Spectral problems 28	
02-33	Spectral problems 29	
02-34	Spectral problems 30	
02-35	Chromatography	
02-36	Thin layer chromatography	
02-37	Monitoring of chemical reaction by thin layer	
02-38	chromatography	
02-39	Preparative thin layer chromatography	
02-40	Column chromatography	

UN	Detailed Syllabus of the Unit	CR
01-01	<b>Correlation tables of mass, infrared NMR, UV spectroscopy :</b> mass spectra, IR spectra, UV spectra, NMR spectra, C-13 NMR spectra,	
01-02	<b>Solved spectra; problem 1</b> :aim, requirement, interpretation of spectral data, structural assignment from all the spectral data, mass spectral fragmentation of the compound, result.	CP 01
01-03	<b>Solved spectra; problem 2</b> :aim, requirement, interpretation of spectral data, structural assignment from all the spectral data, mass spectral fragmentation of the compound, result.	
01-04	<b>Solved spectra; problem 3</b> :aim, requirement, interpretation of spectral data, structural assignment from all the spectral data, mass spectral fragmentation of the compound, result.	
01-05	<b>Solved spectra; problem 4</b> :aim, requirement, interpretation of spectral data, structural assignment from all the spectral data, mass spectral fragmentation of the compound, result.	
01-06	<b>Solved spectra; problem 5</b> :aim, requirement, interpretation of spectral data, structural assignment from all the spectral data, mass spectral fragmentation of the compound, result.	
02-07	<b>Solved spectra; problem 6</b> :aim, requirement, interpretation of spectral data, structural assignment from all the spectral data, mass spectral fragmentation of the compound, result.	
02-08	<b>Solved spectra; problem 7</b> :aim, requirement, interpretation of spectral data, structural assignment from all the spectral data, mass spectral fragmentation of the compound, result.	CRUZ
02-09	<b>Solved spectra; problem 8</b> :aim, requirement, interpretation of spectral data, structural assignment from all the spectral data, mass spectral fragmentation of the compound, result.	
02-10	<b>Solved spectra; problem 9:</b> aim, requirement, interpretation of spectral data, structural assignment from all the spectral data, mass spectral fragmentation of the compound, result.	
02-11	thin layer chromatography TLC1 : aim, principle, procedure, result	
02-12	Monitoring of chemical reaction by thin layer chromatography : aim, principle, procedure, result	
02-13	Preparation of thin layer chromatography : aim, principle, procedure, result	
02-14	Separation of solid mixture by column chromatography: aim, principal, materials needed, procedure, report	

LR Code	Title Author	Edition Year	ISBN Publisher					
Course Websit Self-Test for ea	Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination							
CHE026	Organic chemistry-Separation and Identification of Organic Compounds and Chromatography(Practical).							
Text-Books								
	Prof G.ramchandrah D.koteshwarrao, k.prmila.	2007	Dr, B .R. Ambedkar open University Hydrabad					
Reference-Boo	ks:							
CHE026-RB1	Spectroscopy identification of organic compounds by silverstain and bailier							
CHE026-RB2	Organic spectroscopy by wiliam kemp							
CHE026-RB3	Elementary organic spectroscopy by V.R shrama							

CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!						
CHE026 -CD1	CHE026 -CD1					
Web Links: Explore additional details and reinforce learning, with this optional learning resource!						
CHE026-WL1						

# CHE027: SYNTHESIS OF ORGANIC COMPOUND AND ISOLATION OF NATURAL PRODUCTS (PRACTICAL).

#### **PROGRAMME INFORMATION**

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222 Maharashtra India
_		Website: http://www.ycmou.ac.in/and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(Chemistry)

#### **COURSE INFORMATION**

Sem	Code	Course Name	CR	CST	ST	СА	EE	ТМ	Туре
01	CHE027	Synthesis of Organic Compounds and Isolation of Natural products( Practical).	2	8	120	20	80	100	р

## PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
	After successful completion of this course, student
For successful completion of this course, student	should be able to
should have successfully complete:	Develop technical skill
B.Sc./ with Chemistry or equivalent from a	• To empower our students with practical skills
recognized University/Board.	to comprehend the physiology and other functions of each and every vital systems

UN	Name of the Unit	CSs	Questions	
01-01	Preparation 2 PEHNYL INDOLE		Student is required to answer	
01-02	Preparation OF 7 HDROXY 3 METHYL FLAVONE		4 of 5 SAQ, each of 5 marks,	
01-03	Preparation of 2-5 Dihydroxy acetophenone	CR 01	on eachCR	
01-04	Preparation of benzilic acid	MLs		
01-05	Preparation of benzanilide	01-20		
01-06	Preparation of caprolactum			
01-07	Preparation of acridon			
02-08	One step preparation of organic molecule		Student is required to answer 4 of 5 SAQ, each of 5 marks,	
02-09	Preparation of 4chloro toluene			
02-10	Preparation of Benzpinacol		on eachCR	
02-11	Preparation of 7 hydroxy coumarine	CR 02		
02-12	Preparation of photodimerisation of maleic anhydride	MLs		
02-13	Preparation of benozophinone	21-40		
02-14	Preparation of Vanily alchol			
02-15	Preparation of of Ortho and para nitro phenol			
02-16	Isolation of piperine from peppers		Student is required to answer	
02-17	Isolation of Caffeine from Tea leves		4 of 5 SAQ, each of 5 marks,	

02-18	Isolation of Cineole from Eucalptus leaves:	on <mark>each</mark> CR

UN	Detailed Syllabus of the Unit (Exercises word should not be mentioned here as it is a part of each unit)	CR
01- 01	<b>PREPARATION 2 PEHNYL INDOLE</b> : Aim, chemical name, structure, principle, types of reaction, step 1: preparation of acetophenone phenyl hydrazone, preparation of 2 phenyl indole	
01- 02	<b>PREPARATION OF 7 HDROXY 3 METHYL FLAVONE</b> : Aim, chemical name, structure, principle, types of reaction, preparation of respropiophenone	
01- 03	<b>PREPARATION OF 2-5 Dihydroxy acetophenone :</b> aim, chemical name, structure, principle, types of reaction, preparation of hydroquinone diacetate, preparation of 2-5 dihydroxacetophynone	CD 01
01- 04	<b>Preparation of benzilic acid :</b> aim, chemical name, structure, principle, types of reaction, benzoin condensation, benzalic acid rearrangement.	CRUI
01- 05	Preparation of benzenilide :aim, chemical name, structure, principle, types of reaction, preparation of benzophenon oxime.	
01- 06	Preparation of caprolactum: aim, chemical name, structure, principle, types of reaction, preparation of cyclohexanone oxime.	
01- 07	Preparation of acridine :aim, chemical name, structure, principle, types of reaction, preparation of acridine.	
02- 08	<b>Preparation of 4chloro toluene:</b> aim, chemical name, structure, principle, types of reaction chemical required, apparatus required, procedure, recrystalization, yield, melting point.	
02- 09	<b>Preparation of 7 hydroxy coumarine :</b> aim, chemical name, structure, principle, types of reaction chemical required, apparatus required, procedure, recrystalisation, yield, melting point	
02- 10	<b>Preparation of photodimerisation of maleic anhydride :</b> aim, chemical name, structure, principle, types of reaction chemical required, apparatus required, procedure, recrystalisation, yield, melting point	CB 03
02- 11	Preparation of benozophinone : aim, chemical name, structure, principle, types of reaction chemical required, apparatus required, procedure, recrystalisation, yield, melting point	
02- 12	Isolation of Caffeine from Tea leves aim, chemical name, structure, principle, types of reaction chemical required, apparatus required, procedure, recrystalisation, yield, melting point	

LR Code	Title	Edition	ISBN			
En coue	Author	Year	Publisher			
Course Websi	Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3					
Self-Test for e	ach CR Block, Continuous Assessment Test and End Examination	on				
	Synthesis of Organic Compounds and Isolation of natural					
CHE027	Products (Practical).					
Text-Books	Text-Books					
	Organic Chemistry Practical		Dr. B.R. Ambedkar			
	Prof. G ramchandrah, D. Koteshwarah	2007	Open University Hydrabad			
<b>Reference-Bo</b>	oks: Explore additional details and reinforce learning, with this	optional learn	ing resource!			
CHE027-RB1	Pharmacognocy by kokate					
CHE027-RB2	Elementary practical organic chemistry by arthur1st vogel					
CHE027-RB3	Laboratory method of organic chemistry by L. Gatterman					
CHE027-RB4	Slective organic preparation by devide todd.					
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!						
CHE027 -CD1						

Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
CHE027-WL1			
# CHE028 : ORGANIC CHEMISTRY- SYNTHESIS AND ANALYSIS OF DRUGS(PRACTICAL).

#### **PROGRAMME INFORMATION**

SN	Description	Details
1       University         1       University         1       Website: <a href="http://www.ycmou.ac.in/and">http://ycmou.digitaluniversity.ac/</a>		Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in/</u> and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V132: M.Sc.(CHEMITRY)

#### **COURSE INFORMATION**

Year	Code	Course Name	CR	CST	ST	CA	EE	ТМ	Туре
02	CHE028	Organic Chemistry-Synthesis and Analysis of Drugs (practical).	2	8	120	20	80	100	р

## PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives			
<ul> <li>For successful completion of this course, student should have successfully complete:</li> <li>BSc/ with Chemistry or equivalent from a recognized University/Board.</li> </ul>	<ul> <li>After successful completion of this course, student should be able to</li> <li>Develop technical skill</li> <li>To empower our students with practical skills to comprehend the physiology and other functions of each ad every vital systems</li> </ul>			

# UNITS

UN	Name of the Unit	CSs	Questions		
01-01	Preparation of Drug Intermediate: Preparation o Paracetamol.	f	Student is required to answer 4 of 5 SAQ, each of 5 marks,		
01-02	Preparation of Phenytoin.		on <mark>each</mark> CR		
01-03	Preparation of 6-Methyl Uracil.				
01-04	Preparation of Benzocaine.	CR 01			
01-05	Preparation of Chloritone.				
01-06	Preparation of 4-Aminobenzene sulphonamide.				
01-07	Preparation of Florescence.				
01-08	Preparation of Antipyrine.				
01-09	Preparation of Diazepam.		Student is required to answer		
02-10	Esterification of assay of aspirin.		4 of 5 SAQ, each of 5 marks,		
02-11	Esterification of assay of Ibuprofen.		on <mark>each</mark> CR		
02-12	Esterification of assay of Analgin.	CR 02			
02-13	Esterification of assy of Ascarbic acid.				
02-14	Esterification of assay of Ca+2 ions in calcium gluconate injection.	e			

02-15	Esterification of assay of chloride in ringer lactate solution for injection.
02-16	Estimation of assay of Sulphonilamides by potentiometric titrations.
02-17	Estimation of assay of riboflavin by colorimetric titrations.

#### **DETAILED SYLLABUS**

UN	Detailed Syllabus of the Unit	CR
01-01	<b>Preparation of Paracetamol:</b> Aim ,chemical name ,structure, pharmacological activity, principle,type of reaction,chemicals, apparatus, procedure, re-crystallization, result,melting point, yield, uses.	
01-02	<b>Preparation of phenytoin:</b> Aim, chemical name, structure, pharmacological activity, principle,chemical required, apparatus, procedure, recrystalisation, yield, melting point.	
01-03	<b>Preparation of 6-methyl uracil :</b> Aim, chemical name, structure, pharmacological activity, principle, condensation of ethylacetoacetate and thiourea,synthesis of thiopyrimidine to 6-methyl uracil.	CR 01
01-04	<b>Preparation of benzocaine:</b> Aim, chemical name, structure,pharmacological, principle, preparation, of P- aminobenzoic acid, Etherification of P-Amino benzoic acid to Ethyl P-amino benzoate.	
01-05	<b>Preparation of synthesis of chlorbutol:</b> Aim, chemical name, Pharmacological Activity, structure, principle, procedure, yield, melting point.	
01-06	<b>Preparation of sulfanilamide:</b> Aim, chemical name,structure,pharmacology activity,principle, preparation of P-acetamidobenzene sulphonyl chloride,preparation of P-acetamido benzene sulphaonamide,preparation of sulphonilamide.	
01-07	<b>Preparation of flourescein:</b> Aim, chemical name, structure, pharmacological activity, chemicals, apparatus, procedure, recrystalisation, yield.	
01-08	<b>Preparation of antipyrine:</b> Aim, chemical name, structure, pharmacological activity, principle, synthesis of phenyl methyl pyrazolone, methylation of phenyl methyl pyrazolone.	
01-09	<b>Preparation of diazepam:</b> Aim, chemical name, structure, principle, chemical required, apparatus required, procedure, recrystalisation, melting point.	
02-01	<b>Esterification of assay of aspirin</b> : Aim, chemical name, molecular formula, structure, therapeutic uses, required dose, standards, principle, chemicals, apparatus, procedure, result.	
02-02	<b>Esterification of assay of Ibuprofen:</b> Aim, chemical name, molecular formula, structure, therapeutic uses, dose, usual strength, standards, principle, apparatus required, chemical required, procedure, result.	
02-03	Estimation of assay Analgin: Aim, chemical name, molecular formula, structure, therapeutic use, dose, standards, principal, apparatus required, chemical require, procedure, result.	
02-04	<b>Estimation of assay of ascorbic acid</b> : Aim, chemical name, molecular formula, structure, therapeutic use, standards, principle, chemical required, apparatus required, procedure, result.	CR02
02-05	<b>Estimation of Ca+2 ions in calcium gluconate injection :</b> Aim, chemical name, molecularformula, structure, therapeutic uses, dose, usual strength, standards, principle, apparatus required, chemical required, procedure, result.	
02-06	<b>Estimation of chloride in ringer lactate injection:</b> Aim, chemical composition, therapeutic uses, standards, dosage and administration, principle, apparatus required, chemical required, procedure, report.	
02-07	<b>Estimation of assay of sulphanilmide by potentiometric titrations:</b> Aim, chemical name, structure, molecular formula, therapeutic use, requirement, principle, procedure, result.	
02-08	<b>Estimation of assay of riboflavin by colorimetric:</b> Aim, chemical name, molecular formula, structure, therapeutic use, dose level, standards, principle, procedure, report.	

### LEARNING RESOURCE DETAILS

LR Code	Title	Edition	ISBN		
	Author	Year	Publisher		
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3)					

Self-Test for each CR Block, Continuous Assessment Test and End Examination					
Text-Books					
CHE028	Organic chemistry Synthesis and Analysis of Drugs Prof . G. ramchnfdrah. D.koteshwarao K.pramila	2007	Dr.B. R. Ambedkar open university hydrabad		
Reference-Boo	ks: Explore additional details and reinforce learning, with this op	tional lear	ning resource!		
CHE028-RB1	Indian pharmacopoeia vol 1 & 2	2014			
CHE028-RB2	Practical pharmaceutical chemistry by A.H. beckett and J.B stenlack	2014			
CHE028RB3	Pharmaceutical analysis by ashtohakr	2015			
CHE028-RB4	Vogel textbook of quantitative analysis	2016			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!					
CHE028 - CD1					
Web Links: Explore additional details and reinforce learning, with this optional learning resource!					
CHE028-WL1					

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