

**RANI CHANNAMMA UNIVERSITY, BELGAVI**  
(GOVERNMENT OF KARNATAKA)

**REGULATIONS AND SCHEME OF EXAMINATION  
FOR  
DEPARTMENT OF POST-GRADUATE STUDIES IN CHEMISTRY  
SCHOOL OF BASIC SCIENCES**

**FOR  
M.Sc. ORGANIC CHEMISTRY  
(III SEMESTER)**

**UNDER  
CHOICE BASED CREDIT SYSTEM(CBCS)**

**WITH EFFECT FROM  
ACADEMIC YEAR 2014-15 AND ONWARDS**

Programme structure of **M.Sc. in Organic Chemistry Degree** shall be as follows:

Sem	No. of Compulsory and Specialization courses (Credits/Course)	Total Credits for Compulsory and Specialization courses	No. of Open Elective course (Credits/Course)	Total Credits of Open Elective course	Total Credits for the Semester
I	CT: 04(04)=16 PRA: 03(02)=06 CT: 01(02)=02	24	-	—	24
II	CT: 03(04)=12 PRA: 03(02)=06 CT:01(02)=02	20	CT: 01(04)=04	04	24
III	CT: 03(04)=12 PRA: 03(02)=06 CT: 01(02)=02	20	CT: 01(04)=04	04	24
IV	CT: 03(04)=12 PRA: 03(02)=06 CT:01(02)=02 P J: 01(04)=04	24	-	—	24
<b>Total</b>	<b>CT: 14(04)= 52</b> <b>PRA : 11(02)=24</b> <b>CT: 03(02)=08</b> <b>PJ: 01(04) = 04</b>	<b>88</b>	<b>CT: 02(04)= 08</b>	<b>08</b>	<b>96</b>

**Note :** There shall be open elective course for II and III Semester and a Project for IV Semester.

**Abbreviations:** CT =Compulsory Theory; PRA=Practical; PJ = Project

**Illustrative Model: Grade Card**

**Programme** :  
**Name of the candidate** : **Semester** : I  
**Seat No.** : **Month and Year** :

Course	Course code no	Credits	Max Marks	Mark Obtained	Semester Grade Point	Credit Points
Compulsory Paper / Core Courses						
Course-I		04	100	60	6.00	24.00
Course-II		04	100	74	7.40	29.60
Course-III		04	100	43	4.30	17.20
Course-IV		04	100	52	5.20	20.80
General Theory						
Course-V		02	50	25	5.00	10.00
Practicals						
Course-VI		02	50	25	5.00	10.00
Course-VII		02	50	25	5.00	10.00
Course-VIII		02	50	25	5.00	10.00
<b>Total</b>		<b>24</b>	<b>600</b>	<b>329</b>	<b>42.9</b>	<b>131.6</b>

**Illustrative Model: Grade Card**

**Programme** :  
**Name of the candidate** : **Semester** : II  
**Seat No.** : **Month and Year** :

Course	Course code no	Credits	Max Marks	Mark Obtained	Semester Grade Point	Credit Points
Compulsory Paper / Core Courses						
Course-I		04	100	60	6.00	24.00
Course-II		04	100	74	7.40	29.60
Course-III		04	100	43	4.30	17.20
General Theory						
Course-IV		02	50	25	5.00	10.00
Open Elective						
Course-VI		04	100	52	5.20	20.80
Practicals						
Course-VI		02	50	25	5.00	10.00
Course-VII		02	50	25	5.00	10.00
Course-VIII		02	50	25	5.00	10.00
<b>Total</b>		<b>24</b>	<b>600</b>	<b>329</b>	<b>42.9</b>	<b>131.6</b>

**Illustrative Model: Grade Card**

**Programme** :  
**Name of the candidate** : **Semester** : III  
**Seat No.** : **Month and Year** :

Course	Course code no	Credits	Max Marks	Mark Obtained	Semester Grade Point	Credit Points
Compulsory Paper / Core Courses						
Course-I		04	100	60	6.00	24.00
Course-II		04	100	74	7.40	29.60
Course-III		04	100	43	4.30	17.20
Open Elective						
Course-VI		04	100	52	5.20	20.80
Practicals						
Course-VI		04	100	50	5.00	20.00
Course-VII		04	100	50	5.00	20.00
<b>Total</b>		<b>24</b>	<b>600</b>	<b>329</b>	<b>32.9</b>	<b>131.6</b>

**Illustrative Model: Grade Card**

**Programme** :  
**Name of the candidate** : **Semester** : IV  
**Seat No.** : **Month and Year** :

Course	Course code no	Credits	Max Marks	Mark Obtained	Semester Grade Point	Credit Points
Compulsory Paper / Core Courses						
Course-I		04	100	60	6.00	24.00
Course-II		04	100	74	7.40	29.60
Course-III		04	100	43	4.30	17.20
Project						
Course-VI		04	100	50	5.00	10.00
Practicals						
Course-VI		04	100	50	5.00	10.00
Course-VI		04	100	50	5.00	10.00
<b>Total</b>		<b>24</b>	<b>600</b>	<b>327</b>	<b>32.7</b>	<b>100.80</b>

  
**RANI CHANNAMMA UNIVERSITY, BELGAVI**  
(GOVERNMENT OF KARNATAKA)

**POST-GRADUATE DEPARTMENT OF STUDIES IN CHEMISTRY**  
**SCHOOL OF BASIC SCIENCES**

**Post Graduate Department of Studies in Chemistry (General)**  
**Under**  
**School of Basic Sciences**  
**Regulation and Scheme of Examination**  
**for**  
**M.Sc. Organic Chemistry Degree Course**  
**under**  
**Choice Based Credit System (CBCS)**  
**(With effect from 2014-15)**

**1.1 Title of the Course:** The course shall be called M.Sc. in Organic Chemistry.

**1.2 Duration of the course:** The M.Sc Degree course is of two years duration, spread over four semesters each of four months duration.

**1.3 Eligibility for Admission:** The Bachelor's degree in Science or equivalent degree with Chemistry as one of the subject. The candidate should have obtained at least 45% of marks in optional subjects as well as in aggregate. Relaxation in respect of SC/ST/Cat -I etc. will be followed as per prevailing rules of the university.

**Admission:** The rules for admission are as per university notification from time to time.

**Admission to other semesters:** students are allowed to take admissions to successive semesters under carry over benefit (COB) facility.

**2 Attendance:**

Every student must have at least 75% attendance in each paper of the courses (Theory & Practical) in each semester. Shortage of attendance will be dealt with as per the university rules from time to time.

**3 Medium of instruction:** The medium of instruction shall be English.

**4 Scheme of Course Structure:**

There shall be three categories of courses namely, Compulsory courses, Specialization courses and Open elective courses for M.Sc. in Chemistry.

In the first semester there shall be 4 core theory papers of 4 credits in each paper and 1 core paper of 2 credits and 3 practical's each of 2 credits. In the second semester 3 core theory papers of 4 credits in each paper, 1 core paper of 2 credits, 1 open

elective of 4 credits and 3 practical's of credits 4. In third semester there shall be 3 core theory papers of 4 credits, 1 core paper of 2 credits and one open elective paper of credit 4, 3 practical's with 4 credits each. In the fourth semester there shall be 3 core papers of 4 credits each, 1 core paper of 2 credits, 3 practical's with 4 credits each and 1 Project with four credits. Each Paper shall have four units of 16 hrs each.

Note: The specialization shall be in III and IV Semester.

### **5. Scheme of Evaluation:**

- 5.1 There shall be an examination at the end of each semester.
- 5.2 Each Course shall have two evaluation components:- The semester end examination carrying 80 marks of 3 hours duration and internal assessment (IA) carrying 20 marks.
- 5.3 The theory and Practical Examinations of even semesters shall be evaluated through double valuation by an external examiner and an internal examiner or by two external examiners, but not by two internal examiners. The theory and Practical Examinations of odd semesters shall be evaluated through single valuation by an internal examiner or by external examiner.

### **5.4 Project:**

The project report shall be evaluated for 80 marks by one internal and one external examiner. Internal Assessment (IA) marks for 20 marks shall be based on the presentation of the work in a seminar.

### **6. Pattern of question paper: 80 (Exam) + 20 (IA)**

Question paper contains five questions. Question 1 is compulsory. It shall contain 10 objective type questions carrying 2 marks each, drawn from all the four units equally. Questions 2, 3, 4 and 5 should be drawn from each unit of 16 marks each.

01. Answer any EIGHT of the following questions.

(08x02=16)

- a.
- b.
- c.
- d.
- e.
- f.
- g.
- h.
- i.
- j.

02. a)	05 Marks
b)	05 Marks
c)	06 Marks
OR	
d)	06 Marks
03. a)	05 Marks
b)	05 Marks
c)	06 Marks
OR	
d)	06 Marks
04. a)	05 Marks
b)	05 Marks
c)	06 Marks
OR	
d)	06 Marks
05. a)	05 Marks
b)	05 Marks
c)	06 Marks
OR	
d)	06 Marks

**7. Maximum period for the completion of M.Sc Degree Programme:** There shall be fully carry over system from first through fourth semesters. Maximum number of years for a student to complete the degree is as specified by the University from time to time.

**8. The General Regulations Governing Post Graduate Programmes under CBCS and Regulation Governing Post Graduate Programmes in the faculty of Science and Technology under CBCS of Rani Channamma University, Belgavi are applicable to this course for all the matters not covered under this.**

  
**RANI CHANNAMMA UNIVERSITY, BELGAVI**  
**(GOVERNMENT OF KARNATAKA)**

**M.Sc. Degree Programme in Organic Chemistry**  
**(Effective from the Academic Year 2014-15)**  
**Choice Based Credit System**  
**Course Structure and Scheme of Examination**

Sl. No.	Papers	Hours of Teaching per week	Hours of Exam	Marks			Credits
				Exam	IA	Total	
<b>THIRD SEMESTER</b>							
1	CHORT-3.1: Organic Chemistry-IIIA	4	3	80	20	100	4
2	CHORT-3.2: Organic Chemistry-IIIB	4	3	80	20	100	4
3	CHORT-3.3: Organic Chemistry-IIIC	4	3	80	20	100	4
4	CHEG-3.4: Open elective	4	3	80	20	100	4
5	CHORPr-3.5: Organic Chemistry Practicals-IIIA	8	6	80	20	100	4
6	CHORPr-3.6 : Organic Chemistry Practicals-IIIB	8	6	80	20	100	4
		32		480	120	600	24
<b>FOURTH SEMESTER</b>							
1	CHORT-4.1: Organic Chemistry-IVA	4	3	80	20	100	4
2	CHORT-4.2: Organic Chemistry-IVB	4	3	80	20	100	4
3	CHORT-4.3: Organic Chemistry-IVC	4	3	80	20	100	4
4	CHORP-4.4: Project Work	4	4	80	20	100	4
5	CHORPr-4.5: Organic Chemistry Practicals-IVA	8	6	80	20	100	4
6	CHORPr-4.6: Organic Chemistry Practicals-IVB	8	6	80	20	100	4
		32		480	120	600	24

T : Theory, Pr : Practical, P: Project, EG : Elective General, ES : Elective Special

**Total Credits : 96**

Internal Assessment for the project work shall be based on the presentation of the work in a seminar. The project report shall be evaluated by one internal and one external examiner.



**M.Sc. ORGANIC CHEMISTRY  
III SEMESTER**

**CHORT-3.1 : ORGANIC CHEMISTRY-III  
Teaching hours per week : 04 Credits : 04  
Total hours : 64**

**UNIT-I** **16 hours**

**NATURE AND BONDING IN ORGANIC MOLECULE**

Delocalized chemical bonding, conjugation, cross conjugation, resonance, hyper-conjugation, bonding in fullerenes.

Aromaticity in benzenoid and non-benzenoid compounds, alternant and non-alternant hydrocarbons, Huckel's rule, energy level of  $\pi$ -molecules orbitals, annulenes, antiaromaticity, homoaromaticity.

Aromatic character and chemistry of cyclopentadienyl anion, tropylium cation, tropone and tropolone, bonds weaker than covalent-addition compounds, crown ether complexes and cryptands, inclusion compounds, cyclodextrins, catenanes and rotaxanes, synthetic applications of enamines and imines anions in organic synthesis, phase transfer catalysis, crown ethers and graphene.

**UNIT-II** **16 hours**

**PHOTOCHEMISTRY**

Interaction of radiation with matter, types of excitation, rate of excited molecules, quenching, quantum efficiency, quantum yield, transfer of excitation energy, actinometry, singlet and triplet states, experimental methods in photochemistry of carbonyl compounds, and transition, Norrish type I and Norrish type II reactions, Paterno-Buchi reaction, photoreduction, photochemistry of enones, hydrogen abstraction rearrangement of unsaturated ketones and cyclohexadienones, photochemistry of p-benzoquinones, photochemistry of aromatic compounds with reference to isomerization, addition and substitution, photochemical isomerization of cis and trans alkenes, photo-Fries rearrangement, Barton reaction, Hoffmann-Loefer-Freytag reaction, photochemistry of vision.

**UNIT-III** **16 hours**

**PERICYCLIC REACTIONS**

**Pericyclic Reactions:** Classification of pericyclic reactions, molecular orbital symmetry, frontier orbitals of ethylene, 1,3-butadiene, 1,3,5-hexatriene, allyl system, Woodward-Hoffman correlation diagram method and Perturbation of molecular orbital (PMO) approach of pericyclic reaction under thermal and photochemical conditions, FMO and PMO approach to the following reactions.

Electrocyclic reactions- Con rotatory and dis rotatory ring closure  $4n$  and  $4n+2$  and allylic systems, Woodward and Hoffmann selection rules for pericyclic reactions.

Cycloadditions reactions - Antrafacial and suprafacial additions, more emphasis on [2+2] and [4+2] Cycloadditions, Diels-Alder reaction, 1,3-dipolar cycloaddition reactions.

Sigmatropic rearrangements: Antrafacial and suprafacial shift involving carbon moieties, retention and inversion of configuration, Ene, Claisen and Cope reaction.

#### UNIT-IV

16 hours

#### DYNAMIC STEREOCHEMISTRY

**Prochirality:** Homotopic, heterotopic, enantiotopic and diastereotopic ligands and faces, identification using addition, substitution and symmetry criteria, nomenclature of stereoheterotopic ligands and faces, symbols for stereoheterotopic ligands in molecules with one or more prochiral centres, chiral and prochiral centre; prochiral plane, symbols for enantiotopic and diastereotopic faces.

**Dynamic Stereochemistry:** Stereoselectivity in organic synthesis: stereospecific and stereoselective reactions, principle of stereoselectivity-enantioselectivity and diastereoselectivity, use of chiral reagents, Cram's and Prelog's rules, stereoselectivity in addition, elimination, substitution reactions.

#### Reference books:

01. Fundamentals of photochemistry, K.K. Rohatgi Mukherjee, Wiley Eastern Limited, (1986)
02. Photochemistry, Carol E Wayne and Richard P Wayne, Oxford University Press, (1996)
03. Organic Photochemistry, J. M. Cozen and B. Halton, Cambridge University Press (I Edition) 1974
04. Molecular Reactions and Photochemistry, C H Deputy and D S Chapman, Prentice Hall India, New Delhi ( 1st Edition) , 1972.
05. Concepts of Inorganic photochemistry, A. W. Adamson and P D Fleischaves Wiley.
06. Understanding organic reaction mechanisms, A. Jacob, Cambridge Univ. Press, 1997.
07. Introduction to organic chemistry A. Streitweiser, Jr and C. H. Heathcock, Macmillan, 1985.
08. Physical and mechanistic organic chemistry, R.A.Y. Jones, 1st Edn. Cambridge Univ. Press, 1979.
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10. P. J. Garratt in Comprehensive organic chemistry, D. Barton and W. D. Ollis, 1st Edn. Pergamon Press, Oxford, 1979.
11. Radicals in organic synthesis, B. Giese, Pergamon Press, 1986.
12. Stereoelectronic effects in organic chemistry, P. Deslongchamps, 1st Edn. Pergamon Press, 1983.

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14. Molecular reactions and photochemistry, C. H. Deputy and D. S. Chapman, 1st Edn. Prentice-hall India, New Delhi, 1972.
15. Stereochemistry of carbon compounds, E. L. Eliel, S. H. Wilen and L. N. Mander, John Wiley & Sons, 1994.
16. Stereochemistry, Potapov, MIR, Moscow, 1984.
17. Stereochemistry, Nasipuri, D, New Age, 1999.
18. Advanced organic chemistry, J. March, 4th Edn. John Wiley, 2008.
19. Organic Chemistry, R. E. Ireland Prentice-Hall India, New Delhi, 1975.
20. Some modern methods of Organic Synthesis, W. Caruthers, Cambridge Uni. Press London, 2nd Edn. 1998.
21. Stereochemistry of organic compounds- Principle and applications, D. Nasipuri, 2nd Edn., New Age International Publishers, 2001.

  
**RANI CHANNAMMA UNIVERSITY, BELGAVI**  
**SCHOOL OF BASIC SCIENCES : CHEMISTRY**

**M.Sc. ORGANIC CHEMISTRY**  
**III SEMESTER**

**CHORPr-3.5 : ORGANIC CHEMISTRY-III A**  
**Teaching hours per week : 04 Credits : 04**  
**Total hours : 64**

**ORGANIC ESTIMATIONS**

01. Estimation of phenol.
02. Estimation of aniline
03. Determination of equivalent weight of acids by silver salt method.
04. Estimation of amino groups by acetylation method.
05. Estimation of nitro group.
06. Estimation of sugars by Fehling's method.
07. Determination of saponification value of oils.
08. Determination of iodine value of oils.
09. Estimation of amino acids.
10. Determination of enol content by Meyer's method.
11. Determination of unsaturation by bromination method.
12. Determination of cholesterol by colorimetric method.

**REFERENCES**

- |   |                          |
|---|--------------------------|
| 01. Manual of Organic Chemistry   | Dey and Seetharaman.     |
| 02. Modern experimental Organic Chemistry<br>Neugil   | John H. Miller and E. F. |
| 03. An introduction to practical Organic Chemistry  | Robert, Wingrove etc.    |
| 04. A Text book of practical Organic Chemistry  | A I. Vogel Vol.III       |
| 05. Practical Organic Chemistry   | Mann & Saunders          |
| 06. An Introduction to Practical Organic Chemistry  | Robert, Wingrove etc.    |
| 07. Semimicro qualitative Organic Analysis<br>Hodnet  | Cheronis, Entrikin and   |
| 08. Laboratory Manual of Organic Chemistry<br>International (P) Ltd. London, 3 <sup>rd</sup> edition, 1996. | R. K. Bansal New PAGE    |
| 09. Practical Organic Chemistry<br>International(P) Ltd. London, 3 <sup>rd</sup> edition, 1996.             | N. K. Visno, New PAGE    |

**M.Sc. ORGANIC CHEMISTRY**  
**III SEMESTER**

**CHORT-3.2 : ORGANIC CHEMISTRY-III B**  
**Teaching hours per week : 04 Credits : 04**  
**Total hours : 64**

**UNIT-I** **16 hours**  
**CARBOHYDRATES**

Definition, classification, constitution of glucose and fructose(open chain and ring structure), inter conversion-aldose to ketose and ketose to aldose, chain lengthening and chain shortening of aldoses, epimerisation.(conversion of glucose to mannose), mechanism of mutarotation, conformations of monosaccharides, anomeric effect, Hudson's rules, epimerization.

Synthesis, industrial and biological importance of glycosides and amino sugars.

Disaccharides - Elucidation of structure of maltose and sucrose.

Polysaccharides-structural elucidation of starch, structure of cellulose, glycogen, importance of starch, cellulose and glycogen as energy and structural materials, structure and importance of chitin and insulin.

**UNIT-II** **16 hours**  
**AMINO ACIDS, POLYPEPTIDES, PROTEINS AND NUCLEIC ACIDS**

**Amino acids:** Introduction, classification, structure, methods of synthesis (Gabriel phthalimide, malonic ester, Strecker method) and physical properties.

**Polypeptides:** synthesis of polypeptides- Use of blocking agents, Bruce-Merrifield synthesis of polypeptides.

**Proteins:** structure of proteins, Primary secondary, tertiary and quaternary structure, end group analysis(Edman's and Sanger's methods), biological importance of proteins.

**Nucleic acids:** Introduction, classification, components of nucleic acids, structures and synthesis of nucleosides and nucleotides, Watson-Crick model of DNA, role of DNA and RNAs in protein synthesis, genetic code-salient features.

**UNIT-III** **16 hours**  
**ANTHOCYANINS CAROTENOIDS AND PORPHYRINS**

**Anthocyanins:** Methods of isolation, basic structural features of coumarins, chromones, flavones and isoflavones. Structural elucidation of quercetin and wedelactone (synthesis not included).

**Carotenoids:** Methods of isolation. Structural relationship of  $\alpha$ -,  $\beta$ - and  $\gamma$ -carotenes. Structure elucidation and synthesis of  $\beta$ -carotene.

**Porphyryns:** Structure elucidation and synthesis of haemin, chlorophyll-a.

#### UNIT-IV

16 hours

#### OILS, FATS AND LIPIDS

Oils, fats and waxes: Definition, chemical composition, chemical properties-hydrogenation, hydrogenolysis, hydrolysis, drying oils, rancidity, analysis of oils and fats-saponification value, iodine and acid value.

Soaps-Manufacture of soaps by hot process, cleansing action. Synthetic detergents, comparison of soaps and detergents, types of detergents (cationic, anionic and nonionic).

Animal and plant waxes-composition, examples.

Lipids: Sphingolipids, phospholipids and glycolipids, naturally occurring fatty acids and their triglycerides, essential fatty acids, unusual fatty acids, methods of isolation: Gunstone's partition method, reactions of fatty acids-Fischer and trans esterification, oxidation and acyl group transfer reactions, analytical values-cetane number, emulsions and biodiesel.

#### REFERENCE BOOKS:

01. F. A. Carey and Sundberg, Advanced Organic Chemistry – Part A & B, 3<sup>rd</sup> edition, Plenum Press, New York, 1990.
02. F. A. Carey and Sundberg, Advanced Organic Chemistry – Part A & B, 3<sup>rd</sup> edition, Plenum Press, New York, 1990.
03. Comprehensive Organic Synthesis – B. M. Trost and I. Fleming series, Pergamon Press, New York, 1991.
04. S. K. Ghosh, Advanced General Organic Chemistry, Book and Allied (P) Ltd, 1998
05. Principles of organic synthesis, Richard Norman and J. M. Coxon
06. Disconnection approach, by Steurt Warren.
07. Natural products: Their chemistry and biological significance-J. Mann,
08. R. S. Davidson, J. B. Hobbs, D. V. Banthorpe & J. B. Harborne, Longman, UK,
09. 1994.
10. Terpenes, J. Verghese, Tata McGraw-Hill, New Delhi, 1982.
11. Chemistry of terpenes and terpenoids, A. Newman, Academic Press, London, 1975.
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14. Total synthesis of natural products Vol. I & VI, Apsimon, John Wiley, NY, 1973-1981.
15. Organic chemistry Vol.II, I. L. Finar, 6<sup>th</sup> Edn. Longman,1992.

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17. Total synthesis of natural products: The chiral approach Vol.III, S. Hanessian  
Pergamon Press, 1983.
18. Total synthesis of steroids, Akhaun & Titov, Jerusalem, 1969.
19. Medicinal natural products: A biosynthetic approach, P. M. Dewick. John Wiley, Chichester, 1997.
20. The colours of life: An introduction to the chemistry of porphyrins and related compounds, L. R. Milgrom, Wiley Chichester, 1995.
21. Spectral data of natural products Vol. I- K.Yamaguchi, Elsevier Publishing Co, London,1970.
22. Chemistry of natural products: A unified approach, N. R. Krishnaswamy, University Press, India, 1999.

  
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**M.Sc. ORGANIC CHEMISTRY**  
**III SEMESTER**

**CHORPr-3.6 : ORGANIC CHEMISTRY-IIIB**  
**Teaching hours per week : 04 Credits : 04**  
**Total hours : 64**

**MULTISTEP ORGANIC PREPARATION**

01. Preparation of 2-bromo-3-phenyl propionic acid from cinnamic acid.
02. Preparation of anthralinic acid from phthalimide.
03. Preparation of p-chlorotoluene from p-toluidine.
04. Preparation of benzophenoneoxime and its rearrangement to benzanilide.
05. Preparation of adipic acid from cyclohexanol.
06. Preparation of methyl red from anthralinic acid.
07. Preparation of benzopinacolone from benzophenone.
08. Preparation of 6,8-nitro-4-methyl-7-hydroxycoumarine from resorcinol.

**REFERENCES**

- |   |                          |
|---|--------------------------|
| 01. Manual of Organic Chemistry   | Dey and Seetharaman.     |
| 02. Modern experimental Organic Chemistry<br>Neugil   | John H. Miller and E. F. |
| 03. An introduction to practical Organic Chemistry  | Robert, Wingrove etc.    |
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| 05. Practical Organic Chemistry   | Mann & Saunders          |
| 06. An Introduction to Practical Organic Chemistry  | Robert, Wingrove etc.    |
| 07. Semimicro qualitative Organic Analysis<br>Hodnet  | Cheronis, Entrikin and   |
| 08. Laboratory Manual of Organic Chemistry<br>International (P) Ltd. London, 3 <sup>rd</sup> edition, 1996. | R. K. Bansal New AGE     |
| 09. Practical Organic Chemistry<br>International(P) Ltd. London, 3 <sup>rd</sup> edition, 1996.             | N. K. Visno, New AGE     |



**M.Sc. ORGANIC CHEMISTRY**  
**III SEMESTER**

**CHORT- 3.3 Organic Chemistry-IIIC**  
**Teaching hours per week : 04 Credits : 04**  
**Total hours : 64**

**UNIT-I** **16 hours**

**ELECTRON SPIN RESONANCE SPECTROSCOPY**

Basic principle interaction between spin and magnetic field, origin of spectral line-intensity, width and position of spectral lines, relaxation process, multiplicity in ESR, hyperfine splitting, g-value and factor affecting. Rules for interaction of spectra, zero field splitting and Kramer's degeneracy, John-Teller distortion, isotropic and anisotropic coupling constants, nuclear quadrupole coupling interaction, spin hamiltonian, ESR spectra of radical containing a single set of equivalent protons-methyl, p-benzoquinone, cyclopentadienyl, benzene. ESR spectra of transition metal complexes, applications.

**UNIT-II** **16 hours**

**NUCLEAR QUADRUPOLE RESONANCE and MOSSBAUER SPECTROSCOPY**

**Nuclear quadrupole resonance spectroscopy:** Consequence of nuclear spin larger than  $\frac{1}{2}$ , prolate and oblate nucleus, nuclear quadrupolar charge distribution-theory and instrumentation, relationship between electric field gradients and molecular structure, applications and interpretation of eQq data, effect of crystal lattice on the magnitude of eQq, structural information from NQR spectra.

**Mossbauer spectroscopy:** Theory and principles, experimental methods, isomer shift, quadrupole interactions, electron density, magnetic interactions; time and temperature dependent effect, application-Iodine trihalides, Prussian blue, trisiron dodecacarbonyl, tin halides, hexacyano ferrate and nitroprussides.

**UNIT-III** **16 hours**

**FLAME EMISSION and CHIROPTICAL SPECTROSCOPY**

**Flame emission spectroscopy:** Introduction, principle, flames and flame spectra variation of emission intensity with flames, flame background, metallic spectra in flame. Total consumption and premix, Butters interference, roll on temperature on absorption, and applications.

**Chiroptical spectroscopy:** Plane polarized light, instrumentation, optical rotary dispersion (ORD), plane curves, Cotton effect curves, application of optical rotation method in the determination of rate constants, acid catalyzed muta-rotation of glucose, inversion of cane sugar, octant and haloketone rules, applications. ORD in the determination of configuration of cyclic and steroidal ketones.

## UNIT-IV

16 hours

### MOLECULAR LUMINESCENCE and PHOTOELECTRON SPECTROSCOPY

**Molecular luminescence spectroscopy:** Theoretical basis for fluorescence and phosphorescence. Singlet and triplet excited states. Variables affecting luminescence-quantum efficiency, transition types, structure and structural rigidity, temperature and solvent effects, effect of pH, dissolved oxygen and concentration effect. Excitation spectra *vs* emission spectra. Fluorescence instrumentation-fluorometers and spectrofluorometers. Sensitivity and selectivity. Modification necessary to measure phosphorescence. General scope of applications of luminescence.

**Photoelectron spectroscopy:** Introduction, principles, chemical shifts, photoelectron spectra of simple molecules, X-ray photoelectron and Auger electron spectroscopy, applications.

### REFERENCES

01. Fundamentals of Molecular Spectroscopy, C. N. Banwell and E. M. McCash. 4<sup>th</sup> edition, Tata McGraw-Hill, New Delhi.
02. Introduction to Molecular Spectroscopy, G. M. Barrow, McGraw-Hill, New York.
03. Introduction to Spectroscopy. Pavia, Lampman and Kriz, 3<sup>rd</sup> edition, Thomson.
04. Spectroscopy, B. P. Straughan and S. Walker, John Wiley & Sons Inc., New York, Vol. 1 & 2, 1976.
05. Vibration Spectroscopy Theory and Applications, D. N. Satyanarayana, New age International, New Delhi.
06. Organic Spectroscopy, William Kemp, 3<sup>rd</sup> edition, Palgrava, 1991.
07. Optical Method of Analysis, E. D. Olsen, McGraw Hill Inc, 1975.
08. Spectroscopy of organic compounds – P. S. Kalasi, Wiley Eastern Ltd, India 1993.
09. Introduction to instrumental analysis – R. D. Braun, McGraw Hill Book company 1982.
10. Physical methods in inorganic chemistry – R. Drago, East West Pvt. Ltd, 1968.
11. Instrumental methods of chemical analysis – Gurdeep Chatwal and Anand.
12. Organic Spectroscopy, 2<sup>nd</sup> edition– Jag Mohan, Narosa Publishing House New Delhi.
13. Applications of IR and Raman spectroscopy to coordination and organometallic compounds, K. Nakamoto.

**RANI CHANNAMMA UNIVERSITY, BELGAVI**

**DEPARTMENT OF POST-GRADUATE STUDIES IN CHEMISTRY  
(III and IV SEMESTERS)  
SCHOOL OF BASIC SCIENCES**

**UNDER  
CHOICE BASED CREDIT SYSTEM(CBCS)**

**WITH EFFECT FROM  
ACADEMIC YEAR 2014-15 AND ONWARDS**

**QUESTION PAPER PATTERN**

**HARD CORE ORGANIC CHEMISTRY  
(Regular AND Repeater)**

**Duration: 03 Hours  
Marks: 80**

**Maximum**

**Instructions:**

- 01) Answer all questions.**
- 02) Figures to the right indicate marks.**

01. Answer any EIGHT of the following questions.  
(08x02=16)

- a.
- b.
- c.
- d.
- e.
- f.
- g.
- h.
- i.
- j.

02. a)	05 Marks
b)	05 Marks
c)	06 Marks
OR	
d)	06 Marks
03. a)	05 Marks
b)	05 Marks
c)	06 Marks
OR	
d)	06 Marks
04. a)	05 Marks
b)	05 Marks
c)	06 Marks
OR	
d)	06 Marks
05. a)	05 Marks
b)	05 Marks
c)	06 Marks
OR	
d)	06 Marks

  
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**WITH EFFECT FROM  
ACADEMIC YEAR 2014-15 AND ONWARDS**

**QUESTION PAPER PATTERN**

**SOFT CORE ORGANIC CHEMISTRY:Spectroscopy  
(Regular AND Repeater)**

**Duration: 02 Hours**

**Maximum Marks: 40**

**Instructions:**

**01) Answer all questions.**

**02) Figures to the right indicate marks.**

01. Answer any FOUR of the following questions.

(04x02=08)

- a.
- b.
- c.
- d.
- e.
- f.

02. a)

**05 Marks**

b)

**05 Marks**

c)

**06 Marks**

OR

d)

**06 Marks**

03. a)

**05 Marks**

b)

**05 Marks**

c)

**06 Marks**

OR

d)

**06 Marks**

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