RANI CHANNAMMA UNIVERSITY, BELGAVI

(GOVERNMENT OF KARNATAKA)

REGULATIONS AND SCHEME OF EXAMINATION

FOR

DEPARTMENT OF POST-GRADUATE STUDIES IN CHEMISTRY

(III SEMESTER)

SCHOOL OF BASIC SCIENCES

UNDER
CHOICE BASED CREDIT SYSTEM(CBCS)

WITH EFFECT FROM
ACADEMIC YEAR 2014-15 AND ONWARDS

Programme structure of M.Sc. in Chemistry (General) 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
Total	CT: 14(04)= 52 PRA : 11(02)=24 CT: 03(02)=08 PJ: 01(04) = 04	88	CT: 02(04)= 08	08	96

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
Total		24	600	329	42.9	131.6

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
Total		24	600	329	42.9	131.6

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
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		04	100	50	5.00	20.00
Course-VII		04	100	50	5.00	20.00
Course-VIII						
Total		24	600	329	32.9	131.6

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
General Theory Course-IV		02	50	25	5.00	10.00
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
Course-VIII						
Total		24	600	327	32.7	100.80

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. Chemistry (General) 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 Chemistry(General or with Specialization-Inorganic Chemistry, Organic Chemistry, Physical Chemistry etc.)

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 Progrmme: 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 Chemistry (General)
(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	
THIRD SEMESTER							
1	CHIT- 3.1: Inorganic Chemistry-III	4	3	80	20	100	4
2	CHOT- 3.2: Organic Chemistry- III	4	3	80	20	100	4
3	CHPT- 3.3: Physical Chemistry-III	4	3	80	20	100	4
4	CHGT- 3.4: Spectroscopy-III	2	2	40	10	50	2
5	CHEG- 3.5: Open elective	4	3	80	20	100	4
6	CHIPr- 3.6: Inorganic Chemistry Practicals-III	4	4	40	10	50	2
7	CHOPr- 3.7 : Organic Chemistry Practicals-III	4	4	40	10	50	2
8	CHPPr -3.8: Physical Chemistry Practicals-III	4	4	40	10	50	2
		30		480	120	600	24
FOURTH SEMESTER							
1	CHIT- 4.1: Inorganic Chemistry-IV	4	3	80	20	100	4
2	CHOT- 4.2: Organic Chemistry-IV	4	3	80	20	100	4
3	CHPT- 4.3: Physical Chemistry-IV	4	3	80	20	100	4
4	CHGT- 4.4: Spectroscopy-IV	2	2	40	10	50	2
5	CHGP 4.5: Project Work:	4		80	20	100	4
6	CHIPr -4.6: Inorganic Chemistry Practicals-IV	4	4	40	10	50	2
7	CHOPr -4.7: Organic Chemistry Practicals-IV	4	4	40	10	50	2
8	CHPPr 4.8: Physical Chemistry Practicals-IV	4	4	40	10	50	2
		34		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.

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
III SEMESTER

CHIT- 3.1 INORGANIC CHEMISTRY-III
Teaching hours per week : 04 Credits : 04
Total hours : 64

UNIT–I **16 hours**

ELECTRONIC SPECTRA AND MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES

Microstates, R-S coupling, term symbols for d^n ions, spectroscopic ground states, types of electronic spectra, selection rules for the electronic transitions, relaxation of the selection rules, nature of spectral bands- band intensities in different types of electronic transitions, band shapes (factors affecting the band shapes), band widths, effect of spin-orbit coupling, effect of distortion and reduction in symmetry, Orgel diagrams, limitations of Orgel diagrams, Tanabe-Sugano diagrams, characteristics of the T-S diagrams, Racah parameters, interpretation of spectra of octahedral, distorted octahedral, tetrahedral and square planar complexes, calculation of nephelauxetic parameter, charge transfer bands-origin, types, and characteristics, intervalence charge-transfer bands.

Magnetic properties of transition metal complexes: types of magnetic behavior, classical magnetism, orbital contribution, orbital contribution reduction factor, spin orbit coupling, measurement of magnetic susceptibility – Gouy and Faraday methods, diamagnetic corrections. Magnetically non-dilute compounds- ferro, antiferro and ferri magnetic, spin cross-over systems, correlation of magnetic and structural properties.

UNIT–II **16 hours**

ORGANOMETALLIC CHEMISTRY AND CHEMISTRY OF F-BLOCK ELEMENTS

Classification of organometallic compounds, the 16 and 18 electron rule, synthesis, structure and bonding in metal alkyl (Li, Mg and Al) and reactions of Grignard's reagents.

Chemistry of organometallic compounds with π - bonding ligands : Synthesis, Structure, Spectroscopy, Reactions and bonding in metal – carbon π - bonded systems involving dihapto to hexahapto ligands Viz, Olefins (Zeise's salt), acetylenes, allylic moieties, butadienes, cyclobutadienes, cyclopentadienes and arenes.

Fluxional behavior of organometallic compounds.

Homogeneous and heterogeneous catalysis: oxidative additions, reductive elimination, insertion and deinsertion reactions, hydrogenation, hydroformylation, isomerisation, carboxylation and polymerisation, water gas shift reaction.

UNIT–III **16 hours**

BIO INORGANIC CHEMISTRY: METAL STORAGE AND TRANSPORT

Metal storage and transport - of Fe, Zn, Cu, V, Mo, Co, Ni and Mn ions living organism, iron proteins involved in transport and storage of iron (ferritin, hemosiderin, transferritin), copper proteins involved in transport and storage of copper(Ceruloplasmin serum albumin).

Electron transfer proteins - general features of iron sulfur proteins, Rubredoxin, Ferredoxins (2Fe-ferredoxin, Rieske proteins).

Blue-copper proteins: General features and types of blue copper proteins and their functions.

Cytochromes: structural features, classification and functions of cytochromes. Biological nitrogen fixation, *In vivo* and *in vitro* nitrogen fixation, Interactions of transition metal complexes with DNA.

UNIT–IV **16 hours**

BIO INORGANIC CHEMISTRY: METAL IONS IN BIOLOGICAL SYSTEMS

Essential and trace elements, biological functions of biometals, active transport of cations (Na and K pump), ionophores, different types of naturally occurring ionophores.

Metalloenzymes: metalloproteins as enzymes – carboxy peptidase, catalases, peroxidases, cytochrome P450, superoxide dismutase, copper oxidases, vitamin B12 coenzyme, synthetic model compounds.

Metals in medicine- metal deficiency (Fe, Mn, Cu and Zn), chelation therapy and metal complexes as drugs.

Chlorophyll and its role in photosynthesis: Transport and storage of dioxygen- heme proteins, oxygen uptake, functions of haemoglobin, myoglobin, hemerythrin and hemocyanins, synthetic oxygen carriers.

REFERENCE BOOKS:

01. Inorganic Chemistry: Principles, structure and reactivity, 1997, J. E. Huheey,Keiter and Keiter.

02. Inorganic Chemistry, 3rd edition, C. E. Housecroft and A. G. Sharpe.

03. Physical-Inorganic Chemistry; A coordination Approach by S. F. A. Kettle.

04. Inorganic Chemistry by Purcel and Kotz.

05. Inorganic Chemistry by W. W. Porterfield.

06. Concepts and Models of Inorganic chemistry by Douglass, Alexander and Mcdaniel.

07. Advanced Inorganic Chemistry by Cotton and Wilkinson.

08. Inorganic Chemistry by Miessler and Tarr.

09. Fundamental concepts of Inorganic Chemistry by A. K. Das, volume 1 to 7.

10. Electronic spectroscopy by D. N. Sathyanarayana.

11. Electronic Spectroscopy by A. B. P. Lever.

12. Elements of Magnetochemistry by Symal and Dutta.

13. Bioinorganic Chemistry by A. K. Das.

14. Bioinorganic Chemistry by Bertini, Gary, Lippard and Valentine

15. Organometallic chemistry- A unified Approach 2nd Edition by R.C. Mehrotra and A Singh

16. Basic Organometallic Chemistry by B. D. Gupta and A. J. Elias

17. Organometallic chemistry of the transition elements by F. P. Pruchnik

18. Organometallic Chemistry by G. E. Coates.

19. Organometallic Chemistry of the Transition Elements by Florian P. Pruchnik

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
THIRD SEMESTER

CHIPr -3.6 INORGANIC CHEMISTRY PRACTICAL-III
Laboratory hours per week : 04 Credits : 02
Total hours : 64

PART-A Preparation of coordination compounds

01. Copper-glycine complex : cis and trans forms
02. Tris thiourea Copper (I) sulphate mono hydrate
03. Mercury tetrathiocyanato Cobaltate (II)
04. Tris ethylenediamine Ni(II) Chloride
05. Cis $[Co(en)_2Cl_2]$ Cl
06. Separation of optical isomers of $[Co(en)_3]^{3+}$

PART-B Characterization (Metal ion determination in above complexes

01. Copper by Iodometric method
02. Copper by Iodometric method
03. Nickel by gravimetric method
04. Cobalt volumetrically by EDTA method

PART-C Anion Estimation

05. SO_4^{2-} as Barium Sulphate (gravimetrically)
06. Cl^- by Silver nitrate (demonstration)
07. Interpretation of IR and NMR Spectra of
08. Tris (thiourea) Copper (I) sulphate
09. Cis $[Co(en)_2Cl_2]Cl$
10. $[Co(en)_3]^{3+}$

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
III SEMESTER

CHOT-3.2 : ORGANIC CHEMISTRY-III
Teaching hours per week : 04 Credits : 04
Total hours : 64

UNIT –I **16 hours**

REAGENTS IN ORGANIC SYNTHESIS

Use of the following reagents in organic synthesis and functional group transformation:

1. Gilmann reagent
2. Lithium diisopropyl amide (LDA)
3. Dicyclohexyl carbodimide (DCC)
4. 1,3-Dithiane (reactivity umpolung)
5. Trimethylsilyl iodide
6. Tri-n-butyl tin hydride (TNBH)
7. DDQ
8. Woodward-Prevost hydroxylation
9. Baker'yeast
10. Phase transfer catalysts
11. Crown ethers
12. Peterson synthesis

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 parabenzoquinones, photochemistry of aromatic compounds with reference to isomerization, addition and substitution, photochemical isomerization of cis and trans alkenes, photo-Fries rearrangement, Barton reaction, Hoffmann-Loefler-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**

MEDICINAL CHEMISTRY

Introduction, definition of drug, requirements of drugs, chemotherapy, pharmacokinetics, pharmacodynamics, metabolites and anti metabolites, prodrug and soft drugs, agonists and anti-agonists, concept of drug receptor, elementary treatment of drug receptor interactions, theories of drug activity-occupancy theory, rate theory, induced fit theory, classification of drugs.

Sulphonamides: Introduction, classification, synthesis and SAR studies of sulphathiazole, sulphanilamide, sulphadiazine.

Antimalarials: Introduction, classification, synthesis and drug action-Chloroquin and Pamaquin.

Analgesics: Introduction, classification, synthesis and drug action-Paraacetomol, aspirin, salol, phenyl butazone, antipyrine.

Anti-inflammatory: Introduction, classification, synthesis and drug action-Indomethacin and ibuprofen.

REFERENCE BOOKS:

01. Fundamentals of photochemistry, K.K. Rohatgi Mukhergee, 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.
09. Mechanisms of molecular migrations, Vols I and II, B. S. Thiagarajan, 1st Edn. Pergamon Press, Oxford, 1979.
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.
13. Organic photochemistry, J. M. Coxon and B. Halton, 1st Edn, Cambridge Univ. Press, London, 1974.
14. Molecular reactions and photochemistry, C. H. Deputy and D. S. Chapman, 1st Edn. Prentice-hall India, New Delhi, 1972.
15. Burger's Medicinal Chemistry and Drug Discovery, Vols. 1-6 Ed. D.J. Abraham, John Wiley, 2003
16. Foye's Principles of Medicinal Chemistry, 6th Edn., T L Lemke and D A Williams Eds., Lippincott, Williams and Wilkins, 2007
17. An Introduction to Medicinal Chemistry, P Graham, III Ed., Oxford, 2006
18. Medicinal Chemistry, N Weaver, Oxford, 2006
19. Goodman and Gilman's Pharmacological Basis of Therapeutics, 11th Edn., Tata McGraw-Hill, 2005.
20. Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical chemistry, J H Block and J M Beale, Jr., Eds., Lippincott, Williams and Wilkins, 2003.
21. Medicinal Chemistry – G R Chatwal, Himalaya, New Delhi, 2002
22. Medicinal Chemistry, A Kar, Wiley, 2000.

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
THIRD SEMESTER

CHOPr 3.7 ORGANIC CHEMISTRY PRACTICAL-III
Laboratory hours per week : 04 Credits : 02
Total hours : 64

PART-A: **ORGANIC ESTIMATIONS**

01. Estimation of aniline
02. Determination of equivalent weight of acids by silver salt method.
03. Estimation of sugars by Fehling's method.
04. Determination of saponification value of oils.
05. Determination of iodine value of oils.
06. Determination of enol content by Meyer's method.

PART-B: 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.

Note: Student shall perform one experiment from Part-A and one experiment from Part-B.

REFERENCES

01. Manual of Organic Chemistry — Dey and Seetharaman.
02. Modern experimental Organic Chemistry — John H. Miller and E. F. Neugil
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 — Cheronis, Entrikin and Hodnet
08. Laboratory Manual of Organic Chemistry — R. K. Bansal New AGE International (P) Ltd. London, 3rd edition, 1996.
09. Practical Organic Chemistry — N. K. Visno, New AGE International(P) Ltd. London, 3rd edition, 1996.

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
III SEMESTER

CHPT-3.3 : PHYSICAL CHEMISTRY-III
Teaching hours per week : 04 Credits : 04
Total hours : 64

UNIT–I **16 hours**

SURFACE CHEMISTRY

Surface chemistry: Introduction, adsorption, surface excess; BET isotherm, LB film, membrane equilibrium, micellisation, catalytic activity, surface active agent, Classification of surface active agent, Critical Micellar Concentration (CMC), Factor affecting the CMC of surfactants, hydrophobic interaction, thermodynamics of micellization-phase separation and mass action model, micro emulsion, reverse miceles. Basic principles of catalysis: Frendlich, Langmuir, BET, Gibb's adsorption isotherms, surface area, pore size and acid strength measurement. Thermodynamics of adsorption: interpretation of chemisorptions based on the structure and nature. Kinetic of surface reactions: rate determining step, various types of reaction, simple, parallel and consecutive reactions. Surface films on liquid (electrokinetic phenomenon). Applications of adsorption:-High vacuum, Gas marks, Softening of hard water, Drying gases, Decolorisation, Refining of petroleum and vegetable oils, Prevention of evaporation of water. In curing diseases, concentration of ores, Adsorption indicators.

UNIT–II **16 hours**

CHEMISTRY OF MATERIALS

Introduction: Fundamentals and importance, Metal nanoclusters, magic numbers, theoretical modeling of nano particles, Geometric structure, electronic structure, reactivity, fluctuations, magnetic clusters, Bulk to nano transitions. Semiconducting nanoparticles- optical properties, photofragmentation, coulombic explosion.

Carbon nano particles: Introduction, Carbon molecules, Nature of the carbon bond, New carbon structures. Carbon clusters: small carbon clusters, C_{60}; Discovery, structure, crystal, alkali doping, super conductivity, Fullerens, other Bulkyballs. Carbon nano-tubes: Fabrication, structure, electrical properties, vibrational properties, mechanical properties, application of nano materials.

Methods of preparation: Plasma arcing, chemical vapour deposition, sol-gel, silica-gel, hydrolysis, Condensation and polymerization of monomers to form particles, Electrodeposition, ball milling, Chemical methods, Thermolysis, Pulsed laser methods.

UNIT–III **16 hours**

CHEMICAL KINETICS

Kinetics of opposed reactions, 1^{st} order opposed by 1^{st} order, 1^{st} order opposed by 2^{nd} order. 2^{nd} order opposed by 2^{nd} order. Kinetics of chain reactions, decomposition of C_2H_6, O_3. Reaction between H_2 with Br_2 and Cl_2, decomposition of O_3 carrier with 1^{st} and 2^{nd} breaking apparent, activation energy of chain reactions, chain length, chain transfer reactions, inhibition, Rice-Herzfeld mechanism with example(CH_3CHO), Temperature Co-efficient on the basis of simple collision theory, mechanism of breaking chain reaction, parallel reaction, mathematical treatment of side reactions, Wegscheiders test for side reaction, and its applications. Kinetics of consecutive reactions, apparent activation energy of chain reactions, effect of temperature on reaction rate, polymerization reactions. Kinetics of polymerization reactions, free-radical mechanism, kinetics of addition polymerization, activation energies.

UNIT–IV **16 hours**

POLYMER AND DENDRIMER CHEMISTRY-II

Transition in Polymers: Definition of glass transition temperature (Tg) and flow temperature (Tf) and melting temperature (Tm). Thermal behavior of amorphous and crystalline polymers, factors affecting Tg. Plasticizers, properties and their effect on Tg of PVC. Effeciency of plasticizers, comparison of Tg and Tm, Tg of copolymers and polymer blends, relation between Tg and Tm. Preparation, properties and commercial importance: polyethylene, polystyrene, polyvinyl chloride, poly sulphone, polyurethances, polyisoprenes. Metallocene catalysis polymerization (Ziegler-Natta polymerization).

Methods of polymer fabrications: Fabrication of polymer films: solution casting, melt pressing, melt extrusion and bubble blown.

Fabrication of shaped polymer objects: compression molding, injection molding, blow molding and calendaring.

Spinning industrial polymers: solution spinning and melt spinning.

Dendrimers and hyper-branched polymers: Introduction to dendrimers, methods of preparation, common properties and applications. Synthesis of polyamidoamines using devergent route and dendratic polyether macromolecules using convergent route.

REFERENCE BOOKS:

1. Chemical kinetics –Laidler,Harper and Row ,1987.
2. Solid State Chemistry – N.B. Hannay.
3. Introduction to solids – Azaroff.
4. Kinetics of Chemical reactions -S,K,Jain Vishal Publications,19821.
5. Kinetics and mechanism- Moore and pearson,Willey,1980.
6. The foundations of Chemical kinetics –Bensen,Mc Graw.
7. Textbook of polymer science –Billmeyer, Willey Intersection.
8. Polymer Science- V. R. Gowariker, 2010
9. Physical chemistry-Atkins,ELRS,1982.
10. Physical chemistry –Moore,Orient Longman,1972.
11. Solid State Chemistry: An Introduction, 3rd edition, Lesley E. Smart and Elaine A. Moore.

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
THIRD SEMESTER
CHPPr-3.8 PHYSICAL CHEMISTRY PRACTICAL-III
Laboratory hours per week : 04 Credits : 02
Total hours : 64

01. Verify the degree of DeBye-Huckel and Onsagar equivalent conductance for electrolytes (NaCl, HCl) and determine the constant
02. To study the hydrolysis of methyl acetate catalysed by hydrochloric solution by equimolar solution of Urea-HCl solution and hence determine the degree of hydrolysis of salt
03. To determine the molecular weight of high polymer PVA from viscosity measurements
04. To investigate the reaction between $K_2S_2O_8$ and KI by colarimetric method
05. Determination of heat of solution of benzoic acid by solubility method
06. To determine the solubility and solubility product of silver halide by potentiometrically
07. Colorimetic estimation of Fe evaluation of the molar extinction co-efficient
08. To determine the COD in the given water sample
09. Electrolytic conductance comparison of strength of weak acids- acetic acid and monochloroacetic acid
10. Determination of rate for the photolysis of CAB solution
11. To deremine the percentage composition of two optically active substances (D-Glucose and D-tartaric acid)
12. Kinetic study on Ru(III) –catalysed reaction between primary amine and CAT (a) Determination of order of reaction w.r.t. [Ru(III)], (b) Determination of order of reaction w.r.t. [H^+], (c) Determination of E_a and thermodynamic parameters.
13. Kinetics of saponification of ethyl acetate by conductivity method and study the effect of dielectric constant of the medium (using CH3OH).

1. REFERENCE BOOKS:

2. Advanced physico-chemical experiments – J. Rose.
3. Instrumental analysis manual - Modern Experiments for Laboratory – G.G. Guilbault and L.G. Hargis.
4. A Text Book of Quantitative Inorganic Analysis – A.I. Vogel, 5th edition.
5. Experimental Inorganic Chemistry – G. Palmer.
6. Inorganic Synthesis – O. Glemser.
7. Experimental Inorganic/Physical Chemistry- Mounir A. Malati.
8. Quantitative Chemical Analysis – Daniel C. Harris, (2006) 7th edition.

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
III SEMESTER

CHGT- 3.4 SPECTROSCOPY-III
Teaching hours per week : 02 Credits : 02
Total hours : 32

UNIT–I **16 hours**

ELECTRON SPIN RESONANCE and APPLICATIONS OF IRSPECTROSCOPY

Applications of infra red spectroscopy to inorganic compounds

Infrared spectra of simple molecules and coordination compounds, changes in infrared spectra of donor molecules upon coordination (N,N-dimethylacetamide, urea, ammine, acetato, cyano and thiocyanato complexes), mono, di and trinuclear carbonyl complexes and nitrosyls complexes, change in spectra accompanying change in symmetry upon coordination (NO_3^-, SO_4^{2-}, NO_2^- and ClO_4^-), hydrogen bonding.

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 Krammer's degeneracy, John-Teller distortion, isotropic and anisotropic coupling constants, nuclear quadrupole coupling interaction, spin hamitonium, ESR spectra of radical containing a single set of equivalent protons-methyl, parabezoquinone, 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 ½, prolate and oblate nucleus, nuclear quadrapolar 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, quadrapole interactions, electron density, magnetic interactions; time and temperature dependent effect, application-Iodine trihalides, Prussian blue, trisiron dodecacarbonyl, tin halides, hexacyano ferrate and nitroprussides.

REFERENCES

01. Fundamentals of Molecular Spectroscopy, C. N. Banwell and E. M. McCash. 4th 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, 3rd 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, 3rd 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, 2nd 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
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
THIRD SEMESTER

CHEG-3.5 OPEN ELECTIVE : ENVIRONMENTAL CHEMISTRY
Teaching hours per week : 04 Credits : 04
Total hours : 64

UNIT-I **16 hours**

POLLUTION

Environmental segments, evolution of earth's atmosphere.

Air pollution: Air pollutants, prevention and control, green house gases and acid rain, carbon monoxide, industrial sources and transportation sources.

SO_x- sources, ambient concentration, test methods, control techniques - scrubbing, , limestone injection process. Ozone hole and CFC's, photochemical smog and PAN.

NO_x- sources, ambient concentration, test methods, thermodynamics and NO_x, control techniques.

Particulates: Size distribution, particulate collection - settling chambers, centrifugal separators, wet scrubbers, electrostatic precipitators & fabric filters, catalytic converters for mobile sources, Bhopal gas tragedy.

UNIT-II **16 hours**

WATER POLLUTION

Hydrologic cycle, sources, chemistry of sea water, criteria and standards of water quality- safe drinking water, maximum contamination levels of inorganic and organic chemicals, radiological contaminants, turbidity, microbial contaminants, public health significance and measurement of colour, turbidity, total solids, acidity, alkalinity, hardness, chloride, residual chlorine, sulphate, fluoride, phosphate and different forms of nitrogen in natural and polluted water, chemical sources of taste and odour, treatment for their removal, sampling and monitoring techniques.

UNIT-III **16 hours**

WATER ANALYSIS

Determination and significance of DO, BOD, COD and TOC, water purification for drinking and industrial purposes, disinfection techniques, demineralization, desalination processes and reverse osmosis.

Radioactive waste management, radionuclides in soil, effects of ionizing radiations-effect on ecosystem, accidents at atomic power plants-Chernobyl disaster, disposal of radioactive liquid wastes, methods of radiation protection.

UNIT-IV **16 hours**

DETERGENTS, PESTICIDES and SOIL ANALYSIS

Toxic chemicals in the environment, impact of toxic chemicals on enzymes. **Detergents**- pollution aspects, eutrophication.

Pesticides-pollution of surface water. Sewage and industrial effluent treatment, heavy metal pollution. Chemical speciation- biochemical effects of pesticides, insecticides, particulates, heavy metals (Hg, As, Pb, Se), carbon monoxide, nitrogen oxides, sulphur oxides, hydrocarbon, particulates, ozone, cyanide and PAN. Solid pollutants and its treatment and disposal.

Composition of soil - Inorganic and organic components in soil, micro and macro nutrients, nitrogen and sulphur pathways, soil pollution: classification of pollutants and their characteristics, sources, prevention and control, sampling and monitoring techniques.

REFERENCES BOOKS:

01. A.K. De : Environmental Chemistry (Wiley Eastern).
02. S.K. Banerji : Environmental Chemistry (Prentice Hall India), 1993.
03. S.D. Faust and O.M. Aly : Chemistry of Water Treatment, (Butterworths), 1983.
04. G.D. Christian : Analytical Chemistry, (4th Ed.), (John Wiley)
05. Sawyer and McCarty, Chemistry for Environmental Engineering (McGraw Hill) 1978
06. I. Williams, Environmental Chemistry, John Wiley, 2001
07. S. M. Khopkar, Environmental Pollution Analysis, (Wiley Eastern).
08. J.W. Moore: Heavy Metals in Water, (Springer-Verlag), 1984.
09. C. Malcolm, K.Killham and Edwards: Soil Chemistry and its Applications, Cambridge (1993)
10. M. Raymond and J.C. Shickluna: Soils, 5th Ed. (Prentice Hall, India), 1987.

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 CHEMISTRY
(Regular AND Repeater)

Duration: 03 Hours **Maximum Marks: 80**

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 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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