ABOUT UNIVERSITY

Dr. C.V. Raman University was established on 3 November, 2006, in the district of Bilaspur, Chhattisgarh by the "All India Society for Electronics and Computer Technology" (AISECT), the Sponsoring Body. The University was named after the first Nobel Laureate of the country in the field of science – Dr. C.V. Raman, an Indian physicist efforts influenced in the growth of science in our country. The University's principle goal is to evolve a new cadre of highly skilled technical professionals with deep academic insights and a strong sense of Indian 'Values and ethics', commemorating our forefathers who helped shape this nation.

The Sponsoring Body of the University-All India Society for Electronics and Computer Technology (AISECT) is an ISO 9001:2008 certified organization, established in 1985 and is today's one of The India's most reputed and trusted Education Groups which houses private Universities, Engineering Colleges, Professional Institutions & Education Centres across the country. Till date, AISECT has transformed the lives of over 19 lakh students and has uplifted the lives of millions of people in the community. AISECT has been lauded for its exceptional work and has won awards from the World Bank, NASSCOM, TiE, Government of India, Government of Madhya Pradesh and several others on account of its commitment to high quality education over the last 28 years. AISECT is also a partner institution with GoI, GoMP and GoCG in their Common Service Centre Program and several other projects of state and national concern.

MAIN OBJECTIVES

- Provide quality higher education and make provisions for research
- Create higher levels of intellectual abilities among our students
- Establish state-of-the-art facilities for education, training and examination, including online training
- Carry out teaching, research and offer comprehensive learning for a bright professional career
- Create centers of excellence for R&D to promote an environment of innovation and research
- Provide consultancy to public organizations and the Industry
- Award and maintain the standard of degrees, diplomas, certificates and other academic distinctions in accordance with the norms laid down by UGC, AICTE, BCI, MCI and other regulatory bodies.

Recognitions

- The University is recognized under Section 2(f) of the UGC Act.
- Joint Committee Approval of DEB(UGC/AICTE/DEB)
- Other recognitions include AICTE, NCTE, BCI and DEB
- It is the first University in the state of Chhattisgarh to be awarded an ISO: 9001-2008 Certification.
- Membership of the Association of Indian Universities (AIU)
- NACC B+

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THE FACULTIES OF STUDIES

The University has wide range of faculties which offers the traditional as well as the new era job oriented courses. The main emphasis is on providing a wide choice of courses at different levels. The following faculties currently are in operation in the University:

- Faculty of Arts
- Faculty of Commerce
- Faculty of Management
- Faculty of Science
- Faculty of Engineering
- Faculty of Information Technology
- Faculty of Education
- Faculty of Law

ABOUT INSTITUTE OF OPEN AND DISTANCE EDUCATION (IODE), CVRU

Education determines the quality of our life to a great measure, especially professional life. However, for many, in some circumstances, the path to education is ridden with many obstacles, including location, geographical inflexibility and lack of time. Fortunately, distance education is changing that scenario by providing an effective alternative platform to learn new skills and acquire a degree, such as distance education MBA, without having to attend traditional classes.

We, a UGC/DEB approved distance university (1 may 2009), offer various undergraduate and post-graduate degrees, along with a number of diplomas, which have benefitted many distance learners.

Our distance learning programmes are the shining light that many have been looking for; they unite conventional teaching approaches, including course materials in the form of books, and modern teaching methodologies, which include online access to the course. Our unique approach

has made us the centre of distance education in Chhattisgarh, helping scores of professionals to obtain a degree and fly high in their careers.
With our distance learning programmes, we are bringing people into the fold of skilled workforce, which has changed the life of many.
What makes us a distinguished Chhattisgarh distance education university?

- Reaching various far-flung regions of the state through information technology
- Providing professional education, need- and knowledge-based
- Setting new national standards in distance education

IMPORTANT ACHIEVEMENTS

- AN ISO 9001: 2008 Certified University
- NIRF Ranking Under Top 200 University
- World Education Award
- Largest Network for Learning Support System.
- Declaration of Term end result Time to Time.
- Best in Skill Development Award 2015
- Best University in Open Distance and online Award 2017

ACADEMIC PROGRAMMES OFFERED BY THE UNIVERSITY IN OPEN AND DISTANCE LEARNING MODE

The University offers through the Institute of Open and Distance Education (IODE) both short term and long term programmes leading to Certificates, Diploma and Degrees, which are conventional as well as innovative. Most of these programmes have been developed after an initial survey of the demand for such Programmes in the job market. They are launched with a view to fulfil the learner's need for skill and employability.

- Certification,
- Improvement of skills,
- Acquisition of professional qualifications,
- Continuing education and professional development at work place,
- Self-enrichment,
- Diversification and updation of knowledge, and
- Empowerment.

PROMINENT FEATURES OF THE OPEN AND DISTANCE EDUCATION AT CVRU

The open and distance education at the Dr. C. V. Raman University has certain unique features such as

- Individual study - flexible in terms of place, pace and duration of study.
- Use of latest information and communication technologies.
- Modular approach to programmes.
- Cost-effective programmes.
- Socially and academically relevant programmes based on students need
- Convergence of open and conventional education systems.
- Take higher-education to the unreached sections of the society through the use of information technology.
- Provide need and knowledge-based professional education.
- Set the national standards for Distance Education.

PROGRAMME DELIVERY MODE

The methodology of instruction in the distance learning mode in the university is different from that of the conventional regular programs. The system adopted for this more learner oriented and the learner is an active participant in the pedagogical process. Most of the instructions are imparted through distance education methodology and face to face mode as per requirement. The programme delivery methodology used in the distance learning mode follows a multimedia approach for instructions, which compromises:

- **Self Instructional Written Material:** The printed study material (written in self instructional style) for both theory and practical components of the programs is supplied to the learners in batches for every course.

- **Audio-Visual Material Aids:** The learning package contains audio and video CDs which have been produced/adopted by the University for Better Clarification and enhancement for understanding of the course material given to the learners. A video programme is normally of 25-30 minutes duration. The video cassettes are screened at the leaner support centre during specific sessions which are duly notified for the benefit of the learners.
- **Counseling Sessions:** Normally counseling sessions are held as per schedule drawn by the IODE DR. C. V. RAMAN UNIVERSITY. These are mostly held outside the regular working hours of the learner support centre.
- **Teleconferences:** Live teleconferencing sessions are conducted via Internet/ satellite through interactive Video Conferencing facility (available at some places) from the University studios, the schedule of which is made available at the learner support centre.

- **Industrial Training/Practical/Project work:** Some programmes have industrial training/practical/ project component also. Practical are held at designated institutions for which schedule is provided by the learner support centre. Attendance at practical is

compulsory. For Project Work, comprehensive project guide, in the form of booklet, is provided to the student along with the study material.

- The printed study materials will be dispatched periodically to the enrolled students for each paper of study. These materials will be as guide for the students for effective learning. The assignment for internal assessment shall also be dispatched along with the study material. Online modules are also available for some courses. These are in progress and as and when available, these will be available on the website of the students for registered candidates.

- The counseling sessions will be of 30 days duration for a course in a year. The actual schedule and place of contact program shall be announced and communicated to students in – time.

EVALUTION SYSTEM

The system of evaluation in open and distance learning system has a multi-tier system of evaluation.

1. Self-assessment exercise within each unit of study.
2. Continuous evaluation mainly through assignments which are tutor-marked practical assignments and seminar/workshop/extended.
3. The term-end examinations.
4. Project work.

The evaluation of learners depends upon various instructional activities undertaken by them. A learner has to write assignment responses compulsorily before taking term-end examination from time to time to complete an academic programme. A learner has to submit TMA responses to the learner support centre established by IODE Dr. C. V. Raman University. A learner should keep duplicate copies of assignments responses of TMA that may be required to be produced at Student Evaluation Division on demand. Term-end examination will be conducted at various examination centre approved by institute of open and distance education Dr. C. V. Raman university spread all over the Chhattisgarh. The weightage for Term End Examination will be 70% and weightage for Internal Assessment will be 30 % for this programme.

TERM-END EXAMINATION AND PAYMENT OF EXAMINATION FEE

The University conducts Term-end Examination in semester system and held in the month of Nov/Dec and May/June every year. Students will be permitted to appear in term-end examination subject to the conditions that:

1. Registration for the courses, in which they appeared is valid,
2. Minimum Time to pursue these courses is elapsed.
3. Submission of required number of assignment in respective courses by the due date.

Students can also submit on-line examination form as per guidelines through website at www.cvru.ac.in. Examination fee is required to be paid online payment gateway as per the fee table. Please do all correspondence regarding the course admission and other detail at the following address:

The Director
Institute of Open and Distance Education (IODE)
Dr. C. V. Raman University
Kargi Road, Kota, Bilaspur, Chhattisgarh
Phone: 07753253851, 8827920016, 8827920019
Email: cvrussd@gmail.com

LEARNER SUPPORT DESK:

Phone: 07753-253872, 07753-253873, 8359050061
Email: cvrussd@gmail.com

PROGRAMME GUIDE

DISTANCE EDUCATION PROGRAMMES

MASTER OF SCIENCE (M. Sc.) - CHEMISTRY

- **Scheme of Examination**
- **Detailed Syllabus, Practical & Reference Book**
- **Counseling and Study Structure**
- **Study Modules & Books Information**
- **Date Schedule & Instructions for Submitting Assignments**
- **Guideline For Preparation of Project Report**

DR. C.V. RAMAN UNIVERSITY
INSTITUTE OF OPEN AND DISTANCE EDUCATION (IODE)
KARGI ROAD, KOTA, BILASPUR, CHATTISGARH
PHONE : 07753-253851, 8827920016, 8827920019 FAX : 07753-253728
E-mail: cvrussd@gmail.com, Website: www.cvru.ac.in

MASTER OF SCIENCE (M.Sc.) – CHEMISTRY

Duration : 24 Months (2 years) **Eligibility : Graduation with Science Subjects**

Scheme of Examination

Course Code	Name of the Course	Credit	Total Marks	Theory		Practical/Project Report		Assignments/Viva Vice	
				Max	Min	Max	Min	Max	Min
FIRST SEMESTER									
1MSC1	Inorganic Chemistry-I	3	100	70	25			30	11
1MSC2	Organic Chemistry-I	3	100	70	25	-	-	30	11
1MSC3	Physical Chemistry-I	3	100	70	25			30	11
1MSC4	Analytical Chemistry-I	3	100	70	25	-	-	30	11
1MSC5	Lab-Inorganic Chemistry-I	2	100			70	25	30	11
1MSC6	Lab-Physical Chemistry-I	2	100			70	25	30	11
		16	**600**	**280**	**112**	**140**	**56**	**180**	**72**
SECOND SEMESTER									
2MSC1	Inorganic Chemistry-II	3	100	70	25	-	-	30	11
2MSC2	Organic Chemistry-II	3	100	70	25			30	11
2MSC3	Physical Chemistry-II	3	100	70	25	-	-	30	11
2MSC4	Analytical Chemistry-II	3	100	70	25			30	11
2MSC5	Lab-Organic Chemistry-II	2	100			70	25	30	11
MSC6	Lab-Analytical Chemistry-II	2	100			70	25	30	11
Total		**16**	**600**	**280**	**112**	**140**	**56**	**180**	**72**
THIRD SEMESTER									
3MSC1	Application of Spectroscopy	3	100	70	25			30	11
3MSC2	Bio-organic & Bio-inorganic Chemistry	3	100	70	25			30	11
3MSC3	Elective-I	3	100	70	25	-	-	30	11
3MSC4	Elective-II	3	100	70	25	-	-	30	11
3MSC5	Lab General	2	100			70	25	30	11
3MSC6	Lab Special	2	100			70	25	30	11
		16	**600**	**280**	**112**	**140**	**56**	**180**	**72**
FOURTH SEMESTER									
4MSC1	Environmental Chemistry	3	100	70	25	-	-	30	11
4MSC2	Photo Chemistry & Solid State Chemistry	3	100	70	25	-	-	30	11
4MSC3	Elective-III	3	100	70	25	-	-	30	11
4MSC4	Elective-IV	3	100	70	25	-	-	30	11
4MSC5	Project Work	4	200	-		140	50	60	22
		16	**600**	**280**	**112**	**140**	**56**	**180**	**72**

ELECTIVE PAPERS FOR III & IV SEMESTER

Organic Chemistry	Elective-I	Applied Organic Chemistry
Organic Chemistry	Elective-II	Drug and Heterocyclic Compd.
Inorganic Chemistry	Elective-I	Chemistry of Inorganic Materials
Inorganic Chemistry	Elective-II	Co-ordination Chemistry
Physical Chemistry	Elective-I	Advanced Chemical Kinetics
Physical Chemistry	Elective-II	Electro Chemistry
Organic Chemistry	Elective-III	Chemistry of Natural Products
Organic Chemistry	Elective-IV	Stereo Chemistry
Inorganic Chemistry	Elective-III	Separation Science
Inorganic Chemistry	Elective-IV	Organometalic Chemistry
Physical Chemistry	Elective-III	Surface Chemistry
Physical Chemistry	Elective-IV	Chemistry of Materials

Evaluation Scheme:

1. 36% in each theory, practical, project, dissertation & internal assessment but the total Aggregate for passing is 40%.
2. Total project mark is 200 in which 140 marks for project report and 60 marks will be for project viva.

Dr. C.V. RAMAN UNIVERSITY
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SEMESTER- First Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-1MSC1,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- INORGANIC CHEMISTRY – I

UNIT-I

Wave mechanics : Origin of quantum theory, black body radiation, atomic spectra, photoelectric effect, matter waves, wave nature of the electron, the wave equation, the theory of hydrogen atom, particle in one dimensional box, transformation of coordinates, Separation of variables and their significance.

UNIT-II

Stereochemistry and Bonding in main group : VSEPR theory &drawbacks, Walsh diagram (tri and penta atomic molecules dπ-pπ bonds, Bent rule, and energetic of hybridization, some simple reactions of covalently bonded molecules.

UNIT-III

Chemistry of transition elements : General characteristic properties of transition elements, co-ordination chemistry Of transition metal ions, stereochemistry of coordination compounds, ligand field Theory, splitting of d orbital's in low symmetry environments, John- Teller effect, Interpretation of electronic spectra including charge transfer spectra, Spectrochemical series, nephelauxetic series, metal clusters, sandwich compounds, metal carbonyls.

UNIT-IV

Bioinorganic Chemistry : Role of metal ions in biological processes, structure and properties of metalloproteinase in electron transport processes, cytochromes, ferrodoxins and iorn sulphur proteins, ion transport across membranes, Biological nitrogen fixation, PSI ,PS – II, Oxygen uptake proteins.

UNIT-V

Symmetry and group theory in chemistry : Symmetry elements and symmetry operations, definition of group and and sub group, relation between order of finite group and its sub group. Congugacy relation and classes, point symmetry group, (representation for Cn, Cnv, Cnh, Dnh etc. Groups to be worked out explicitly). Character of representation.

TEXT AND REFERENCE BOOK

- J H, Huheey, Inorganic Chemistry – Principal, structure and reactivity, Hrper And Row Publisher, Inc. York (1992).

- J.D. Lee, Concise Inorganic Chemistry, Elba with Chapman and Hall, London.
- F.A. Cotton, R.G. Wilkinson. Advanced Inorganic chemistry.
- Chakrabury,Sold State Chemistry, New Age International Science e Books.
- Inorganic chemistry vol 1&2 Gurdeep Raj, Goal publication.
- Inorganic chemistry- R. Sarkar (Vol.I-II), New centraj Book Agency.
- Basic Principales of Inorganic chemistry- Asim Kr. Das (Vol. I-II), CBS publishers,s Distributors, New Delhi.

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SEMESTER- First Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-1MSC2,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ORGANIC CHEMISTRY-I

UNIT-I

Reaction Mechanism: Structure and Reactivity : Types of reactions, potential energy diagrams, transition states and intermediates.Hard and soft acids and bases, strength of acids and bases. Generation, structure,stability and reactivity of carbocations and carbanions.

b) Aliphatic Nucleophilic substitutions: The SN2, SN1 reactions with respects to mechanism and stereochemistry.Reactivity effect of substrate structure, effect of attacking nucleophiles, leaving groups and reaction medium, Neighbouring Group Participation. Nucleophilic aromatic substitutionreactions SN1, SN2.

UNIT-II

Aromatic Electrophilic Substitutions: Introduction, Concept of Aromaticity, the arenium ion mechanism, orientation and reactivity in Nitration, Sulphonation, Friedel-Crafts and Halogenation in aromatic systems, energy profile diagrams. The ortho/para ratio, ipso attack, orientation in their ring systems. Diazo-coupling, Vilsmeir reaction, Gatterman-Koch rection, Von Richter rearrangement .

UNIT-III

Addition to Carbon–Carbon Multiple Bonds : Mechanism and steriochemical aspects of the addition reactions involving electrophiles and free radicals, regio and chemo-selectivity, orientation and reactivity. Hydrogenation of double and triple bonds, hydrogenation of aromatic rings. Michael reaction.

UNIT-IV

Elimination Reactions: The E1, E2 and E1cB mechanisms. Orientation in Elimination reactions. Reactivity: effects of substrate structures, attacking base the leaving group the nature of medium on elimination reactions. Pyrolytic elimination reactions.

UNIT-V

Study of following reactions: Beckman, Fries, Benzilic acid, Hoffman, Schmidt, Curtius, Lossen & Benzilic acid, **Stereochemistry:** Concept of Chirality and molecular dissymmetry, Recognition of symmetry elements and chiral centers, Prochiral relationship, homotopic, enantiotopic and disteriotopic groups and faces. Recemic modifications and their resolution, R

and S nomenclature. Geometrical isomerism E and Z. Nomenclature. Conformational analysis : cyclohexane derivatives, stability and reactivity,

TEXT AND REFERENCE BOOK

- Mechanism and structure in Organic chemistry (Holt Reinh.) B.S. Gould.
- Organic reaction mechanism (McGraw-Hill) R.K. Bansal.
- Reaction mechanism in organic chemistry- S.M. Mukharji and S.P. Singh
- Stereochemistry by P.S. Kalsi (New Age International)
- Reaction and Reagent O.P. Agrawal
- Reaction mechanism inorganic chemistry,Jerry Marks

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SEMESTER- First Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-1MSC3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- PHYSICAL CHEMISTRY-I

UNIT- I

THERMODYNAMICS-I Introduction, revision of basic concepts. Second law of thermodynamics: Physical significance of entropy (Direction of spontaneous change and dispersal of energy), Carnot cycle, efficiency of heat engine, coefficient of performance of heat engine, refrigeration and problems. Maxwell relations, thermodynamic equation of state, chemical potential, variation of chemical potential with temperature & pressure. Applications of chemical potential, phase rule, lowering of vapor pressure (Rault's law) and elevation in boiling point.

UNIT-II

THERMODYNAMICS-II : Ideal solutions, Rault's law, Duhem-Margules equation and its applications to vaporpressure curves(Binary liquid mixture), determination of activity coefficients fromvapor pressure measurements, Henry's law. Nonideal solutions : deviations from ideal behaviour of liquid mixtures, liquidvapor compositions, conditions for maximum.

UNIT-III

KINETIC THEORY OF GASSES : Postulates of kinetic theory of gases, P-V-T relations for an ideal gas, non-idealbehavior of gases, equation of state, compressibility factor, virial equation, van derWaal's equation, excluded volume and molecular diameter, relations of van derWaal's constants with virial coefficients and Boyle temperature. Molecular statistics, distribution of molecular states, deviations of Boltzmannlaw for molecular distribution, translational partition function, Maxwell-Boltzmann law for distribution of molecular velocities, physical significance of the distribution law, deviation of expressions for average, root mean square and most probable velocities, experimental verification of the distribution law. Molecular collision in gases, mean free path, collision diameter and collision number in a gas and in a mixture of gases, kinetic theory of viscosity and diffusion.

UNIT-IV

COLLOIDS AND MACROMOLECULES: Sols, Lyophilic and lyophobic sols, properties of sols, coagulation. Sols of surface active reagents, surface tension and surfactants, critical micelle concentration. Macromolecules: Mechanism of polymerization, molecular weight of a polymer (Number and mass average) viscosity average molecular weight, numerical problems. Degree of polymerization and molecular weight, methods of determining molecular

weights(Osmometry, viscometry, light scattering, diffusion and ultracentrifugation) Chemistry of polymerization: Free radical polymerization(Initiation, propagation and termination), kinetics of free radical polymerization, step growth polymerization(Polycondensation), kinetics of step polymerization, cationic and anionic polymerization.(More stress should be given to solving numerical problems)

UNIT-V

PHASE RULE DISTRIBUTION LAW: Partition of iodine between water and carbon tetrachloride. Equilibrium constant of I- + I2 □ I3-. Concentration of unknown potassium iodide. Partition of ammonia between water and chloroform. Partition of aniline between benzene and water. Hydrolysis constant of aniline hydrochloride. Association of benzoic acid in Naphthalene. Solid-Liquid Equlibria: Construction of phase diagrams of simple eutectics, systems with congruent melting points and solid solutions. Determination of composition of unknown mixtures. Analytical and synthetic methods for the determination of solubilities

TEXT AND REFERENCE BOOK

- Text book of Physical Chemistry- S. Glasstone
- Physical Chemistry- G.M. Barrow, Tata-McGraw Hill, Vth edition, 2003
- Physical Chemistry- G.K. Vemulapalli, Prentice-Hall of India, 1997.
- A Text book of Physical Chemistry- A.S. Negi- New Age International
- A Text book of Physical Chemistry- K.L. Kaboor (Vol.I- IV) Mec millan India Limited.
- Advanced Physical Chemistry- J.N. Gurtu R A Gurta, Pragati Prakashan.
- Advanced Physical Chemistry – Gurdeep Raj Krishran Publication.
- Physical Chemistry- Puri, Sharma & Parhalia, Vikash Publication.

Dr. C.V. RAMAN UNIVERSITY
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SEMESTER- First Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-1MSC4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ANALYTICAL CHEMISTRY –I

UNIT-I

ERRORS AND TREATMENT OF ANALYTICAL CHEMISTRY : Errors, Determinant, constant and indeterminate. Accuracy and precision Distribution of random errors. Average derivation and standard derivation, variance and confidance limit. Significance figures and computation rules. Least square method. Methods of sampling: samples size. Techniques of sampling of gases, fluid, solids, and particulates.

UNIT-II

CHROMATOGRAPHIC METHODS: (10+2) : General principle, classification of chromatographic methods. Nature of partition forces. Chromatographic behavior of solutes. Column efficiency and resolution.

Gas Chromatography: detector, optimization of experimental conditions. Ion exchanges chromatography. Thin layer chromatography: coating of materials, prepative TLC. Solvents used and methods of detection Column chromatography. Adsorption and partition methods. Nature of column materials.Preparation of the column. Solvent systems and detection methods.

UNIT-III

ELECTROANALYTICAL TECHNIQUES : Polarography: Introduction, Instrumentation, Ilkovic equation and its verification. Derivation of wave equation, Determination of half wave potential, qualitative and quantitative applications. Amperometry: Basic principals, instrumentation, nature of titration curves, and analytical applications.

UNIT-IV

THEORY OF VOLUMETRIC AND GRAVIMETRIC ANALYSIS : Standard solutions Indicators, theory of indicators , types of titrations, Acid , base , precipitation, Redox and complexometric titrations, Acid–base titrations in nonaqueous media , solvent characterisation , living effect , applications of non –aqueous titrations , MnO2 in pyrolusite, Na2CO3 + NaHCO3 and NaOH + Na2CO3 Mixture analysis , Gravimetric Analysis purity of the precipitate – Co precipitation's and post precipitations from homogenous solution , organic precipitation.

UNIT-V

COMPUTER SCIENCE: Introduction: History etc. Hardware: Central processor unit. Input devices. Storage devices. Periferals, Software: Overview of the key elements of basic program structure, loops, arrays, mathematical function. User defined functions, conditional statements, string. Applications. Data representation, Computerized instruments system. Microcomputer interfacing.

TEXT AND REFERENCE BOOK

- Analytical Chemistry : (J.W) G.D. Christain
- Instrumental Methods of analysis (CBS)- H.H. Willard, L.L. Mirrit, J.A. Dean
- Instrumental Methods of Analysis : Chatwal and Anand
- Instrumental Methods of Inorganic Analysis (ELBS) : A.I. Vogel

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SEMESTER- First Semester

PROGRAMME:- M.SC.CHEMISTRY **PRACTICAL MAX.M:70MIN.M:25**
COURSE CODE:-1MSC5,CREDIT-2 **VIVA. MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (INORGANIC CHEMISTRY-I)

Qualitative analysis of mixture containing
Eight radical including some less common metal ions among the following by common method (preferably semi-micro method).

Basic radicals
Ag, Pb, Hg, Cu, Cd,Bi, As, Sb, Sn, Fe, Al, Cr, Zn, Mn, Co, Ni, Ba, Sr, Ca, Mg, Na, K, NH4, Ce, Th, Zr, w, Te, Ti, Mo, O, V, Be, Li, Au, Pt,
Acid Radicals: - Co3, SO4, SO3, NO3, F, Cl, Br, I, NO2, BO3, C2O4, PO4, SiO4, Thiosulphate, Ferroeynide, Ferricyanide, Chromate, Arsenite, Arsenate, Permanganate,

Quantitative Analysis
Involving two of the following in ores, alloys or mixture in solution – one by volumetric and other by gravimetric method Ag, Cu, Fe, Cr, Mn, Ni, Zn, Ba, Ca, Mg, chloride, Sulphate.

Estimation of
Phosphoric acid in commercial orthophosphoric acid,
Boric acid in borax,
Ammonium lon in Ammonium salt,
MnO2 in pyrolusite
Available chlorine in bleaching powder,
H2O2 in commercial sample,

Preparation of selected Inorganic compounds and study of their properties by various method including IR, Electronic Spectra, Mossbaur, ESR, Spectra magnetic susceptibility etc.
Vo(acac)2
Cis & Trans K [Cr (C2O4)2(H2O)2]. 2H2O
Na[cr(NH3)2(SCN)4]
Mn (acac)
K3[Fe(C2O4)3]
Prussian Blue Turnbulls Blue
[Co(NH3)6][Co(NO2)6]
Hg [Co (SCN)4]
[Ni (NH3)4] Cl2
Ni (DMG)2

[Cu(NH3)4]SO4
Mohr's salt
Nickel ammonium Sulphate

TEXT AND REFERENCE BOOK

- A text book of Quantitative Inorganic Analysis-A.I.Vogel.
- Experimental Inorganic Chemistry-W.G.Palmer.
- The analysis of minerals and ores of the rarer elements-W.R.Schoeller and A.R.Powell, Charles, Griffin and company Ltd.
- Practical Inorganic Chemistry, Gurdeep Raj, Goal Publication.

Dr. C.V. RAMAN UNIVERSITY
Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- First Semester

PROGRAMME:- M.SC.CHEMISTRY **PRACTICAL MAX.M:70MIN.M:25**
COURSE CODE:-1MSC6,CREDIT-2 **VIVA. MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (PHYSICAL CHEMISTRY-II)

Asorption
Verification of Freundlich's Adsorption Isotherm,
Chemical Kinetics
Determination of effect of
Change of temperature
Change of concentrations of reactants and catalyst.
Lonic strength of the media on the velocity constant of hydrolysis of ester.
Determination of order of reaction for reaction between K2S2O8 and KI.
Electrochemistry
Conductometry
Determination of solubility of sparingly soluble salt (e.g., PbSO4, BaSO4) conductometrically.
Determination of the strength of strong and weak acids in a given mixture conductometrically.
Determination of dissociation constant of weak electrolyte by conductometer.
pH metry/Potentiometry
Determination of the strength of strong and weak acid in a given mixture using pH meter/potentiometer.
Determination of dissociation constant of weak acid by pH meter.
Determination of concentration of acid in given buffer solution by pH meter.
Polarimetry
Determination of rate constant for hydrolysis/inversion of sugar using polarimeter
Solubility and partition coefficient
Effect of temperature on solubility of electrolyte.
Determination of partition coefficient of between carbon tetrachloride and water.
Find out atomic parachor of carbon and hydrogen.
Colorimety
Verification of beer's and lamberts law and find out the concentration of unknown solution

TEXT AND REFERENCE BOOK

- A text book of Quantitative Inorganic Analysis-A.I.Vogel.
- Experimental Inorganic Chemistry-W.G.Palmer.
- Practical physical chemistry, A.M.James and F.E.Prichard Longman.
- Practical Physical Chemistry, Gurdeep Raj, Goal Publication.

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SEMESTER- Second Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-2MSC1,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- INORGANIC CHEMISTRY – II

UNIT-I

CHEMISTRY OF NON–TRANSITION ELEMENTS: General discussion on the properties of the non – transition elements, special features of individual elements, synthesis, properties and structure of halides and oxides of the non – transition elements, Polymorphism in carbon, phosphorous and sulphur, Synthesis, properties and structure of boranes, carboranes, silicates, carbides, phosphazenes, sulphur – nitrogen compounds, peroxo compounds of boron, carbon,sulphur, structure and bonding in oxyacids of nitrogen,phosphorous, sulphur and halogens, interhalogens, pseudohalides.

UNIT-II

ORGANOMETALLIC CHEMISTRY OF TRANSITION ELEMENTS: Ligand hapticity, electron count for different types of organometallic compounds, 18 and 16 electron rule ,synthesis, structure and bonding,organometallic reagents in organic synthesis and in homogeneous catalytic reactions (Hydrogenation, hydroformylation, isomerisation and polymerisation), pi metal complexes,

b) Metal – ligand equilibria in solution Stepwise and overall formation constants and their interaction, trends in stepwise constants, factors affecting the stability of metal complexes with reference to nature of metal ion and ligand, chelate effect.

UNIT-III

STUDIES AND APPLICATIONS OF LANTHANIDES AND ACTINIDES : Spectral and magnetic properties, use of lanthanide compounds as shift reagents, Modern methods of separation of lanthanides and actinides, Organometallic chemistry applications of lanthanide and actinide compounds in Industries.

UNIT-IV

CHEMISTRY IN NON- AQUEOUS SOLVENTS : Classification of solvents, properties, leveling effect, type reactions in solvents, chemistry of liquid ammonia, liquid dinitrogen tetraoxide and anhydrous sulphuric acid with respect to properties, solubilities and reactions.

UNIT-V

NUCLEAR AND RADIOCHEMISTRY : Radioactive decay and equilibrium, nuclear reactions, Q value, cross-sections, types of reactions, chemical effects of nuclear transformation, fission and fusion, fission products and fission yield

TEXT AND REFERENCE BOOK

- J H Huheey, Inorganic Chemistry - Principles,structure and reactivity, Harper and Row Publisher, Inc New York (1972)
- J.D. Lee, concise inorganic Chemistry, Elbs with Champan and Hall, London
- T.S. Swain and D.S.T. Black organometallic Chemistry
- F.A. Cotton, R.G. Wilkinson. Advanced Inorganic Chemistry

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SEMESTER- Second Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-2MSC2,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ORGANIC CHEMISTRY-II

UNIT-I

STUDY OF FOLLOWING REACTIONS: Mechanism of condensation reaction involving enolates Mannich, Benzoin, Stobbe, Dieckmann, Diels-Alder, Robinson annulation Reimer-Tieman, Chichibabin, Baeyer Villiger oxidation

UNIT-II

ALKYLATION AND ACYLATION: Introduction, Types of alkylation and alkylating agents: C-Alkylation and Acylation of active methylene compounds and Applications.

b) .Hrdroboration and Enamines : Mechanism and Synthetic Applications.

UNIT-III

REDUCTIONS : Study of following reductions- Catalytic hydrogenation using homogeneous and heterogeneous catalysts. Study of following reactions: Wolff-Kishner, Birch, Clemmensen, Sodium borohydride, Lithium Aluminium hydride (LAH) and Sodium in alcohol, Fe in HCl.

OXIDATION : Application of following oxidizing agents: KMnO4, chromium trioxide, Manganese dioxide, Osmium tetraoxide, DDQ, Chloranil .

UNIT-IV

STUDY OF ORGANOMETALLIC COMPOUNDS: Organo-magnesium, Organo-zinc and Organo-lithium, Hg and Sn reagents; Use of lithium dialkyl cuprate their addition to carbonyl and unsaturated carbonyl compounds.

UNIT-V

METHODOLOGIES IN ORGANIC SYNTHESIS: ideas of synthones and retrones. Functional group transformations and interconversions of simple functionalities.

TEXT AND REFERENCE BOOK

- Modern synthetic reactions- (Benjamin) H.O. House.
- Principles of organic synthesis- (Methuen) R.O. C. Norman.
- Organic Chemistry (Longman) Vol.I & Vol. II- Finar.

- Advanced Organic chemistry 2nd Ed. R R. Carey and R.J. Sundburg.
- Some modern methods of Organic synthesi- (Cambridge) W.Carruthares

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SEMESTER- Second Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-2MSC3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- PHYSICAL CHEMISTRY – II

UNIT-I

PHOTOCHEMISTRY: Absorption of light and nature of electronic spectra, electronic transition, Frank-Condon principle, selection rules, photodissociation, predissociation, photochemical reactions: photoreduction, photooxidation, photodimerization, photochemical substitution, photoisomerization, photochemistry of environment: Green house effect.

UNIT-II

PHOTO PHYSICAL PHENOMENAI: Electronic structure of molecules, molecular orbital, electronically excited singlet states, designation based on multiplicity rule, life time of electronically excited state, construction of Jablonski diagram, electronic transitions and intensity of absorption bands, photphysical pathways of excited molecular system (radiative and non-radiative).

UNIT-III

PHOTO PHYSICAL PHENOMENA II: Fluorescence, delayed fluorescence, and phosphorescence, fluorescence quenching: concentration quenching, quenching by excimer and exciplex emission, fluorescence resonance enrgy transfer between photexcited donor and acceptor systems. Stern-Volmer relation, critical energy transfer distances, energy transfer efficiency, examples and analytical significance, bimolecular collisional V quenching and Stern-Volmer equation.

UNIT-IV

ELECTROCHEMISTRY: 1. Arrhenius theory of electrolytic dissociation (Evidences and limitations), revision of basic electrochemistry(Types of electrodes and cells).

2. Electrochemical cells with and without transference, determination of activity coefficients of an electrolyte, degree of dissociation of monobasic weak acid (approximate and accurate), instability constant of silver ammonia complex. Acid and alkaline storage batteries.

UNIT-V

CHEMICAL KINETICS: Experimental methods of following kinetics of a reaction, chemical and physical (measurement of pressure, volume, EMF, conductance, diffusion current and absorbance) methods and examples. Order and methods of determination(Initial

rate, Integration, graphical and half life methods), rate determining step, steady state approximation and study of reaction between NO2 and F2, decomposition of ozone, and nitrogen pentoxide. Kinetics of complex reactions, Simultaneous (first order opposed by first order), Parallel and Consecutive reactions. Examples and numericals.

TEXT AND REFERENCE BOOK

- Photochemistry- J.G. Calverts andJ.N. Pitts, John- Wiley & Sons
- Fundamentals of Photochemistry- K. K. Rohatgi-Mukharjii, Wiley Eastern
- Advanced Physical Chemistry- Gurdeep Raj, Goel Publishing House

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SEMESTER- Second Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-2MSC4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ANALYTICAL CHEMISTRY- II

UNIT-I

A) ULTRAVIOLET AND VISIBLE SPECTROPHOTOMETRY (UV-VIS) : Introduction, Beer Lambert's law, instrumentation, calculation of absorption maxima of dienes, dienones and polyenes, applications.

B) INFRARED SPECTROSCOPY (IR) : Introduction, instrumentation, sampling technique, selection rules, types of bonds, absorption of common functional groups. Factors affecting frequencies, applications.

UNIT-II

NUCLEAR MAGNETIC RESONANCE (NMR) : Magnetic and nonmagnetic nuclei, Larmor frequency, absorption of radio frequency. Instrumentation (FT-NMR). Sample preparation, chemical shift, anisotropic effect, spinspin coupling, coupling constant, applications to simple structural problems.

UNIT-III

MASS SPECTROSCOPY : Principle, working of mass spectrometer (double beam). Formation of different types of ions, Mclafferty rearrangements, fragmentation of alkanes, alkyl aromatics, alcohols and ketones, simple applications, simple structural problems based on IR, UV , NMR and MS.

UNIT-IV

NEPHLOMETRY AND TURBIDOMETRY: Introduction, Theory, Instruments, working and Applications

b) Radiochemical Analysis, NAA: Scintillation counter and G.M. Counter (08)

UNIT-V

A) ATOMIC ABSORPTION SPECTROSCOPY : Introduction, Principal, difference between AAS and FES, Advantages of AAS over FES, advantages and disadvantages of AAS. Instrumentation, Single and double beam AAS, detection limit and sensitivity, Interferences applications.

B) INDUCTIVELY COUPLED PLASMA SPECTROSCOPY: Introduction, Nebulisation Torch, Plasmsa, Instrumentation, Interferences, Applications

TEXT AND REFERENCE BOOK

- Spectroscopic identification of organic compounds- R.M. Silverstein and G.C. Bassler.
- Spectroscopic methods in organic chemistry- D.H. Williams and I. Fleming.
- Absorption spectroscopic of organic molecules- V.M. Parikh.
- Applications of spectroscopic techniques in Organic chemistry- P.S. Kalsi.
- Physical Methods in Inorganic Chemistry (DWAP)- R. Drago.
- Advanced spectroscopic methods- H. Kaur, Pragati Prakashan.

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SEMESTER- Second Semester

PROGRAMME:- M.SC.CHEMISTRY **PRACTICAL MAX.M:70MIN.M:25**
COURSE CODE:-2MSC5,CREDIT-2 **VIVA.MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (ORGANIC CHEMISTRY- I)

Qualitative Analysis :-
Separation, Purification and identification of binary mixture (One liquid and one solid) using TLC and column chromatography. Chemical text, IR spectra may be used for functional group identification.
Organic Synthesis :-
Acetylation : of Cholesterol and separation of Cholesterol acetate by Column Chromatography.
Oxidation : Adipic acid by chromic acid, oxidation of cyclohexanol.
Grignard's reaction : Triphenyl methanol from Benzoic acid.
Aldol condensation : Dibenzalacetone from Benzaldehyde
Sandmeyer reaction : P-chloro Toluene from Toluidine.
Friediel Craft's reaction : P-Benzoyl propanoic acid from succinic anhydride and Benzene.
Aromatic electrophilic substitution : P-nitro aniline from p-bromo aniline.
Product may be Characterised by Spectral techniques.
Quantitative analysis :-
Determination of the percentage number of hydroxyl groups by acetylation method.
Estimation of amine/phenols using Bromate Bromide method of Acetylation method.
Estimation of Carbonyl group by hydrazone method.
Estimation of Glycine by titration.
Determination of equivalent weight of carboxylic compounds.Estimation of carboxyl group by titration/Silver salt method.

TEXT AND REFERENCE BOOK

- Volel's Textbook of Quantitative Analysis, revised, J. Basseell, R.C. Denney, G.H.. Jaffery and J. Metham, ELBS.
- Experiments and Techniques in Organic Chemistry, D. Pasto, C. Johnson and M. Miller, Prentice. Hall
- Volgel's Textbook of Practical Chemistry, A.R. Tatchall, john Willey
- Experimental Physics Chemistry R.C. Das and Beher, Tata McGraw Hill.

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SEMESTER- Second Semester

PROGRAMME:- M.SC.CHEMISTRY **PRACTICAL MAX.M:70MIN.M:25**
COURSE CODE:-2MSC6,CREDIT-2 **VIVA.MAX.M: 30 MIN. M: 11**
COURSE:- LABORATORY (ANALYTICAL CHEMISTRY)

Error analysis & Statistical data analysis :-
Error, types of errors, minimization of errors, statistical treatment for error analysis standard deviation, Relative standard, Linear Least Squares.
Calibration of Volumetric apparatus, burettes, pipettes, standard flask, weight box etc.
Volumetric analysis :-
Basic principles. Determination of iodine and saponification values of oil sample Determination of DO, COD, BOD, Hardness of water samples.
Gravimetric analysis :-
Determination of metal ions eg. Ni, Cu etc. by gravimetric methods using organic precipitants such as dimethyglyoxime dithizone, 8-hydroxyguinoline, etc.
Chromatography :-
Separation of cations and anions by-
Paper chromatography (b) Column Chromatography
pH metry / potentiometry : Determination of strength of acids etc.
Flame Photometry / AAS/ FIA/ Colorimetrty :-
Determination of cations/anions and metal ions, e.g. Na+, K+, Ca2+, SO42- , NO2-, Fe, Mo, Ni, Cu, Zn, etc.
Spectrophotometry :-
Verification of Beer-Lambert Law. Molar absorptivity calculation, plotting graph to obtain □□max etc. Effect of pH in aqueous coloured systems. Determination of metal ions, e.g. Fe, Cu, Zn, Pb, etc. using inorganic reagent like SCN and organic chelating agent like dithizone, cuferron 8-hydroxyquinoline, etc. in aqueous/organic phase in the presence of surface active agents.
Nephelometry / Turbidimetry :-
Determination of chloride, sulphate, phosphate, turbidity, etc.
Application of computers in chemistry :-
As specified in theory paper in Sect. II (a)

TEXT AND REFERENCE BOOK

- Volel's Textbook of Quantitative Analysis, revised, J. Basseell, R.C. Denney, G.H.. Jaffery and J. Metham, ELBS.

- Experiments and Techniques in Organic Chemistry, D. Pasto, C. Johnson and M. Miller, Prentice. Hall
- Volgel's Textbook of Practical Chemistry, A.R. Tatchall, john Willey
- Experimental Physics Chemistry R.C. Das and Beher, Tata McGraw Hill.

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SEMESTER- Third Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSC1,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:-APPLICATION OF SPECTROSCOPY

UNIT-I

ROTATIONAL: Vibrational Spectroscopy: Microwave Spectroscopy: Classification of molecules, rigid rotor model, effect of isotopic substitution on transition frequencies, intensities, non-rigid rotor. Applications. Vibration-rotation spectroscopy, P,Q,R branches. Breakdown of Born-Oppenheimer approximation, vibration of polyatomic molecules, normal modes of vibration, group frequencies, overtones, hot bands, factor affecting the band positions and intensities, far IR region, metal-ligand vibrations. Normal coordinate analysis.

UNIT-II

MOLECULAR SPECTROSCOPY: Energy levels, molecular orbitals, vibronic transitions, vibrational progressions and geometry of the excited states, Franck-Condon principle, electronic spectra of polyatomic molecules. Emission spectra; radio-active and non-radioactive decay, internal conversion, spectra of transition metal complexes, charge-transfer spectra. Raman Spectroscopy: Classical and quantum theories of Raman effect. Pure rotational, vibrational and vibrational rotational Raman spectra, selection rules, mutual exclusion principle, Resonance Raman spectroscopy, application of resonance Raman spectroscopy particularly for the study of active sites of metalloproteins, coherent anti stokes Raman spectroscopy (CARS).

UNIT –III

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY: General introduction, chemical shift, spin-spin interaction, shielding mechanism, chemical shift values and correlation of protons present indifferent groups in organic compounds. Chemical exchange, effect of deuteration, complex spin-spin interaction between two, three, four and five nuclei, virtual coupling. factors influencing coupling constant "j" Classification (AXB, AMX, ABC, A2B2 etc.). Stereochemistry, hindered rotation, Karplus- relationship of coupling constant with dihedral angle. Simplification of complex spectra-nuclear magnetic double resonance, spin tickling, INDOR, contact shift reagents, solvent effects. Fourier transform technique, Nuclear Overhauser Effect (NOE). Introduction to resonance of other nuclei –13C, 19F and 3 IP, FT NMR, advantages of FT NMR. Principle and introduction to C13 NMR, 2-D and 3-D NMR, Applications of NMR .

UNIT-IV

PHOTOELECTRON AND ESR SPECTROSCOPIES: Valance and core binding energies – Measurement technique – Koopman's theorem – Chemical shifts in X-ray

photoelectron spectroscopy – Auger spectroscopy – Applications of ESCA in chemistry. Electron spin Resonance Spectroscopy – Origin of the spectrum – method of recording - hyperfine splitting – g value and hyperfine splitting constant - McConnell relationship. Zero field splitting ESR spectra of simple organic radicals - application of ESR spectra to transition metal complexes

UNIT-V :

NQR AND MOSSBAUER SPECTROSCOPIES: NQR spectroscopy – Theory of NQR – instrumentation – Nuclear quadrupole coupling constants – effects of magnetic field on the spectra – relation between electric field gradient and structure – Applications. Mossbauer spectroscopy – principle – source and absorber – isomer shift – quadrupole splitting – magnetic interactions – applications to Fe and Sn compounds.

TEXT AND REFERENCE BOOK

- V.M. Parikh, Application spectroscopy of organic molecules. (Mehata)
- Silverstein and Basallar, Spectroscopic methods of organic compound.
- P.S. Kalsi Spectroscope of organic compounds (New age publisher)
- J.R. Dyer. Application of absorption spectroscopy of organic compounds.
- W. Kemp, Organic spectroscopy ELBS
- Advanced spectroscopic methods- H. Kaur, Pragati Prakashan.
- Absorption spectroscopic of organic molecules- V.M. Parikh

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SEMESTER- Third Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSC2,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- BIO-ORGANIC & BIO- INORGANIC CHEMISTRY

UNIT-I

A) CELL STRUCTURE AND FUNCTIONS: Structure of prokaryotic and eukaryotic cells, Intracellular organelles and their functions, comparison of plant and animal cells. Overview of metabolic processcatabolism and anabolism. ATP – the biological energy currency. Origin of life- unique properties of carbon, chemical evolution and rise of living system. Introduction to biomolecules, building blocks of bio- macromolecules.

B) ENZYMES: Structure activity and reactions, catalyzed determination of active site, inhibition mechanism chemical transformations using enzyme.

UNIT-II

AMINO ACIDS, PEPTIDES AND PROTEINS : Chemical and enzymatic hydrolysis of proteins to peptides, amino acid sequencing. Secondary structure of protein, forces responsible for holding of secondary structures. _-helix, _-sheets, super secondary structure, triple helix structure of collagen. Tertiary structure of protein- folding and domain structure. Quaternary structure. Amino acid metabolism- degradation and biosynthesis of amino acids, sequence determination: chemical/ enzymatic/ mass spectral, racemization/ detection. Chemistry of oxytocin and tryptophan releasing hormone (TRH).

UNIT-III

NUCLEIC ACIDS : [Purine and pyrimidine of nucleic acids, base pairing via H – bonding. Structure of ribonucleic acids (RNA) and deoxyribonucleic acid (DNA), double helix model of DNA and forces responsible for holding it. Chemical and enzymatic hydrolysis of nucleic acids. The chemical basis for heredity, an overview of replication of DNA, transcription, translation and genetic code. Chemical synthesis of mono and poly nucleosides.

UNIT-IV

METALS IN LIFE PROCESSES : Na+-K+-Pump charge carriers & osmotic pressure, relation to sensitivity of nerves and control on muscles, Mg-Ca complexes with nucleic acid, nerve impulse transmission, trigger reaction, Mn, Fe, Co, Cu, Mo, ferridoxins, Zn-super acid catalysis.

UNIT-V

NITROGEN FIXATION : Nitrogen in biosphere, nitrogen cycle, nitrification role of microorganisms, nitrogen fixation in soils

TRACE METALS IN PLANT LIFE : Micronutrients in soil, role of micronutrients in plant life

TEXT AND REFERENCE BOOK

- Eichhorn: Inorganic Biochemistry : Vol I,2 Elsevier
- Williams: an Introduction to Bioinorganic Chemistry, C.C. Thomos Spring III
- Biochemistry, L. Stryer, W.H. Freeman.
- Biochemistry, Voet and Voet, John Wiley.

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SEMESTER- Third Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSC3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ORGANIC CHEMISTRY (ELECTIVE PAPER I)
APPLIED ORGANIC CHEMISTRY

UNIT-I

AGROCHEMICAL: a) Carbamate pesticides: Introduction, carbaryl, Baygon, Aldicarb, Ziram, Zineb

b) Organophosphorus pesticides: Malathion, monocrotophos, dimethoate, phorate, mevinphos c. Natural and synthetic pyrethroids : Isolation and structures of natural allethrin, fenvalerate, cypermethrin,d. Plant growth regulators: General survey synthesis of simple compounds e. Insect repellents: General survey and synthesis f. Jovenile harmone: introduction structures JHA importance synthesis g. Pheromones: introduction, examples, and importance in IPM synthesis of juvabione bombycol, grandisol, and disparure

UNIT-II

MANUFACTURE OF FOLLOWING: 2-Phenylethanol, detergents, vanillin and other food flavours, synthetic musk, Acetic acid and butenaldehyde from ethanol butyl acetate, furfural, from bagasse, citric acid from molasses, Application of oro and marker process. Nicotine from tobacco waste and citral from lemon grass, synthetic detergents, glycerol.

UNIT-III

DYES AND INTERMEDIATES : Synthesis of important dye intermediates. Commercial processes for Azo dyes, reactive dyes, optical brighteners, thermal sensitive dyes, dispenses dyes.

UNIT-IV

POLYMERS: Mechanism of polymerization. Study of polyesters, polyamides, PVC, polystyrene, polyvinyl acetate and polyvinylalcohol, polyethenes, viscose rayon, synthesis of polyethylene, polypropylene. Synthetic rubbers: Styrene-butadiene, butyl polyisoprene, phenol formation formaldehyde resin. Plastictisers and anti oxidants for polymers, Natural polymers: Starch and cellulose.

UNIT-V

SOAP AND DETERGENTS: Soap -Introduction, method of preparation of soap, types of soap, cleaning mechanism, limitation of soap as cleaning agent. Detergents- Introduction, types of detergents, the mechanism of cleaning action of detergents, advantage of using detergent ,washing powder.

TEXT AND REFERENCE BOOK

- Chitwal, Synthetic Dyes
- K. H. Buchel: Chemistry of Pesticides
- F.W. Billmeyer, A text book of polymarscience
- Shashi Chawla, Engineering Chemistry, Dhanpat Rai and Co (P) Ltd

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SEMESTER- Third Semester

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COURSE CODE:-3MSC4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ORGANIC CHEMISTRY (ELECTIVE PAPER II)
DRUG & HETEROCYCLIC

UNIT-I

a) Drug design : Development of new drugs, procedures followed in drug design, concepts of prodrugs and soft drugs. Theories of drug activity, Quantitative structure activity relationship. Theories of drug activity, Quantitative structure activity relationship. History and development of QSAR. Concepts of drug receptors b) Study of the Following types of drugs:I
a) Antibiotics: Preparation of semi synthetic penicillin, conversion of penicillin into cephalosporin, general account of tetracycline & macrocyclic antibiotics(no synthesis)
b) Antimalerials: Trimethoprim
c) Analgesic & Antipyretics: Paracetamol, Meperidine, methadone, Aminopyrine.

UNIT-II

a) b) Study of the Following types of drugs:II
i) Anti- inflammatory: Ibuprofen, Oxyphenylbutazone, Diclophenac, Indomethacin.
ii) Antitubercular & antileprotic : Ethambutol, Isoniazide & Dapsone
iii) Anaesthetics : Lidocaine, Thiopental.
iv) Antihistamines: Phenobarbital, Diphenylhydramine.
v) Tranquilizers: Diazepam, Trimeprazine.
vi) Anti AIDS: General study
vii) Cardiovascular: Synthesis of dilliazem, quinidine, methyldopa, atenolol, oxyprenol
viii) Anti-neoplastic drugs: Cancer chemotherapy, Synthesis of mechloraethamine, cyclophosphamide, Mephalan, uracils, mustards. Recent development in cancer chemotherapy. Hormones and natural products.

UNIT-III

a) Small ring Heterocycles
Three membered and four membered Heterocycles- synthesis and reactions of aziridines, oxiranes, thiranes, azetidines, oxitanes and thietanes.
b) Benzo fused five membered Heterocycles. Synthesis and reactions of benzopyrroles, benzofurans and benzothiophenes.

UNIT-IV

a) Six membered Heterocycles with one heteroatom

Synthesis and reactions of pyrilium salts and pyrones and their comparison pyridinium and thiopyrylium salts and pyridones. Synthesis and reactions of coumarins, chromones.

UNIT-V

a) Six membered Heterocycles with two and more Heterocycles Synthesis and reactions of diazines & triazines.

b) Seven membered Heterocycles Synthesis and reactions of azepines, oxepines & thiepines.

TEXT AND REFERENCE BOOK

- Burger : Medicinal chemistry.
- A. Kar : Medicinal Chemistry (Wiley East)
- Wilson, Gisvold & Dorque: Text book of organic medical and pharmaceutical chemistry
- R. M. Acheson : An introduction to chemistry of heterocyclic compounds (Interscience).
- Joule & Smith: Heterocyclic chemistry (Van Nostrand).
- R.K. Bansal: Hetterocyclic chemistry (Wiley E).
- Finar : Organic chemistry (Vol.1& 2)
- Heterocyclic Chemistry, J.A. Joule, K Mills and G.F. Smith, Chapman and Hall
- Heterocyclic Chemistry, T.L. Gilchrist, Longman Scientific Technical
- An Introduction to Heterocyclic Compounds, R.M. Acheson, J. Willey

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SEMESTER- Third Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSC3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- INORGANIC CHEMISTRY (ELECTIVE PAPER-I)
CHEMISTRY OF INORGANIC MATERIALS

UNIT-I

LATTICE DEFECTS

Introduction to types of Solids, Perfect & imperfect crystals, point defects, Line defect and plane defect defect (definition & explanation of meaning) order & disorder phenomena, thermodynamics of Schottky & frenkel defect formation, Determination of defect, Nonstiochiometric defect (structural and thermodynamic aspects) incorporation of stiochometric excess of defects, thermodynamics of Nonstiochiometric phases.

UNIT-II

SYNTHESIS OF INORGANIC MATERIALS

Synthesis of solid state materials using different techniques ceramic techniques, coprecipitation techniques, sol gel techniques, precursor techniques, high temperature & high pressure synthesis.

UNIT-III

IONIC CONDUCTORS

Types of ionic conductors, mechanism of ionic conduction, interstitial jumps, vacancy mechanism, diffusion, super ionic conductors, phase transition & mechanism of conduction in super ionic conductors, examples and applications of ionic conductors, Electronic properties of materials, Organic semiconductors, examples, properties and application

UNIT-IV

A] MAGNETIC PROPERTIES OF MATERIALS

Introduction, Magnetization, Electron spin and magnetic moment, Theory of diamagnetism, langevins theory & paramagnetic susceptibility of solids, ferromagnetism, Domain theory. Hysteresis in magnetism, ferrimagnetisms (ferries) Applications of magnetic materials.

B] MAGNETIC MATERIALS

Structure and Properties of i) Metal and Alloys ii) Transition metal Oxides Formation and characteristics.

UNIT-V

ADVANCED INORGANIC MATERIALS

Nanotechnology and its business applications, Introduction to nanoscale, Potential applications of nanomaterials, Challenges and opportunities scope of nanotechnology, Commercialization scope Nanotechnology research in 21st century, Basic nanotechnology science and chemistry concepts, basic nanostructures , nanocomposites, Thin films, nanofoam, nanoclusters, smart nanostructures, manufacturing techniques of nanomaterials.

TEXT AND REFERENCE BOOK

- N.N. Greenwood: lonic Crystals, Lattice Defects and Nonstionchiometry (Butterworth's)
- A. R. West, Solid State Chemistry
- H.V. K Keer, Principles of the Solid State Chemistry, Wiley Eastern.

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SEMESTER- Third Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSC4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- INORGANIC CHEMISTRY (ELECTIVE PAPER-II)
CO-ORDINATION CHEMISTRY

UNIT-I
THEORIES OF METAL-LIGAND BONDING
Molecular Orbital treatment, Octahedral (with and without pi bonding) tetrahedral and square planer complexes in a qualitative manner, comparison of theories of bonding, VBT, CFT, LFT and MOT.

UNIT-II
STRUCTURAL STUDIES OF COORDINATION COMPOUNDS
Compounds of first transition series elements, with respect to their electronic spectra, magnetic & thermal properties (DTA, TGA)

UNIT-III
MAGNETO CHEMISTRY
Diamagnetic correction, single & multielectron system, types of the magnetic behaviour, Diamagnetism, Para magnetism, Ferro & Ferri, Antiferro and magnetic interaction, The origin of Para magnetism, Magnetic behavior of complexes, Simplification of Van Velck equation, magnitude of magnetic moments, Determination of magnetic susceptibility by Gouy and faraday method.

UNIT-IV
TRANSITION METAL COMPLEXES & CATALYSIS
Introduction, General Principle, catalysis by transition metal complexes, Hydrocarbons Oxidation by Molecular oxygen, olefin Oxidation, olefin polymerization, olefin hydrogenation, Arene reactions catalyzed by metal complexes, catalysis of condensation polymerization reaction, Current and feature trend in catalysis.

UNIT-V
MIXED LIGAND COMPLEXES
Stabilities of ternary complexes, Dynamics of formation of ternary complexes reaction of Coordination ligand in ternary complexes, Mimicking reactions in biological systems, enzyme models, Amino acids ester hydrolysis, peptide synthesis & hydrolysis, Detarbodylation of B keto acids

TEXT AND REFERENCE BOOK

- Jones: Elementary Coordination Chemistry J. Weily
- Graddon: Introduction to Coordination Chemistry J. Weily
- Drago: Physical methods of Inorganic Chemistry. J. Weily
- Datta & Shymlal Elements of Magneto Chemistry
- James E. Huheey: Inorganic Chemistry Principles of Structure and reactivity, harber & Row, Publishers Inc. New York 1972.
- William L. Jolly: Modern Inorganic Chemistry Mecgrow Hill USA, 1984
- F.A. Cotton & R.G. Willkinson: Advanced Inorganic Chem.

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Institute of Open and Distance Education (IODE)
Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Third Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSC3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- PHYSICAL CHEMISTRY (ELECTIVE PAPER-I)
ADVANCED CHEMICAL KINETICS

UNIT-I
CHEMICAL KINETICS:
Steady State Approximation Collision theory of gas reaction , collision frequency. The rate constant , molecular diameters , collision theory vs. experiment Kinetics of Fast reactions: Relaxation techniques, pressure jump and temperature jump methods, NMR relaxation, flash photolysis and molecular beam methods.

UNIT-II
HYDROGEN ION DEPENDENCE OF REACTION RATES:
Protonation and hydrolysis equilibria, determination of active reactant species form kinetic data, interpretation of hydrogen ion effect with example.

UNIT-III
ELECTRON TRANSFER REACTION:
Complimentary and non-complimentary reactions, outer and inner-sphere electron transfer reactions, proton transfer, hydride transfer and hydrogen, oxygen and chlorine atom transfer reactions.

UNIT-IV
CATALYSIS:
Trace metal ion catalysis and their mechanisms. Micellar catalysis, Berezini, Menger-Portonoy, cooperative and pseudo-phase ion exchange models and examples.

UNIT-V
MECHANISM OF CHROMIUM(VI) OXIDATIONS:
One and two equivalent reductants oxidation, assumptions, limiting forms of rate laws, Westheimer mechanism and its validity. Catalysis, Induced and cooxidations. Mechanisms other than Westheimer mechanism.

TEXT AND REFERENCE BOOK

- Text book of Physical Chemistry- S. Glasstone
- Physical Chemistry- G.M. Barrow, Tata-McGraw Hill, Vth edition, 2003
- Physical Chemistry- G.K. Vemulapalli, Prentice-Hall of India, 1997.
- A Text book of Physical Chemistry- A.S. Negi- New Age International
- A Text book of Physical Chemistry- K.L. Kaboor (Vol.I- IV) Mec millan India Limited.
- Advanced Physical Chemistry- J.N. Gurtu R A Gurta, Pragati Prakashan.
- Advanced Physical Chemistry – Gurdeep Raj Krishran Publication.
- Physical Chemistry- Puri, Sharma & Parhalia, Vikash Publication.

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SEMESTER- Third Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-3MSC4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- PHYSICAL CHEMISTRY (ELECTIVE PAPER-II)
ELECTROCHEMISTRY

UNIT - I
ELECTROLYTIC CONDUCTANCE:
Debye - Huckel theory of inter-ionic attraction , ionic atmosphere, time of relaxation, relaxation and electro-phoretic effects, Debye-Huckel-Onsagar equation and its validity for dilute solutions and at appreciably concentrated solutions. Abnormal ionic conductance of hydroxyl and hydrogen ions. Activity coefficients: forms of activity coefficients and their interrelationship. Debye-Huckel limiting law its applications to concentrated solutions. DebyeHuckel

UNIT - II
ION SOLVENT INTERACTIONS AND ELECTROLYSIS:
The Born Model and expression for the free energy of ion- solvent interactions. Thermodynamic parameters for the ion - solvent interactions. Calculations of heats of hydration of ions and the concept of hydration number. Electrolysis: Decomposition potentials: calculations and determinations. Polarization: types of polarization, over voltage and hydrogen and oxygen over voltage.

UNIT – III
ELECTRODE REACTIONS:
Tafel equations, kinetics of discharge of hydrogen ions . Diffusion over potentials. Fuel cells: significance of fuel cells: hydrogen - oxygen, hydrocarbon - air, natural gas and carbon monoxide, air fuel cells. Corrosion: concept and importance, mechanism of corrosion and Pourbaix diagrams.

UNIT-IV
ELECTROKINETIC PHENOMENA:
Electrical double lever, theories of double layer, electro-capillary phenomena, electro-capillary curve. Electro-osmosis, electrophoreses. Streaming and Sedimentation potentials. Zeta potentials and its determination by electrophoresis, influence of ions on Zeta potential.

UNIT-V

ELECTROANALYTICAL METHODS :

Potentiometric methods: Reference electrodes and indicator electrodes. The hydrogen calomel, Ag-AgCl electrodes. The glass electrode – its structure, perofrmance and limitations. Measurement of pH. Petentiometric titrations. Redox and precipitation titrations. Electrogravimetry: Principle and method. Determination of Cu. Separation of metals. Conductometry: Principle and method. Conductance measurements. Conductometric titrations. Colorimetry: Principle and method. Colorimetric titrations.

TEXT AND REFERENCE BOOK

- An introduction to Electrochemistry by S.Glasstone
- Modern Electrochemistry Vol. I & II by J.O.M. Bockris and A.K.N.Reddy.
- Physical Chemistry by S.Glasstone.
- Electrolytic Solutions by R.A.Robinson and R.H.Strokes
- Physical Chemistry by P.W.Atkins. ELBS

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SEMESTER- Third Semester

ROGRAMME:- M.SC.CHEMISTRY **PRACTICAL MAX.M:70MIN.M:25**
COURSE CODE:-3MSC5,CREDIT-2 **VIVA.MAX.M: 30 MIN. M: 11**
COURSE:- LAB WORK GENERAL

Conductometry
i) Verify Debye Huckel and Onsager limiting law for strong electrolyte.
ii) Determine the degree of hydrolysis and hydrolysis constant of
CH3COONa (b) NH4Cl
iii) Determine the basicity of an organic acid by conductometric measurements
iv)Determine the equivalent conductance of an electrolyte and determine the dissociation constant .
V) Determine solubility of sparingly soluble salts .
B. Colorimetry
i) Determine the composition of K2Cr2O7 and KMnO4 using spectrophotometer
ii) Determine the dissociation constant of methyl red by spectrophotometric method .
C.pH metry
i) Determine pK value of given dibasic acid by pH meter.
ii) Determine the pH of various mixtures of acetic acid and sodium acetate in aqueous solution and hence determine the dissociation constantof the acid.
D.Potentiometry
i) Titrate ferrous ammonium sulphate against K2Cr2O7/KMnO4 and determine redox potential of ferric system .
E. Distribution coefficient
i) Determine the distribution coefficient of succinic acid between ether and water.
ii) Study the distribution of benzoic acid between benzene and water, and hence show that benzoic acid dimerises in benzene
iii) Determine the equilibrium constant of the reaction KI+I2-KI3 by distribution method.

TEXT AND REFERENCE BOOK

- A text book of Quantitative Inorganic Analysis-A.I.Vogel.
- The analysis of minerals and ores of the rarer elements-W.R.Schoeller and A.R.Powell, Charles, Griffin and company Ltd.
- Practical Inorganic Chemistry, Gurdeep Raj, Goal Publication.
- A text book of Quantitative Inorganic Analysis-A.I.Vogel.
- Experimental Inorganic Chemistry-W.G.Palmer.
- Practical physical chemistry, A.M.James and F.E.Prichard Longman
- Practical Physical Chemistry, Gurdeep Raj, Goal Publication.

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SEMESTER- Third Semester

ROGRAMME:- M.SC.CHEMISTRY **PRACTICAL MAX.M:70MIN.M:25**
COURSE CODE:-3MSC6,CREDIT-2 **VIVA.MAX.M: 30 MIN. M: 11**
COURSE:- LAB WORK SPECIAL

Instrumental methods and Analytical Technique
Spectrophotometric determination
Manganese/Chromium/Vanadium in steel sample.
Iron-salicylic aicd complex by jobs method of continuous variation of concentration.
Zirconium-Alizarin red –s-complex; Mole ratio method.
Copper Ethylenediamine Complex; Slope ratio method.
Separation& determination of two metal ions: Cu- Ni, Zn-Ni,Mg-Ni involving volumetric & gravimetric method.
Polarography
Composition and stability constant of complexes.
Flame photometric determination
Sodium and potassium when present together
Lithium/Calcium /Barium/ Strontium
Cadmium and Magnesium in tap water
Quantitative &Qualitative Analysis :
Paper chromatography- Cadmium and Zinc, Zinc and Magnesium
Thin layer chromatography – separation of Nickel, Manganese, Cobalt and Zinc. Determination of Rf values.
Ion Exchange
Solvent Extraction
Electrophoretioc separation.
F. i) Analysis of Dolomite.
ii) Estimation of available oxygen in H2 O2 by Iodometry.

TEXT AND REFERENCE BOOK

- A text book of Quantitative Inorganic Analysis-A.I.Vogel.
- Experimental Inorganic Chemistry-W.G.Palmer.
- The analysis of minerals and ores of the rarer elements-W.R.Schoeller and A.R.Powell, Charles, Griffin and company Ltd.
- Practical Inorganic Chemistry, Gurdeep Raj, Goal Publication.
- A text book of Quantitative Inorganic Analysis-A.I.Vogel.
- Experimental Inorganic Chemistry-W.G.Palmer.
- Practical physical chemistry, A.M.James and F.E.Prichard Longman
- Practical Physical Chemistry, Gurdeep Raj, Goal Publication.

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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSC1,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ENVIRONMENTAL CHEMISTRY

UNIT – I
CHEMISTRY AND BIOLOGY :
Amino acids , proteins , enzymes , DNA & RNA in living systems , electrolytes, the chirality of biological molecules , the biochemical process , weak and strong interactions, macromolecules and rubber elasticity , polyelectrolytes , biopolymers.

UNIT - II
PHYSICAL ASPECTS OF BIOPOLYMERS:
X-ray diffraction, electronic absorption & luminescence Spectroscopy, optical activity , magnetic activity , magnetic-optical activity. Osmosis, hydrophobic hydration and interactions. The properties of amino acids and their aqueous solutions.

UNIT-III
A] AIR POLLUTION :
Sources and sinks of gases pollutants, classification & effects of air pollutants on living and nonliving things, , pollution problems in industrial area, global air pollution problems, green house effect, acid rain, ozone depletion and their consequences on Environment. Major air pollution disasters.
B] WATER POLLUTION :
Types, sources and classification of water pollutants, Industrial water pollution, constituents of aquatic Environment, oxygen contents of water and aquatic life, oxygen electrode, and its use, industrial water, Effects of water pollutants on life and Environment.

UNIT-IV
A) METHOD OF CONTROL OF AIR POLLUTION :
Method of control of air pollution, electrostatic precipitation wet & dries scrubber, filters, gravity and cyclonic separation, Adsorption, absorption and condensation of gaseous effluent
B] METHOD OF CONTROL OF WATER POLLUTION :
Water and waste water treatment, aerobic and anaerobic, aeration of water, principle of coagulation, flocculation, softening, disinfection, demineralization and fluoridation.

UNIT-V

A] RADIATION POLLUTION :

classification & effects of radiation, effects of ionizing radiation on man, Effects of non ionizing radiation on life, radioactivity and Nuclear fallout, protection

B] Environmental toxicology Chemical solutions to environmental problems biodegradability, principles of decomposition better industrial processes, Bhopal gas tragedy, Chernobyl, three mile island, sewozo and minamata disasters. n and control from radiation.

TEXT AND REFERENCE BOOK

- Elements of Inorganic Photochemisty, G.J.Gerrandi Wiley.
- Environmental Pollution, A.K.De
- Environmental Pollution Control in Process Industries, S.P.Mahajan
- Introduction to Air Pollution P.K.Trivedi
- Environmental Pollution Analysis, S.M.Kharpkar
- Environmental Pollution Engineering and Control, C.S.Rao
- Environmental Chemistry, B.K. Sharma & H.Kaur.

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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO.MAX.M:70MIN.M: 5**
COURSE CODE:-4MSC2,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- PHOTO CHEMISTRY AND SOLID STATE CHEMISTRY

UNIT-I
PHOTOCHEMISTRY-I:
Effect of light intensity on the rate of photochemical reactions. Types of photochemical reactions, phtodissociation gas phase photolysis, photochemistry of alkynes, intramolecular reactions of the olefinic bonds, geometrical isomerism, cyclisation reactions, rearragements of 1,4 and 1,5 dienes.

UNIT-II
PHOTOCHEMISTRY- II :
Photochemistry of carbonylcompounds, intramolecular reactions of carbonyl compounds saturated cyclic and acyclic ,α β unsaturated compounds, cyclohexadinones, intermolecular cycloaddition reactions, dimerisation and oxitane formation, photochemistry of aromatic compounds, miscellaneous photochemical reactions, photo fries reactions of anilides, photo fries rearrangements. Singlet molecular oxygen reactions, photochemistry of vision.

UNIT III
SOLID STATE REACTIONS:
General principle, types of reactions: Additive, structure sensitive, decomposition and phase transition reactions, tarnish reactions, kinetics of solid state reactions, factors affecting the reactivity of solid state reactions.

UNIT IV
ELECTRONIC PROPERTIES AND BAND THEORY:
Metals, insulators and semi conductors, free electron theory and its applications, electronic structure of solids, band theory, band structure of metals, insulator, and semiconductors, doping in semiconductors, p- n junction, super conductors, optical properties, photo-conduction and photoelectric effects, laser action, solid state laser and their applications.

UNIT V
PREPARATION OF MATERIALS:
Purification and crystal growth, zone refining, growth from solution, growth from melt and preparation of organic semiconductors for device applications.

TEXT AND REFERENCE BOOK

- A guide to laser in chemistry by Gerald R., Van Hecke, Keny K. Karokitis
- Principals of solid state, H.V. Keer Wiley Eastern,
- Solid state chemistry, N.B. hannay
- Solid state chemistry, D.K. Chakrabary , New Age International
- An Introduction to Crystallography : F. G. Philips
- Solid state Chemistry by A. R. West (Plenum)

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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSC3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ORGANIC CHEMISTRY(ELECTIVE PAPER-III)
CHEMISTRY OF NATURAL PRODUCTS

UNIT-I
TERPENOIDS (10+2):
Structure and synthesis of abietic acid, zingiberene, santonin, cuparenonne and caryophyllene.

UNIT-II
ALKALOIDS :
Structure, stereochemistry, synthesis and biosynthesis of the following Structure of morphine, reserpine, ephedrine, (+) Conin.

UNIT-III
A) STEROIDS:
Occurrence, nomenclature, basic skeleton, Diels hydrocarbon and study of the following hormones, Androsterone, Testosterone, Estrone, Progesterone, Aldosterone and cartisone. Biosynthesis of steroids.
B) PROSTAGLANDINS:
Occurrence, nomenclature, classification, biogenesis and physiological effects, Synthesis of PGE2 and PGF2

UNIT-IV
BIOGENESIS:
Alkaloids (pyridine, morphine and indole type) terpenoids of classes with examples, cholesterol, flavones, coumarins, carbohydrates and proteins.

UNIT-V
VITAMINS:
Synthesis and structure of biotin and vitamin B2, synthesis of vitamin B1, biological functions of B6, B12, folic acid and thiamin.

TEXT AND REFERENCE BOOK

- Apsimon: The total synthesis of natural products.
- P. D B. mayo: The chemistry of natural products

- P.W. Bently: Chemistry of Natural products,
- I. Final: Organic chemistry vol. II and I
- J.B. Hendrickson The molecules of nature.

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Kargi Road, Kota, Bilaspur (C.G.)

SEMESTER- Fourth Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSC4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- ORGANIC CHEMISTRY(ELECTIVE PAPER-IV)
STEREOCHEMISTRY

UNIT-I
STEREOCHEMISTRY OF ORGANIC COMPOUNDS
Molecular chirality and stereochemical nomenclature. Molecules with chiral axes and planes. Molecular shape, topology and optical activity. Atropisomerism and its designation. Racemisation, resolution, prostereoisomerism, stereotopicity and enantiomeric excess. Non-carbon chiral centres. Introduction to chiroptical properties.

UNIT-II
NEWER METHODS OF STEREOSELECTIVE SYNTHESIS
Introduction and stereoselective and stereospecific reactions. Enantioselective synthesis (chiral approach) reactions with hydride donors, hydroboration, catalytic hydrogenation via chiral hydrazones and oxazolines. Sharpless epoxidation. Diels Alder selective synthesis, use of calculations of optical purity and enantiomeric excess.

UNIT-III
a)Conformation and reactivity in acyclic compounds and of cyclohexanes
Stability and reactivity of diastereoisomers. Curtin- Hammett principle,
b) Some aspects of the stereochemistry of ring systems
Stereoisomerism and determination of configuration Stability of rings and ease of rings formation)
c) The shapes of the rings other than six membered: Shapes of five, six, and seven membered rings

UNIT-IV
a) Fused and bridged rings: Fused bicyclic ring systems :
Cis and trans decalins and perhydrophenanthrene. Bridged rings, Nomenclature stereoichemical restrictions, and The Bredt's rule, Reactivities.
b) O.R.D. and C.D. : Types of curves, the axial haloketone rule.
The Octant rule. Determination of conformation and configuration.

UNIT-V
a) Stereochemistry of Allenes, Spiranes and Biphenyls
Assignment of configuration

b) Configuration of diastereomers based on physical and chemical methods.

TEXT AND REFERENCE BOOK

- E.L. Elil: Stereochemistry of carbon compounds
- D. Nasipuri : Stereochemistry: of organic compounds
- P.S. Kalsi: Stereochemistry: conformation and Mechanism.
- Hallas: Organic stereochemistry
- Mislow and Benjamin: Introduction to stereochemistry.

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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSC3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- INORGANIC CHEMISTRY (ELECTIVE PAPER-III)
SEPARATION SCIENCE

UNIT-I
SOLVENT EXTRACTION SEPARATION
Principles of solvent extraction, formation of metal complexes, distribution of extractable species, quantitative treatment of extractable equillibria, Methods of extraction, techniques in extraction, application of diketone, hydroxyquinoline, oximes, dithiocarbamates, xanthets, thiols, macrocyclic polythenes and orgao phosphouous compounds in solvent extraction. Separation of nonmetals and metals.

UNIT-II
CHROMATOGRAPHIC SEPARATION TECHNIQUES
Extraction chromatography, theoretical aspects of extraction chromatography, correlation between solvent extraction and extraction chromatography, techniques in extraction chromatography, chromatographic inert support, stationary phases, use of extraction chromatography for separation of fission products.

UNIT-III
ION EXCHANGE SEPARATION
Fundamental properties of ion exchangers, theories of ion exchange, exchange capacity, screening effect, penetration of electrolytes into the ion exchange resins, sorption of complex ions, ion exchanges equilibrium, column operation, theory of break through curves, elution steps, use of non aqueous solvents in one exchange separation, application of ion exchange separation in determination of total salt concentration, removal of interfering ions, separation of anions and metals.

UNIT-IV
(10+2)
Separation by electrolysis Basic principles, over potentials, electrogravimetry, constant current electrolysis,separation with controlled electrode potentials, constant voltage electrolysis, potentialbuffers, and physical characteristics of metal deposits, internal electrolysis,electrography, electrophoresis, and electro chromatography.

UNIT-V

GAS CHROMATOGRAPHY

Principles of gas chromatography, plate theory of gas chromatography, Instrumentation for gas chromatography, working gas chromatography, application of gas chromatography, programmed temperature chromatography, flow programming chromatography, gas-solid chromatography, and hyphenated techniques in chromatography Problems.

TEXT AND REFERENCE BOOK

- Solvent extraction in analytical A chemistry by G.H. Morrison, F. Frieiser, john Wiley & Sons, NY.
- Sovent extraction Chemistry, Selkine and alegagawa.
- A.I. Vogel, A Text Book of quantitatice Inorganic Analysis. Longmann Green.
- D.A. Skoog & D.M. west, Fundamentals of Analytical Chemistry- holy Rinchart.
- S.M. Khopkar, Basic Concepts of Analytical Chemistry.

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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSC4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- INORGANIC CHEMISTRY (ELECTIVE PAPER-IV)
ORGANOMETALLIC CHEMISTRY

UNIT-I
A] METHYL DERIVATIVES OF METALS
Structures, bonding, classification of methyl derivatives of metals, cleavage of metal carbon bonds, thermochemical consideration.
B] CATALYTIC PROCESSES
Carbonylation, hydrogenation, isomerisation of olefins, olefin oxidation, oligomerization, polymerization.

UNIT-II
ORGANOMETALLIC SYNTHESIS
Radicals + metals, carbonyls, olefins complexes, addition of metal hydrides to unsaturated carbons,, addition of metal alkyls to unsaturated hydrocarbons, substitution reactions, Hydrocarbons + metal Organometallic + metal, mettalation, metal halogen exchange reactions, Mercuration & related covalent metallation reactions of Organometallic compounds with metal salts, reactions of bimetallic compounds and halides, ligand exchange reactions of diazoalkanes with metal hydrides and halides, addition of M-OR to C=c, electrolyte reduction using metal cathode, decarboxylation.

UNIT-III
PROPERTIES OF REACTIONS OF ORGANOMETALLIC COMPOUNDS
Complex formation, reactions with active oxygen compounds, reactions with halogen, reactions with alkyl halides, acid halides, reactions with oxygen, carbonyls and others.

UNIT-IV
Metal carbonyls, isocyanides and acetylides. Preparation, structure, reactions of metal carbonyls with alkyl halides, reactions of metal carbonyls with metal alkyls, cyanides and isocyanides complexes, acetalynide complex adduct formation. Complexes: 2,3,4,5,6 and 7 electron donor carbametallic compounds, aromaticity of cyclopentadienyls.

UNIT-V
TECHNIQUES OF ORGANOMETALLIC CHEMISTRY
Methods of synthetic chemistry, vacuum techniques, inert atmosphere, nonaqueous media, handling and hazards of organ metallic.

TEXT AND REFERENCE BOOK

- Advances in Organometallic Chemistry A. P. Pract Paper No. PCH- 404 A:

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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSC3,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- PHYSICAL CHEMISTRY (ELECTIVE PAPER-III)
SURFACE CHEMISTRY

UNIT I
ADSORPTION AND SURFACE PHENOMENON :
Physisorption and chemisorption , adsorption isotherms, Langmuir and B. E. T. equation and significance in surface area determination, surface films, states of insoluble films, L. B. films and their application, adsorption from solution, adsorption types, surface excess concentration , Gibb's adsorption equation : derivation , significance and experimental verification , catalytic activity of surfaces.

UNIT II
MICELLE :
Surface activity, surface active agents and their classification, micellisation, critical micelle concentration (cmc) thermodynamics of micellisation , factors affecting cmc, methods of determination of cmc , reverse micelle , solubisation of water insoluble organic substances , use of surfactants in oil recovery ,

UNIT III
EMULSION:
Types of emulsion, theories of emulsion and emulsion stability, identification of Emulsion types, inversion emulsion, micro emulsion: theory and application ,

UNIT IV
LIQUID GAS AND LIQUID INTERFACES:
Surface tension, capillary action, methods of determination of surface tension, surface tension across curved surfaces, vapor pressure of droplet (Kelvin equation) , surface spreading , spreading coefficient, cohesion and adhesion energy,contact angle, constant angle hysteresis, wetting and detergency.

UNIT V
SOLID INTERFACES :
Surface energy of solids, adhesion and adsorption, sintering and sintering mechanism, Tammann temperature and its importance, surface structure and Surface composition.

TEXT AND REFERENCE BOOK

- Physical chemistry of surfaces: A.W. Adamson.
- Chemisorptions by B.m.W. Trapnell and H.O. Hayward.
- Introduction to colloide and surface chemistry by D.J. Shaw.
- Theories of chemical reaction rates by A.J.K. laidler
- Surface chemistry by J.J. Bikermann

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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.CHEMISTRY **THEO. MAX. M: 70 MIN. M: 25**
COURSE CODE:-4MSC4,CREDIT-3 **ASSIG. MAX.M: 30 MIN. M: 11**
COURSE:- PHYSICAL CHEMISTRY (ELECTIVE PAPER-IV)
CHEMISTRY OF MATERIALS

UNIT I
GLASSES, CERAMICS, COMPOSITE AND NANOMATERIALS:
Glassy state, glass formers and glass modifiers, applications, Ceramic structures,mechanical properties, clay products. Reformatories,characterizations, properties and applications.Microscopic composites; dispersion - strengthened and particle - reinforced, fibre -reinforced composites, macroscopic composites. Nanocrystline phase, preparationprocedures, special properties, and applications.

UNIT II
HIGH TC MATERIALS :
Defect perovskites, high Tc superconductivity in cuprates, preparation and characterization of 1-2-3 and 2-1-4 materials, and normal state properties; anisotropy; temperature dependence of electrical resistance; optical photon modes,superconducting state; heat capacity; coherence length, elastic constants, positionlifetimes, microwave absorption - pairing and multigap structure in highTc materials , applications of high Tc materials.

UNIT III
POLYMERIC MATERIALS:
Molecular shape , structure and configuration, crystallinity, stress- strain behavior,Thermal behavior, polymer types and their applications, conducting andferro -Electric polymers.

UNIT IV
A)THIN FILMS AND LANGMUIR- BLODGETT FILMS:
Preparation techniques; evaporation / sputtering, chemical processes, MOCVD, sol - gel etc. Langmuir- Blodgett (LB) film, growth techniques, photolithography, properties and application of thin and LB films.

UNIT V
MATERIALS OF SOLID DEVICES:
Rectifiers, transistors, capacitors IV-V compounds, low dimensional quantum Structure; optical properties.

TEXT AND REFERENCE BOOK

- Solid Stte Physics, N.W.Ashcrott and N.D. Merin, Saunders College.
- Material Science and Engineering, An introducation, W.D.Callister, Willey.
- Principals of Solid State, H.V.Keer Willey Eastron.
- Materials Science, J.C.Andterson, K.D.Leaver, J.M.Alexander and R.D.Rawlings, ELBS.
- Thermotropic Liquid Crystals, Ed, G.W.Gray, John Willey.
- Text Book of liquid cristals, kelkar and Halz, Chemie.

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SEMESTER- Fourth Semester

PROGRAMME:- M.SC.CHEMISTRY
COURSE CODE:-4MSC5,CREDIT-4
COURSE:- PROJECT WORK

PRACTICAL MAX.M:140MIN.M:50
VIVA. MAX.M: 60 MIN. M: 22

PROJECT

All the candidates of M.Sc.(Chemistry) are required to submit a project-report based on the work done by him/her during the project period. A detailed Viva shall be conducted by an external examiner based on the project report. Students are advised to see the detailed project related guidelines on the website of CVRU. (www.cvru.ac.in) under Project Guidelines for student section.

Counseling and Study Structure

			Counselling and Study Structure (hours)					
Sl.No.	Course Code	Title of the Course	Credit	Total Hours of Study	Face to Face Counselling	Self study	Practical	Assignments
SEMESTER I								
1	1MSC1	Inorganic Chemistry.-I	3	90	12	51		27
2	1MSC2	Organic Chemistry.-I	3	90	12	51	-	27
3	1MSC3	Physical Chemistry-I	3	90	12	51		27
4	1MSC4	Analytical Chemistry-I	3	90	12	51	-	27
5	1MSC5	Lab-Inorganic Chemistry-I	2	60	8	-	52	-
6	1MSC4	Lab-Physical Chemistry-I	2	60	8	-	52	-
SEMESTER II								
5	2MSC1	Inorganic Chemistry - II	3	90	12	51		27
6	2MSC2	Organic Chemistry.-II	3	90	12	51		27
7	2MSC3	Physical Chemistry-II	3	90	12	51		27
8	2MSC4	Analytical Chemistry-II	3	90	12	51		27
	2MSC5	Lab-Organic Chemistry.-II	2	60	8	-	52	-
	2MSC6	Lab-Analytical Chemistry-II	2	60	8	-	52	-
SEMESTER-III								
9	3MSC1	Application of Spectroscopy	3	90	12	51		27
10	3MSC2	Bio-organic & Bio-inorganic Chemistry	3	90	12	51		27
11	3MSC3	Elective-I	3	90	12	51		27
12	3MSC4	Elective-II	3	90	12	51		27
	3MSC5	Lab General	2	60	8	-	52	-
	3MSC6	Lab Special	2	60	8	-	52	-
SEMESTER-IV								
13	4MSC1	Environmental Chemistry	3	90	12	51		27
14	4MSC2	Photo Chemistry & Solid State Chemistry	3	90	12	51		27
15	4MSC3	Elective-III	3	90	12	51		27
16	4MSC4	Elective-IV	3	90	12	51		27
	4MSC5	Project work	4	120	16	-	104	-

STUDY MODULES AND BOOKS INFORMATION

Course Code	Name of the Course	Books / Module to be used
SEMESTER-I		
1MSCP1	Inorganic Chemistry-I	Module Published by CVRU
1MSCP2	Organic Chemistry-I	Module Published by CVRU
1MSCP3	Physical Chemistry-I	Module Published by CVRU
1MSCP4	Analytical Chemistry-I	Module Published by CVRU
SEMESTER-II		
2MSCP1	Inorganic Chemistry-II	Module Published by CVRU
2MSCP2	Organic Chemistry-II	Module Published by CVRU
2MSCP3	Physical Chemistry II	Module Published by CVRU
2MSCP4	Analytical Chemistry-II	Module Published by CVRU
SEMESTER-III		
3MSCP1	Application of spectroscopy	Module Published by CVRU
3MSCP2	Bio organic & bio inorganic chemistry	Module Published by CVRU
3MSCP3	Elective-I	Module Published by CVRU
3MSCP4	Elective-II	Module Published by CVRU
SEMESTER-IV		
4MSCP1	Environmental Chemistry	Module Published by CVRU
4MSCP2	Photo Chemistry & Solid State Chemistry	Module Published by CVRU
4MSCP3	Elective-III	Module Published by CVRU
4MSCP4	Elective-IV	Module Published by CVRU

DATE SCHEDULE & INSTRUCTIONS FOR SUBMITTING ASSIGNMENTS

DUE DATE OF SUBMISSION OF ALL ASSIGNMENTS AT THE STUDY CENTRE		
Semester	Assignment No.	Due Date
First Semester	1MSC1 1MSC2 1MSC3 1MSC4	• April 30 (for January Session) • October 31 (for July session)
Second Semester	2MSC1 2MSC2 2MSC3 2MSC4	• October 31 (for January Session) • April 30 (for July session)
Third Semester	3MSC1 3MSC2 3MSC3 3MSC4	• April 30 (for January Session) • October 31 (for July session)
Fourth Semester	4MSC1 4MSC2 4MSC3 4MSC4	• October 31 (for January Session) • April 30 (for July session)

Note: Assignments of the course are available for download at the CVRU Website http://www. cvru.ac.in . You can download the assignments as per your course, follow the instructions given and submit it before due dates at the study centre.

INSTRUCTIONS TO STUDENTS FOR FORMATTING THE ASSIGNMENTS
सत्रीय कार्य हेतु छात्रों के लिये निर्देश

1. This booklet contains the assignments for the entire (All Semester) programme. Each course has one assignment. All assignments should be completed and submitted at IODE CVRU/ study centre before the due date.
इस पुस्तिका में पूरे पाठ्यक्रम के लिये (सभी सेमेस्टर) के सत्रीय कार्य दिये गये हैं। प्रत्येक पाठ्यक्रम के लिये एक सत्रीय कार्य दिया गया है जिसे पूर्ण करने के पश्चात निर्धारित तिथि तक डॉ. सी. वी आर.यु के दूरस्थ षिक्षा संस्थान / अध्ययन केन्द्र को भेजना आवश्यक है।

2. Please note that you will not be allowed to appear for the Term End Examinations for the course, until the assignments are submitted before the due date.
कृपया ध्यान रहे जब तक सत्रीय कार्य निर्धारित तिथि तक जमा नहीं होंगे, आप सत्रांत परीक्षा में नहीं बैठ सकेंगे।

3. The assignments constitute the continuous component of the evaluation process and have 30% weightage in the final grading. You need to score minimum marks as per Examinations Scheme of Particular Programmme in assignment in each course in order to clear the continuous evaluation component.
सत्रीय कार्य सतत् मूल्यांकन का महत्वपूर्ण अंग है एवं अन्तिम ग्रेडिंग में 30 प्रतिशत अंक निर्धारित हैं। सतत् मूल्यांकन में उत्तीर्ण करने हेतु प्रत्येक सत्रीय कार्य में संबंधित कार्यक्रम के परीक्षा योजना के अनुसार न्यूनतम अंक प्राप्त करना अनिवार्य है।

4. The assignment should be hand written on a A-4 size paper with proper cover which contains all the required information as given on the next page. You can use the photocopy of the cover for each assignment.
सत्रीय कार्य ए–4 साइज पेपर पर हस्तलिखित होना चाहिए तथा उस पर अगले पृष्ठ पर दिये गये कवर के अनुसार सभी जानकारी लिखी होनी चाहिए। (आप चाहें तो कवर की फोटोप्रति प्रत्येक सत्रीय कार्य पर लगाकर प्रयुक्त कर सकते हैं)

5. Leave at least 4cm margin on the left, top and bottom of your answer sheets for the evaluator's comments.
प्रत्येक पृष्ठ पर बायें, ऊपर एवं नीचे कम से कम 4 सें.मी. जगह छोड़ें जो मूल्यांकनकर्ता अपनी टिप्पणी के लिये प्रयोग करेगा।

6. Your answers should be brief, precise and in your own words. Please do not copy the answers from the study material.
सत्रीय कार्य के प्रश्नों के उत्तर संक्षेप, स्पष्ट एवं स्वयं के शब्दों में होना चाहिए। उत्तर स्टडी मटेरियल की कॉपी नहीं होना चाहिये।

7. Please do not copy the assignment from other student.
कृपया सत्रीय कार्य दूसरे छात्र से कॉपी न करें।

8. While solving the questions, clearly indicate the question number along with the part being solved. Recheck your work before submitting it.
प्रश्नों के उत्तर लिखते समय, प्रश्न संख्या अथवा उसके भाग का स्पष्ट उल्लेख करें। सत्रीय कार्य जमा करते समय एक बार पुनः जांच कर लें।

9. You may retain a copy of your assignment response to avoid any unforeseen situation.
सत्रीय कार्य की एक प्रतिलिपि अपने पास रखें ताकि किसी अनहोनी घटना से बचा जा सके।

10. You can resolve the difficulties you may face while studying the course material by sending an e-mail to Programme coordinator IODE CVRU/ study centre coordinator. However, the coordinator will not provide solutions to the assignment questions, since they constitute an evaluation component.
पाठ्यक्रम सामग्री के अध्ययन के समय यदि कोई कठिनाई होती है तो उसके निराकरण हेतु कार्यक्रम समन्वयक दूरस्थ षिक्षा संस्थान डॉ. सी. वी. रामन् विष्वविद्यालय / अध्ययन केन्द्र के समन्वयक से ई–मेल द्वारा संपर्क किया जा सकता है। परंतु समन्वयक सत्रीय कार्य के प्रश्नों के उत्तर नहीं देंगे क्योंकि ये मूल्यांकन पद्धति के अंग हैं।

Note: Assignments of the course are available for download at the CVRU Website http://www.cvru.ac.in . You can download the assignments as per your course, follow the instructions given and submit it before due dates at the IODE CVRU/study centre.

GUIDELINE FOR PREPARATION AND PRESENTATION OF PROJECT REPORT

INSTITUTE OF OPEN AND DISTANCE EDUCATION
DR. C.V. RAMAN UNIVERSITY
KARGI ROAD, KOTA, DISTT. - BILASPUR
CHHATTISGARH

PROJECT REPORT FORMAT

IODE PROGRAMME

The Project Report consists of three main parts (i) The Preliminaries (ii) The Text (iii) Annexure. It is to be arranged in the following sequence.

THE PRELIMINARIES:

- Title Page (Outer Cover) as per the format given in Annexure III, (should be printed in White Colour on a Navy Blue background).
- Title Page (Inner Cover) as per the format given in Annexure IV
- Declaration by the candidate (Annexure – V)
- Certificate of Supervisor/s (Annexure – VI)
- Acknowledgements (Annexure – VII)
- Table of Contents (Annexure – VIII)
- Abstract/Preface
- List of Tables (If applicable)
- List of Figures (If applicable)
- List of abbreviations (Optional)
- Chapter –I to ….continue according to the table of contents.

THE TEXT OF THE PROJECT REPORT

The text the Project Report is usually divided in to chapter's with subheadings, within the chapters to indicate the orderly progression of topics and their relation to each other

Chapter-I Introduction: - The Project Report should normally begin with a general introduction presenting an overview of the purpose and significance of the study. The introduction should show why the topic selected is worth investigating. This will normally be done with reference to existing research, identifying areas that have not been explored, need to be explored. The final section of the introduction should provide a brief overview of each of the main chapters that the reader will encounter.

Chapter-II Review of Related Literature: - The purpose of the literature review is to summarize, evaluate and compare the main developments and current database in the field which are specifically relevant to the subject of research embodied in the Project Report .

Chapter-III Research Methology: - The supervisor and the student may decide how this part of the Project Report should be structured. Although this section varies depending up on method and analysis technique chosen, the chapter describes and justifies the methods chosen for the study and why this method was the most appropriate.

Chapter-IV Observations & Analysis:- Observations , Analysis and Interpretation should be done as per data collected from sample.

Chapter-V Results Conclusions and Suggestions: The results are actual statement of observations, including statistics, tables and graphs. Do not present the same data as graph as well as table. Use one of the appropriate style of presentation. The purpose of this chapter is not just to reiterate the findings but discuss the observation in relation to the theoretical body of knowledge on the topic.

Bibliography Citation in Text: Citation in the text usually consists of the name of the author(s) and the year of the publication. The page no is added when utilizing a direct quotation. It should be arranged Alphabetically .

Example (i):Thomas.V (2007) identified….

Example (ii): Gould and Brown (1991, p. 14) used the

Example (iii) : Rhoades et. al (2008) define the …..

References: All publications listed in the Project Report should be presented in a list of references, following the sample.

Citation from Project Report :

- Kundur., D. (1999),Mulitresolution Digital Watermarking: Algorithms and Implications for Multimedia Signals. Ph.D Project Report , University of Toronto.

Citation from Journal:

- Clifford, G. D. and Tarassenko.,s L. (2001),One-pass Training of Optimal Architecture Auto-associativeNeural Network for Detecting Ectopic Beats. Electron Letters. 37(18): 1126–1127.
- Rhoades, B.E. (1997), A Comparison of various definitions of Contractive mappings, Trans.Amer.Math.Soc.,Vol. 5, no.3, 257-290.

Citation from Books:

- Thompson, D. ed., (1995),The Concise Oxford Dictionary of Current English. Oxford, UK: Oxford University Press, 9th ed. ISBN No.: 0987654.
- Lindsay, D. (1999),A Guide to Scientific Writing, Melbourne, Chapter 2, Australia: Addison Wesley Longman Australia, 2nd ed. ISBN No.: 12345678.

Citation from Website:

Anonymous, unZign, “Tool for Evaluating a Variety of Watermarks”, http://altern.org/watermark/, (Browsing date: 23rd September 1997)
Publication of the University of Geneva (on digital watermarking): <http:// cuiwww.unige.ch/˜vision/Publications/watermarking_publications.html> (Browsing Date: 4thJanuary 2006)

Citation from patent:

Gustafsson J. K. (1976), “Analog-digital converter for a resistance bridge”, Patent U. S. 3960010, June 1,.
References must be given alphabetically in References section and in text as …..
Clifford. G. D. and Tarassenko. L. (2001) suggested that……

Appendices:

- Questionnaire /Formula /Diagnosis/Any other Supporting Documents

GUIDELINES FOR WRITING :-

1. Font size For English **Font size For Hindi**

Title Page	18-24	18-24
Headings / subheadings	12-16	16-20
Text	12	14
Footnotes	8-10	10-12

Footnotes be given on the same page where reference is quoted

2. Type style

Times New Roman for English Kruti dev 10 for Hindi

3. Margins.

At least 1¼ -1½ inches (3.17-3.81cm) on the left-hand side, 3/4 - 1 inch (2 - 2.54cm) at the top and bottom of the page, and about ½ - 0.75 inches (1.27 - 1.90cm) at the outer edge. The best position for the page number is at top-center or top right ½ inch (1.27 cm) below the edge. Pages containing figures and illustration should be suitable paginated.

4. The *Project Report* shall be computer typed (**English**- British, Font Style -Times Roman, Size-12 point, **Hindi-** Font Style -Krutidev-10,Size-14) and printed on A4 size paper.

5. The *Project Report* shall be typed on one side only with double space with appropriate margin.

6. Use only standard abbreviations. Avoid abbreviations in the title. The full term for which an abbreviation stands should precede its first use in the text except in case of measurement units. The measurement units if any shall be followed consistently.

7. Maintain uniformity in writing the *Project Report* .

8. All copies of the *Project Report* are to be bound in colored hard cover (according to color code) of the *Project Report* .

9. The final submission of the *Project Report* shall be in 03 hard bound copies and 01 soft copy (MS Word) in a CD along with all the corrections and suggestions as recommended before.

ANNEXURE-III (Outer cover

THE TITLE OF THE PROJECT REPORT IN THE OUTER COVER SHALL LOOK EXACTLY LIKE THIS TITLE

(Font: Times New Roman, Size:16, Bold, Line Spacing: 1 ½, Centered)

{Here put a gap of 4 lines}

Project Report submitted to

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of one line}

<University's logo>

INSTITUTE OF OPEN AND DISTANCE EDUCATION

Dr. C.V. Raman University

Kota, Bilaspur (C.G.)

(Font: Times New Roman, Size: 14, Bold, centered)

{Here put a gap of one line}

For the award of the degree of

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of one line}

PROGRAMME NAME

(Font: Times New Roman, Size: 14, Bold, centered)

{Here put a gap of two lines}

by

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of two lines}

<NAME OF THE STUDENT>

(Font: Times New Roman, Size: 14, Bold, centered)

Registration No.: <>

(Font: Times New Roman, Size: 12, Bold, centered)

<Year>

(Font: Times New Roman, Size: 12, Bold, centered)

(Font: Times New Roman, Size: 10, Bold, Centered)

ANNEXURE-IV(Inner cover)

THE TITLE OF THE PROJECT REPORT IN THE INNER COVER SHALL LOOK EXACTLY LIKE THIS TITLE

(Font: Times New Roman, Size:16, Bold, Line Spacing: 1 ½, Centered)

{Here put a gap of 4 lines}

Project Report submitted to

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of one line}

INSTITUTE OF OPEN AND DISTANCE EDUCATION

Dr. C.V. Raman University

Kota, Bilaspur (C.G.)

(Font: Times New Roman, Size: 14, Bold, centered)

{Here put a gap of one line}

For the award of the degree

of

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of one line}

PROGRAMME NAME

(Font: Times New Roman, Size: 14, Bold, centered)

{Here put a gap of two lines}

by

(Font: Times New Roman, Size: 12, Bold, centered)

{Here put a gap of two lines}

<NAME OF THE STUDENT>

(Font: Times New Roman, Size: 14, Bold, centered)

Under the Guidance of

(Font: Times New Roman, Size: 12, Bold, centered)

<NAME OF THE SUPERVISOR/S>

(Font: Times New Roman, Size: 14, Bold, centered)

<Year>

(Font: Times New Roman, Size: 12, Bold, centered)

(Font: Times New Roman, Size: 10, Bold, Centered)

ANNEXURE-V

DECLARATION

I the undersigned solemnly declare that the Project Report entitled "**title of the work**" is based on my own work carried out during the course of my study under the supervision of < name of supervisor >.

I assert that the statements made and conclusions drawn are an outcome of my research work. I further certify that

i. The work contained in the Project Report is original and has been done by me under the general supervision of my supervisor (s).

ii. The work has not been submitted to any other Institute for any other Degree/Diploma/Certificate in this University or any other University of India or abroad.

iii. I have followed the guideline provided by the University in writing the Project Report.

iv. I have conformed to the norms and guidelines given in the concerned Ordinance of the University.

v. Whenever I have used materials (data, theoretical analysis, and text) from other sources, I have given due credit to them by citing them in the text of the Project Report and giving their details in the references.

vi. Whenever I have quoted written materials from other sources, I have put them under quotation marks and given due credit to the sources by citing them and giving required details in the references.

(Name & Signature of the Student)

Registration No.

ANNEXURE-VI

CERTIFICATE

This is to certify that the work incorporated in the Project Report entitled " title of the Project Report " is a record of own work carried out by **<Name of Student >** under my supervision for the award of degree of **Programme Name** of Institute of Open and Distance Education Dr. C.V. Raman University, Bilaspur (C.G.)-India.

To the best of my knowledge and belief the Project Report :

i. Embodies the work of the candidate himself/herself,

ii. Has duly been completed.

iii. Is up to the desired standard both in respect of contents and language for being referred to the examiners.

Supervisor-

(Name and signature of the Supervisor
With designation and Name of Organization)

(Signature of Academic Coordinator)

(Seal of IODE)

ANNEXURE-VII

ACKNOWLEDGEMENT

Acknowledgements should be brief and should not exceed one page. Acknowledgements should be duly signed by the candidate. Gratitude may be expressed to only those who really contributed to the work directly or indirectly. Name of student should appear at the bottom of the page.

SAMPLE ACKNOWLEDGEMENT

It is a matter of immense pleasure to express the overwhelming sense of gratitude, devotion, incontestable regards to my esteemed & learned guides <…….> who have striven to perfect my project report.

……

……

……..

Finally, I express my indebtedness to all who have directly or indirectly contributed to the successful completion of my project work.

< Name of Student >

ANNEXURE-VIII

TABLE OF CONTENTS

Note