

## **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 Gol, 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)
- NAAC B+

□

## 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
- 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 comprises:

- **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 learner 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](http://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](mailto:cvrussd@gmail.com)

### **LEARNER SUPPORT DESK:**

Phone: 07753253872, 07753-253873, 8359050061

Email: [cvrussd@gmail.com](mailto:cvrussd@gmail.com)

# **PROGRAMME GUIDE**

## **DISTANCE EDUCATION PROGRAMMES**

---

### **BACHELOR OF SCIENCE (B.Sc.) -MATHS**

---

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



**INSTITITUTE OF OPEN AND DISTANCE EDUCATION (IODE)**  
**DR. C.V.RAMAN UNIVERSITY**

KARGI ROAD, KOTA, BILASPUR, CHATTISGARH

PHONE : 07753-253851, 8827920016, 8827920019 FAX : 07753-253728

E-mail: [cvrussd@gmail.com](mailto:cvrussd@gmail.com), Website: [www.cvru.ac.in](http://www.cvru.ac.in)

**BACHELOR OF SCIENCE (B.Sc.) – Maths Group**

Duration : 36 Months

Eligibility : 12<sup>th</sup> in Mathematics

**SCHEME OF EXAMINATION**

Course Code	Name of the Course	Credit	Total Marks	Theory		Practical Marks		Assignments	
				Max	Min	Max	Min	Max	Min
<b>First Semester</b>									
1BSC1	Hindi Language Structure - I	2	50	35	12	-	-	15	5
1BSC2	Entrepreneurship Development	2	50	35	12	-	-	15	5
1BSC3	Physics-I	4	150	70	23	50	17	30	10
1BSC4	Chemistry-I	4	100	70	23	50	17	30	10
1BSC5	Mathematics-I	4	150	70	23	-	-	30	10
<b>Total</b>		<b>16</b>	<b>500</b>	<b>280</b>	<b>101</b>	<b>100</b>	<b>36</b>	<b>120</b>	<b>43</b>
<b>Second Semester</b>									
2BSC1	English Language and Indian Culture	2	50	35	12	-	-	15	5
2BSC2	Development of Entrepreneur	2	50	35	12	-	-	15	5
2BSC3	Physics-II	4	150	70	23	50	17	30	10
2BSC4	Chemistry-II	4	100	70	23	50	17	30	10
2BSC5	Mathematics-II	4	150	70	23	-	-	30	10
<b>Total</b>		<b>16</b>	<b>500</b>	<b>280</b>	<b>101</b>	<b>100</b>	<b>36</b>	<b>120</b>	<b>43</b>
<b>Third Semester</b>									
3BSC1	Hindi Language aur Samvedana	2	50	35	12	-	-	15	5
3BSC2	Environmental Studies	2	50	35	12	-	-	15	5
3BSC3	Physics-III	4	150	70	23	50	17	30	10
3BSC4	Chemistry-III	4	150	70	23	50	17	30	10
3BSC5	Mathematics-III	4	100	70	23	-	-	30	10
<b>Total</b>		<b>16</b>	<b>500</b>	<b>280</b>	<b>101</b>	<b>100</b>	<b>36</b>	<b>120</b>	<b>43</b>
<b>Fourth Semester</b>									
4BSC1	English Language and Scientific Temper	2	50	35	12	-	-	15	5
4BSC2	Environmental Study	2	50	35	12	-	-	15	5
4BSC3	Physics-IV	4	150	70	23	50	17	30	10
4BSC4	Chemistry-IV	4	150	70	23	50	17	30	10
4BSC5	Mathematics-IV	4	100	70	23	-	-	30	10
<b>Total</b>		<b>16</b>	<b>500</b>	<b>280</b>	<b>101</b>	<b>100</b>	<b>36</b>	<b>120</b>	<b>43</b>
<b>Fifth Semester</b>									
5BSC1	Hindi Language (Bhasha Kaushal aur Sanchar Sadhan)	2	50	35	12	-	-	15	5
5BSC2	Computer & Information Technology Basics-I	2	100	35	12	50	17	15	5
5BSC3	Physics-V	4	150	70	23	50	17	30	10
5BSC4	Chemistry-V	4	150	70	23	50	17	30	10
5BSC5	Mathematics-V	4	100	70	23	-	-	30	10
<b>Total</b>		<b>16</b>	<b>550</b>	<b>280</b>	<b>101</b>	<b>150</b>	<b>54</b>	<b>120</b>	<b>43</b>
<b>Six Semester</b>									
6BSC1	English Language and Aspects of Development	2	50	35	12	-	-	15	5
6BSC2	Computer & Information Technology Basics-II	2	100	35	12	50	17	15	5
6BSC3	Physics-VI	4	150	70	23	50	17	30	10
6BSC4	Chemistry-VI	4	150	70	23	50	17	30	10
6BSC5	Mathematics-VI	4	100	70	23	-	-	30	10
<b>Total</b>		<b>16</b>	<b>550</b>	<b>280</b>	<b>101</b>	<b>150</b>	<b>54</b>	<b>120</b>	<b>43</b>



### **Evaluation Scheme**

1. 33% in each theory, practical, project, dissertation & internal assessment but the total Aggregate for passing is 36%.



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

SEMESTER- **First Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 35 MIN. M: 12**

**COURSE CODE: IBSC1, CREDIT:-2**

**ASSIG. MAX.M: 15 MIN. M: 05**

**COURSE: -HINDI LANGUAGE STRUCTURE – I**

**इकाई-1**

भारत वंदना (काव्य) सूर्यकांत त्रिपाठी 'निराला'  
जाग तुझकों दूर जाना सुश्री महादेवी वर्मा  
स्वतंत्रता पुकारती (काव्य) जयशंकर 'प्रसाद'  
हम अनिकेतन (काव्य) बालकृष्ण शर्मा 'नवीन'  
भाषा की महत्ता और उसके विविध रूप  
भाषा-कौशल

**इकाई-2**

करुणा (निबंध) आचार्य रामचन्द्र शुक्ल  
समन्वय की प्रक्रिया (निबंध) रामधारी सिंह 'दिनकर'  
विच्छेदी बुआ (कहानी) डॉ. लक्ष्मण विष्ट 'बटरोही'  
अनुवाद परिभाषा प्रकार , महत्व, विशेषताएं  
हिन्दी की शब्द-संपदा  
परिभाषिक शब्दावली

**इकाई-3**

विलायत पहुंच ही गया (आत्मकथांश) महात्मा गांधी  
अफसर (व्यंग्य) शरद जोषी  
तीर्थयात्रा (कहानी) डॉ. मिथिलेश कुमार मिश्र  
मकड़ी का जाला (व्यंग्य) डॉ. रामप्रकाश सक्सेना  
वाक्य-संरचना: तत्सम, तद्धव देशज विदेशी

**इकाई-4**

अप्य दीपो भव (वक्तृत्व कला) स्वामी श्रद्धानंद  
भारत का सामाजिक व्यक्तित्व (प्रस्तावना) जवाहरलाल नेहरू  
पत्र मैसूर के महाराजा को (पत्र-लेखन) स्वामी विवेकानंद  
बनी रहेंगी किताबें (आलेख) डॉ. सुनीता रानी घोष  
पत्र-लेखन: महत्व और उसके विविध रूप  
सड़क पर दौड़ते ईहा मृंग (निबंध) डॉ. श्यामसुन्दर दुबे

**इकाई-5**

योग की शक्ति (डायरी) डॉ. हरिवंशराय बच्चन  
कोश के अखाड़े में कोई पहलवान नहीं उतरता (साक्षात्कार) भाषाविद् डॉ. हरदेव बाहरी से प्रो. त्रिभुवननाथ शुक्ल  
नीग्रो सैनिक से भेंट (यात्रा-संस्मरण) डॉ. देवेन्द्र सत्यार्थी

यदि बा न होती तो शायद गांधी को  
यह ऊँचाई न मिलती (साक्षात्कार) 5 कथाकार  
सर-लेखन, भाव-पल्लवन साक्षात्कार और कौशल

गिरिराज किशोर से सत्येन्द्र शर्मा

### **TEXT AND REFERENCE BOOK**

- भारतीयता के अमर स्वर, मध्य प्रदेश हिन्दी ग्रंथ अकादमी



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **First Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 35 MIN. M: 12**

**COURSE CODE: 1BSC2, CREDIT:-2**

**ASSIG. MAX.M: 15 MIN. M: 05**

**COURSE: - ENTERPRENEUSHIP DEVELOPMENT**

**Unit-I**

Entrepreneurship-

Definition, Characteristics and importance, Types and functions of an entrepreneur, merits of a good entrepreneur motivational factors of entrepreneurship.

**Unit-II**

Motivation to achieve targets and establishment of ideas. Setting targets and facing challenges. Resolving problems and creativity. Sequenced planning and guiding capacity, Development of self confidence.

Communication skills, Capacity to influence, leadership.

**Unit-III**

Project Report- Evaluation of selected process. Detailed project report - Preparation of main part of project report pointing out necessary and viability.

Selecting the form of Organization: Meaning and characteristics of sole Proprietorship, Partnership and cooperative committees, elements affecting selection of a form of an organization.

Economic management -Role of banks and financial institutions banking, financial plans, working capital-evaluation and management, keeping of accounts.

**Unit IV**

Production management - Methods of purchase. Management of movable assets/goods. Quality management. Employee management. Packing.

Marketing management Sales and the art of selling. Understanding the market and market policy. Consumer management. Time management.

**Unit-V**

Role of regulatory institutions - district industry centre, pollution control board, food and drug administration, special study of electricity development and municipal corporation.

Role of development organizations, khadi & village Commission/ Board, State Finance Corporation, scheduled banks, MP Women's Economics Development Corporation.

Self-employment-oriented schemes, Prime Minister's Employment schemes, Golden Jubilee Urban environment scheme, Rani Durgavati Self-Employment scheme, Pt. Deendayal Self-employment scheme.

Various grant schemes - Cost-of-Capital grant, interest grant, exemption from entry tax, project report, reimbursement grant, etc.

Special incentives for women entrepreneurs, prospects & possibilities.

Schemes of Tribal Finance Development Corporation, schemes of Antyavasai Corporation, schemes of Backward Class and Minorities Finance Development Corporation.

### **TEXT AND REFERENCE BOOK**

- Entrepreneurship development, K. Ramachandran, Publication- TMH Publishers.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **First Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 70 MIN. M: 23**

**COURSE CODE: 1BSC3, CREDIT:-4**

**ASSIG. MAX.M: 30 MIN. M: 10**

**COURSE:- PHYSICS-I**

**Unit-1 Mechanics:** Laws of motion, motion in a uniform field, components of velocity and acceleration in different coordinate systems. Uniformly rotating frame, centripetal acceleration, Coriolis force and its applications. Motion under a central force, Kepler's laws.

Gravitational law and field,. Potential due to a spherical body, Gauss & Poission's Equation of Gravitational self-energy System of. particles,, centre, of mass, equation of motion, conservation of linear and angular, momentum, conservation of energy, single stage and multistage rockets, elastic and inelastic collisions.

**Unit-2 Oscillations:** Potential well and. periodic oscillations, case of harmonic oscillations, differential equation and its solution, kinetic and potential energy, simple harmonic oscillations and its examples, spring and mass system, Vibrations of a magnet, oscillations of two masses connected by a spring.

Rigid Body Motion rotational motion, moments of inertia and their products, principal moments and axes, Euler's equations simple and compound pendulum tensional pendulum, bifilar oscillations, Helmholtz resonator,LC circuit.

**Unit-3 Superposition Of Harmonic Motion :** Superposition of two simple harmonic motions of the same frequency along the same line, interference, superposition of two mutually perpendicular simple harmonic vibrations of the same frequency, Lissajous figures, case of different frequencies. Two coupled oscillators, normal modes, N coupled oscillators, damped harmonic oscillators, power dissipation, quality factor and their examples, driven harmonic oscillator; transient and steady states, power absorption, resonance in systems with many degrees of freedom.

**Unit-4 Properties of matter:** Elasticity, small deformations, Hook's Law, elastic constants for an isotropic solid, beams supported at both the ends, cantilever, torsion of a cylinder bending moments and shearing forces.

Kinematics of moving fluids, equations of continuity Euler's equation, Bernoulli's theorem , viscous fluids, streamline and turbulent flow, Poiseulle's law, Capillary tube flow, Reynold's number, Stokes law Surface tension and surface energy molecular interpretation of surface tension, pressure on a curved liquid surface wetting.

**Unit-5 Motion of charged Particles in Electric and Magnetic Fields :** (note : The emphasis here should be on the mechanical aspects and not on the details of the apparatus mentioned which are indicated as applications of principles involved.) E as an accelerating field, electron gun, case of discharge tube, linear accelerator. E as deflecting field- CRO, sensitivity of CRO. Transverse B field; 180° deflection, mass spectrograph or velocity selector curvatures of tracks for energy determination for nuclear particles; principles of a cyclotron.

Mutually perpendicular E and E fields- velocity selector, its resolution. Parallel E and B fields; positive ray parabolas, discovery of isotopes, elements of mass spectrographs, principle of magnetic focusing (lenses).

### **TEXT AND REFERENCE BOOK**

- “Mechanics” J.C. Upadhyay, (Prgati Prakasan meerut)
- “Mechanics” D.S. Mathur, S. Chand & co. Delhi
- “Vibration and Waves” K.K. Srivastava, Anusandhan Prakashan Kanpur
- “Oscillations and Waves” Satya Prakash, Prgati Prakasan meerut
- “Sound”. Khanna and Bedi
- “Unified Physics” R. P. Goyal, Shiv Lal Agrawal & co. Agra
- “Properties of Matter” N. Subramanayam, S. Chand & co. Delhi
- “Prabodh Bhoutiki” Kher, Choube & Upadhyay Yugbodh offset Pvt. Ltd. Raipur
- “A text book of sound” N. Subramanayam, & Brijlal, Vikash publishing HousePvt. Ltd. Delhi
- “Yugbodh Physics Patel & Verma” Yugbodh Prakashan Raipur



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

SEMESTER- **First Semester**

**PROGRAMME: BACHELOR OF SCIENCE (B.SC MATHS) PRACTICAL MAX.M:50MIN.M:17**

**COURSE CODE: IBSC3, CREDIT:-4**

**COURSE:- PRACTICAL PHYSICS-I**

1. Study of laws of parallel and perpendicular axes for moment of inertia.
2. Study of a compound pendulum.
3. Study of damping of a bar pendulum under various mechanics.
4. Study of oscillations under a bifilar suspension.
5. Study of bending of a cantilever or a beam.
6. Study of torsion of a wire (static and dynamic methods)
7. Study of conservation of momentum in two dimensional oscillations.
8. Potential energy curves of a 1-Double system and oscillations in it for Various amplitudes.
9. Study of oscillations of mass under different combinations of springs.
10. Study of flow of liquids through capillaries.
11. Determination of surface tension of a liquid by different methods.
12. Study of viscosity of a fluid by methods.

### **TEXT AND REFERENCE BOOK**

- Practical Physics, Dr. S.L. Gupta & Dr. V. Kumar, Pragti Prakashan Meerut
- Degree level practical Physics, Sharma, Singh & Prashad, Bharti Bhawan Publication Patna-6.
- Experiment in Engineering Physics-M.N. Awadhanulu, A.A. Dani & P.M. Pokle, S.Chand Pub. New Delhi.
- Prabodh Prayogik Bhoutiki, Dr. P.K.Upadhayay, Yugbodh offset Pvt. Ltd. Raipur
- A text book of Engineering Physics Practical Das, Robinson & Kumar University Science press New Delhi
- Practical Phywsics, Chattopadhyay





## **Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **First Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 70 MIN. M: 23**

**COURSE CODE: IBSC4, CREDIT:-4**

**ASSIG. MAX.M: 30 MIN. M: 10**

**COURSE: - CHEMISTRY-I**

### **Unit I**

A. Mathematical Concepts : Logarithmic relations, curves stretching, linear graphs and calculation of slopes, Differentiation of functions like  $Kx$ ,  $ex$ ,  $xn$ ,  $\sin x$ ,  $\log x$ ; maxima and minima, partial differentiation and reciprocity relations. Integration of some useful/relevant functions; permutations and combinations. Factorials, Probability.

B. Gaseous States : Deviation from ideal behaviour, van der Waals equation of state. Critical phenomenon : PV isotherms of ideal gases, continuity of states, the isotherms of van der Waals equations, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of states.

### **Unit II**

A. Liquid State : Intermolecular forces, structure of liquids (a qualitative description) Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholesteric phases. Thermography and seven segment cell.

B. Colloidal State : Definition of colloids, classification of colloids. Solids in liquids (sols): properties- kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze law, gold number. Liquids in liquids (emulsions) : types of emulsions, preparation. Emulsifier. Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids.

### **Unit III**

Chemical Kinetics : Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction concentration, temperature, pressure, solvent, light and catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions- zero order, first order, second order, pseudo order, half life and mean life. Determination of the order of reaction - differential method, method of integration, method of half life period and isolation method.

Experimental methods of chemical kinetics - conductometric, potentiometric, optical methods- polarimetry and spectrophotometry. Theories of chemical kinetics: effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis) Expression for the rate constant based on equilibrium constant and thermodynamic aspects.

#### Unit IV

A. Structure and Bonding : Hybridizations, Bond lengths and bond angles, bond energy : Localized and delocalized chemical bond, van-der Waals interactions, inclusion compounds, clathrates, charge transfer complexes, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

B. Mechanism of Organic reactions : Curved arrow notations, drawing electron movements with arrows, half-headed and double headed arrows, homolytic and heterolytic bond breaking.

C. Types of Reagents : Electrophiles and nucleophiles. Types of organic reactions. Energy consideration. Reactive intermediates- carbocations, carbanions, free radicals and carbenes. Methods of determination of reaction mechanism.

#### Unit V

A. Stereochemistry : Concept of isomerism, types of isomerism, optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centres, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, mesocompounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configurations, sequence rule, D & L , R & S systems of nomenclature. E and Z system of Nomenclature geometrical isomerism in alicyclic compounds. Conformation, conformational analysis of ethane and n-butane. Conformations of cyclohexanes, axial and equatorial bonds, Newman projection and Sawhorse formulae, Fischer and Flying wedge formulae.

#### TEXT AND REFERENCE BOOK

- Inorganic Chemistry (Part-I, Part-II), R.L. Dutta, NBS Publication.
- Unified Chemistry, Dr.M.M.Tandon, Shivrish Agrawal & Comp.
- Synthetic Organic Chemistry, O.P.Agrawal, Krishna Prakashan Media Ltd.
- Physical Chemistry, K.L.Kapoor, Macmillan Pub. India, Ltd



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **First Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

PRACTICAL MAX.M:50MIN.M:17

COURSE CODE: **1BSC4**, CREDIT:-4

COURSE: - PRACTICAL CHEMISTRY-I

Duration of practicals during the entire semester : 90 hours

Duration of practical during the semester examination : 4 hours

Physical Chemistry

A. (Any one experiment will be asked in examination form the following carrying 12 Marks)

1. Calibration of thermometer
2. Determination of melting point
3. Determination of boiling point
4. Determination of mixed melting point
5. Preparation of solutions of various concentrations, NaOH, HCl, H<sub>2</sub>SO<sub>4</sub>.

B. (Any one experiment will be asked in examination form the following carrying 12 Marks)

1. To determine the velocity constant (specific reaction rate) of hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
2. To study the effect of acid strength on the hydrolysis of an ester.
3. To compare the strength of HCl and H<sub>2</sub>SO<sub>4</sub> by studying the kinetics of hydrolysis of ester.
4. To study kinetically the reaction rate of decomposition of iodide by H<sub>2</sub>O<sub>2</sub>.
5. Determination of surface tension / percentage composition of given organic mixture using surface tension method.
6. Determination of viscosity / percentage composition of given organic mixture using viscosity method.

Organic chemistry

(Any one experiment will be asked in examination form the following carrying 12 Marks)

1. Distillation

2. Crystallization
3. Decolourisation and crystallization using charcoal
4. Sublimation

Viva: 6 marks

Records: 8 marks

### **TEXT AND REFERENCE BOOK**

- Unified Practical Chemistry, Dr. M.M.Tandon, ShivalalAgrawal& Com.
- Unified Chemistry, Tandon, Rathore, Agrawal, ShivalalAgrawal& Com.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **First Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 70 MIN. M: 23

COURSE CODE: **IBSC5**, CREDIT:-4

ASSIG. MAX.M: 30 MIN. M: 10

COURSE:-**MATHEMATICS-I**

**Unit-1**

Rank of a matrix. Eigen values, eigen vectors.Characteristic equation of a matrix. Cayley Hamilton theorem and its use in finding inverse of marix. Application of matrix to a system of linear ( both homogenous and non - homogenous) equations. Theorems on consistency and inconsistency of a system of linear equations. Solving the linear equations with three unknowns. Relation between the roots and coefficients of a general polynomial equation in one variable. Transformation of equations, Descarte's rule of signs.

**Unit-2**

De Moivre's theorem and its application. Direct and inverse circular and hyperbolic functions, Expansion of trigonometrical function. Gregory's Series, Summation of Series,

**Unit-3**

Definition and basic properties of group. Order of an element of a group. Subgroups, algebra of subgroups. Cyclic groups and their simple properties. Coset decomposition and related theorems. Lagrange's theorem and its consequences, Normal sub groups, quotient groups.

**Unit-4**

Homomorphism and isomorphism of groups, kernel of Homomorphism and fundamental theorem of Homomorphism of groups Permutation groups (even and odd permutations) Alternating groups  $A_n$ , Cayley's theorem. Introduction to rings, subrings, integral domains and fields, simple properties and examples.

**Unit-5**

General equation of second degree. Tracing of conics. Equation of cone with given base, generators of cone, condition for three mutually perpendicular generators, Right circular cone. Equation of Cylinder and its properties. Right circular cylinder, enveloping cylinder and their properties Central conicoids, Paraboloids. Plane sections of Conicoids.

**TEXT AND REFERENCE BOOK**

- H.K. Pathak Algebra & Trignometry,Geometry; Shiksha Sahitya a Prakashan,Meeret.

- P.B. Bhattacharya, S.K. Jain & S.R. Nagpaul Abstract algebra, Cambridge University.
- K.B. Dutta, Matrix & Linear algebra, Pvt. Lmt.
- B.R. Thakur, Algebra & Geometry.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Second Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 35 MIN. M: 12**

**COURSE CODE: 2BSC1, CREDIT:-2**

**ASSIG. MAX.M: 15 MIN. M: 05**

**COURSE: - ENGLISH LANGUAGE AND INDIAN CULTURE**

**UNIT – I**

1. Amalkanti : Nirendranath Chakrabarti
2. Sita : Toru Dutt
3. Tryst with Destiny : Jawaharlala Nehru
4. Delhi in 1857 : Mirza Ghalib
5. Preface to the Mahabharata : C., Rajagopalachari
6. Where the Mind is Without Fear : Rabindranath Tagore
7. A Song of Kabir : Translated by Tagore
8. Satyagraha : M.K. Gandhi
9. Toasted English : R.K. Narayan
10. The Portrait of a Lady : Khushwant Singh
11. Discovering Babasaheb : Ashok Mahadevan

**Unit – II** Comprehension

**Unit – III** Composition and Paragraph Writing (Based on expansion of an idea).

**Unit – IV** Basic Language Skills : Vocabulary – Synonyms, Antonyms, Word Formation, Prefixes and Suffixes, Words likely to be confused and Misused, Words similar in Meaning or Form, Distinction between Similar Expressions, Speech Skills.

**Unit – V** Basic Language Skills : Grammar and usage – The Tense Forms, Propositions, Determiners and Countable/Uncountable Nouns, Verb, Articles, Adverbs.

**TEXT AND REFERENCE BOOK**

- Essentials of English Grammar by Sultan Chand & Sons
- English Grammar and Composition by Wren & Martin
- Scholar's Senior English Grammar and Composition, T.R. Bhanot, H. Martin, Scholar Publishing House (P) Ltd.
- English Language and Indian Culture, published by M. P. Hindi Granth Academy



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Second Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 35 MIN. M: 12**

**COURSE CODE: 2BSC2, CREDIT:-2**

**ASSIG. MAX.M: 15 MIN. M: 05**

**COURSE: - DEVELOPMENT OF ENTREPRENEURSHIP**

**Unit - I** Entrepreneurship – Meaning, Concept, Characteristics of entrepreneur.

**Unit – II** Types of entrepreneurship, importance and views of various thinkers (Scholars).

- Formation of goals, How to achieve goals.
- Problems in achieving targets and solution.
- Self motivation, elements of self motivation and development
- Views of various scholars, evaluation, solutions.

Leadership capacity : Its development and results.

**Unit – III** Projects and various organizations (Govt., non-Govt), Govt. Projects, Non-Govt.projects.

Contribution of Banks, their limitations, scope.

**Unit – IV** Functions, qualities, management of a good entrepreneur.

Qualities of the entrepreneur (Modern and traditional).

Management skills of the entrepreneur.

Motive factors of the entrepreneur.

**Unit – V** Problems and Scope of the Entrepreneur:

- Problem of Capital
- Problem of Power
- Problem of registration
- Administrative problems
- Problems of Ownership.

**TEXT AND REFERENCE BOOK**

- Entrepreneurship development, K. Ramachandran, Publication- TMH Publishers.





## **Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Second Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 70 MIN. M: 23**

**COURSE CODE: 2BSC3, CREDIT:-4**

**ASSIG. MAX.M: 30 MIN. M: 10**

**COURSE: - PHYSICES-II**

### **Unit-1 Mathematical Background**

Scalars and vectors, dot and cross products, triple vector product, gradient of scalar field and its geometrical Interpretation divergence and curl of a vector field, line, surface and volume integrals, flux of a vector field, Gauss's divergence theorem. Green's theorem and Stoke's theorem.

Functions of two and three variables, partial derivatives, geometrical interpretation of partial derivatives of functions of two variables. Total differential of a function of two and three variables, higher order derivative, and its applications.

Repeated integrals of a function of more than one variable, definition of a double and triple integral, evaluation of double and triple integrals as repeated integrals, change of variables of integration, Jacobian applications.

### **Unit-2 Electrostatics**

Coulombs law in vacuum expressed in vector forms, calculations of E for simple distributions of charge at rest, dipole and quadrupole fields. Work done on a charge in an electrostatic field expressed as a line Integral, conservative nature of the electrostatic field. Electric potential  $E = -\vec{\nabla} \phi$ , torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, Gaussian pillbox, fields at a surface of a conductor, screening of E field by a conductor.

Capacitors, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field, point charge in front of a grounded infinite conductor. Dielectrics, parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector, and displacement vector D, molecular interpretation of Clausius-Mossotti equation, boundary conditions satisfied by E and D at the interface between two homogenous : Dielectrics, illustration through a simple example.

### **Unit-3 Electric Currents**

Steady current, current density J, non-steady currents and continuity equation, Kirchoff 's laws and analysis of multiloop circuits, rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits. AC circuits, complex numbers and their applications solving AC circuits Problems, complex impedance and reactance, series and parallel resonance.,

Q factor, power consumed by an A.C. circuit, power factor, Y and A networks and transmission of electric power.

#### **Unit-4 Magnetostatics:**

Force on a moving charge: Lorentz force equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio, Biot and Savart's Law, calculation of H for simple geometrical situations, Ampere's Law,  $\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$ ,  $\vec{\nabla} \cdot \vec{B} = 0$ ; Field due to a magnetic dipole magnetization current magnetization vector, Half order field, magnetic permeability (linear cases), interpretation of a bar magnet as a surface distribution of solenoidal current.

#### **Unit-5 Time Varying Fields :**

Electromagnetic induction, Faraday's Laws, electromotive force  $\mathcal{E} = \int \vec{E} \cdot d\vec{l}$ , integral and differential forms of Faraday's laws. self and mutual inductance transformers, energy in a static magnetic field. Maxwell's displacement current, Derivations of Maxwell's equations, electromagnetic field energy density., Poynting's vector. The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, reflection at a plane boundary of dielectrics, polarization by reflection and total internal reflection. Faraday effect, waves in a conducting medium, reflection and refraction by the ionosphere.

#### **TEXT AND REFERENCE BOOK**

- Electromagnetic Fields”. A.M. Portis
- “Principles of Electricity and Magnetism” Pugh and Pugh, India Book House, Delhi.
- “Unified Physics” R. P. Goyal
- Prabodh Bhoutiki” Kher, Choube & Upadhyay. Yugbodh Offset Pvt. Ltd. Raipur.
- Electricity and Magnetism , Mahajan & Rangwala TMH New Delhi
- Electricity and Magnetism, JC Upadhyay, H.P. Sinha & S Upadhyay, Ram Prasad & Sons Agra
- Foundation of magnetism & Electricity, DN Vashudeva S. Chand & Co. Delhi
- Elements of Physics-Electrostatics, DP Singh & K Rai , Scientific book co. Patna.
- Elements of Physics-Electricity, DP Singh & K Rai , Scientific book co. Patna
- Elements of Vector Calculus, N. Sharma & R Prasad, Pothywala Pvt. Ltd. Allahabad
- Electricity and Magnetism, Arora, Saxena & Prakash, Pragati Prakashan Meerut.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Second Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50MIN.M:17**

**COURSE CODE: 2BSC3, CREDIT:-4**

**COURSE: - PRACTICAL PHYSICS-II**

1. Characteristics of a ballistic galvanometer
2. Setting up and using an electroscope or electrometer.
3. Measurement of low resistance by Carey-Foster bridge or otherwise;
4. Measurement of inductance using impedance at different frequencies.
5. Measurement of capacitance using, impedance at different frequencies.
6. Response curve for LCR circuits and response frequencies.
7. Sensitivity of a cathode- ray oscilloscope
8. Use of a vibration magnetometer to study a field
9. Study of B field due to a current.
10. Study of decay of currents in LR and RC circuits.

**TEXT AND REFERENCE BOOK**

- Practical Physics, Dr. S.L. Gupta & Dr. V. Kumar, Pragti Prakashan Meerut
- Degree level practical Physics, Sharma, Singh & Prashad, Bharti Bhawan Publication Patna-6.
- Experiment in Engineering Physics-M.N. Awadhanulu, A.A. Dani & P.M. Pokle, S.Chand Pub. New Delhi.
- Prabodh Prayogik Bhoutiki, Dr. P.K.Upadhayay, Yugbodh offset Pvt. Ltd. Raipur
- A text book of Engineering Physics Practical Das, Robinson & Kumar University Science press New Delhi
- Practical Physics, Chattopadhyay



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Second Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 70 MIN. M: 23

COURSE CODE: **2BSC4**, CREDIT:-4

ASSIG. MAX.M: 30 MIN. M: 10

COURSE: - CHEMISTRY-II

**Unit I**

A. Atomic Structure : Idea of de Broglie's matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrödinger wave equation, significance of  $l$  and  $m_l$ , quantum numbers, radial and angular wave functions and probability distribution curves, effective nuclear charge.

B. Periodic Properties : Atomic and ionic radii, ionization energy, electron affinity and electronegativity : definition, method of determination, trends in periodic table and applications.

C. Chemical Bonding : Covalent bond- valence bond theory and its limitations, directional characteristic of covalent bond. Hybridization and shapes of simple molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theory to  $\text{NH}_3$ ,  $\text{SF}_4$ ,  $\text{ClF}_3$ ,  $\text{ICl}_2$  - and  $\text{H}_2\text{O}$ .

**Unit II**

A. Molecular Orbital theory for homonuclear and heteronuclear ( $\text{CO}$  and  $\text{NO}$ ) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and the bond energy, % ionic character from dipole moment and electronegativity difference. Weak interactions, hydrogen bonding, van der Waals forces.

B. Ionic Solids : Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, Lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarizability of ions. Fajan's rule, Metallic bond, free electron, Valence bond and Band theories.

C. Noble Gases : Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

**Unit III**

A. s-Block Elements : Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls.

B. p-Block Elements : Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16.

Hydrides of boron-diborane and higher boranes. Borazine, borohydrides. Fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens.

#### **Unit IV**

A. Arenes and Aromaticity : Nomenclature of benzene derivatives. The aryl group, Aromatic nucleus and side chain structure of benzene, molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure. MO picture. Aromaticity the Huckel rule, aromatic ions. Aromatic electrophilic substitution, general pattern of the mechanism, role of s and p complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents. orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction. Methods of formation and chemical reactions of alkylbenzenes and biphenyl.

#### **Unit V**

A. Cycloalkenes, Dienes and alkynes : Methods of formation, conformation and chemical reactions of cycloalkenes, nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions - 1,2 and 1,4 additions, Diels-Alder reaction. Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroborationoxidation and polymerization.

B. Alkyl and Aryl Halides : Nomenclature and classes of alkyl halides, methods of formation, chemical reactions; mechanisms of nucleophilic substitution reaction of alkyl halides, SN2 and SN1 reactions with energy profile diagrams.

#### **TEXT AND REFERENCE BOOK**

- Inorganic Chemistry (Part-I, Part-II), R.L. Dutta, NBS Publication.
- Unified Chemistry, Dr.M.M.Tandon, Shivrish Agrawal & Comp.
- Synthetic Organic Chemistry, O.P.Agrawal, Krishna Prakashan Media Ltd.
- Physical Chemistry, K.L.Kapoor, Macmillan Pub. India, Ltd



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

SEMESTER- **Second Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50MIN.M:17**

**COURSE CODE: 2BSC4, CREDIT:-4**

**COURSE: - PRACTICAL CHEMISTRY-II**

Macro/Semi-micro Analysis- Cation analysis, separation and identification of ions from group I-VI, anion analysis

Separation of cations by paper chromatography. 4 marks

Preparation of ferrous alum. 8 marks

Organic Chemistry: (12 marks )

1. Detection of elements (N, S and halogens) 2 elements, 4 marks

2. Functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and aniline) in simple organic compounds.

2 functional groups: 8 marks

Viva: 6 marks

Records: 8 marks

### **TEXT AND REFERENCE BOOK**

- Unified Practical Chemistry, Dr. M.M.Tandon, ShivalalAgrawal & Com.
- Unified Chemistry, Tandon, Rathore, Agrawal, ShivalalAgrawal & Com.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Second Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 70 MIN. M: 23**

**COURSE CODE: 2BSC5, CREDIT:-4**

**ASSIG. MAX.M: 30 MIN. M: 10**

**COURSE: - MATHEMATICS -II**

**Unit-1** CONCEPT OF PARTIAL DIFFERENTIATION, SUCCESSIVE DIFFERENTIATION, LEIBNITZ THEOREM, MACLAURIN AND TAYLOR SERIES EXPANSIONS, ASYMPTOTES AND CURVATURE, TESTS FOR CONCAVITY AND CONVEXITY, POINTS OF INFLEXION. MULTIPLE POINTS. TRACING OF CURVES IN CARTESIAN AND POLAR CO-ORDINATES

**Unit-2** Integration of irrational algebraic functions and transcendental functions. Reduction formulae. Definite Integrals. Quadrature, Rectification, Volumes and Surfaces of solids of revolution of curves.

**Unit-3** Linear equations and equations reducible to the linear form, Exact differential equation First order higher degree equations for  $x$ ,  $y$ ,  $p$ , Clairaut's form and singular solutions. Linear differential equations with constant coefficients.

**Unit-4** Homogenous linear ordinary differential equations, linear differential equations of second order. Transformation of the equation by changing the dependent variable and the independent Variable, Method of variation of parameters, Ordinary simultaneous differential equations.

**Unit-5** Vector differentiation. Gradient, Divergence and Curl. Vector integration, Theorem of Gauss (without proof) and problems based on it. Theorem of Green (without proof ) and problems based on it. Stoke's theorem (without proof ) and problems based on it.

**TEXT AND REFERENCE BOOK**

- P.K. Jain & S.K. Kaushik, An introduction to Real Analysis. New Delhi.
- Shanti Narayan, Vector Calculus, X.Chand & Co. New Delhi
- N., Sharan & S.N. Nigam, Introduction to Vector Analysis, Pvt. Ltd. Alahabad.
- H.K. Pathak Calculus.
- Gorakh Prasad, Differential calculus, Pothishala Pvt. Ltd.



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

SEMESTER- **Third Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 35 MIN. M: 12**

**COURSE CODE: 3BSC1, CREDIT:-2**

**ASSIG. MAX.M: 15 MIN. M: 05**

**COURSE: - HINDI LANGUAGE AUR SAMVEDENA**

इकाई .एक

1. आचरण की सभ्यता : सरदार पूर्ण सिंह
2. जवानी (काव्य) : श्री माखनलाल चतुर्वेदी
3. विज्ञान : परिभाषा, शाखाएँ, संक्षिप्त इतिहास
4. सपनों की उड़ान : ए. पी.जे अब्दुल कलाम
5. प्रमुख वैज्ञानिक आविष्कार और हमारा जीवन
6. त्रुटि संशोधन

इकाई .दो

1. शिरीष के फूल-निबंध : आचार्य हजारी प्रसाद द्विवेदी
2. विकास का भारतीय मॉडलर: धर्मपाल
3. निबंध लेखन की कला
4. संधि.समास : संरचना और प्रकार
5. निराला : संस्मरण - महादेवी वर्मा

इकाई .तीन

1. मांडव (यात्रा वृत्तांत): पं. रामनारायण उपाध्याय
2. हिन्दी भाषा का मानकीकरण
3. भारतीय कृषि
4. जीवन : उद्भव और विकास
5. जनजातीय जीवन
6. उसने कहा था (कहानी) : श्री चन्द्रधर शर्मा गुलेरी

इकाई .चार

1. महाजनी सभ्यता (निबंध) : प्रेमचन्द
2. मुहावरे और लोकोक्तियाँ
3. सौर मण्डल
4. ब्रह्मण्ड और जीवन



5. शिकागो (व्याख्या) : स्वामी विवेकानंद

6. संक्षिप्तियां

इकाई .पांच

1. मध्यप्रदेश एवं छत्तीसगढ़ के पर्यटन स्थल
2. फिल्टर तो चाहिए ही. डॉ. देवेन्द्र दीपक
3. भारतीय वनस्पतियाँ और जीव
4. भोलाराम का जीवन (व्यंग्य) हरिशंकर परसाई
5. टाँगन का पंछी : विद्यानिवास मिश्र

### **TEXT AND REFERENCE BOOK**

- हिन्दी भाषा एव संवेदना , मध्य प्रदेश हिन्दी ग्रंथ अकादमी



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Third Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 35 MIN. M: 12**

**COURSE CODE: 3BSC2, CREDIT:-2**

**ASSIG. MAX.M: 15 MIN. M: 05**

**COURSE: - ENVIRONMENTAL STUDIES**

**UNIT – I Study of Environmental and ecology :**

- (a) Definition and Importance.
- (b) Environmental Pollution and problems.
- (c) Public participation and Public awareness.

**UNIT – II Environmental Pollution :**

- (a) Air, water, noise, heat and nuclear pollution.
- (b) Causes, effect and prevention of pollution.
- (c) Disaster management – Flood, Earthquake, cyclones and landslides.

**UNIT – III Environment and social problems :**

- (a) Development – non-sustainable to Sustainable.
- (b) Energy problems of cities.
- (c) Water preservation – rain-water collection.

**UNIT – IV Role of mankind in conserving natural resources :**

- (a) Food resources – World food problem.
- (b) Energy resources – increasing demand for energy.
- (c) Land resources – Land as resources.

**UNIT – V Environment conservation laws :**

- (a) Conservation laws for air and water pollution.
- (b) Wildlife conservation laws.
- (c) Role of information technology in protecting environment & health.

**TEXT AND REFERENCE BOOK**

- Environmental Science & Engineering, R.Anandan R. Kumaravelan, Scitech Publication (India) Pvt. Ltd.
- Environment & Ecology, Dr. J.P.Sharma, Laxmi Publication.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Third Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 70 MIN. M: 23

COURSE CODE: **3BSC3**, CREDIT:-4

ASSIG. MAX.M: 30 MIN. M: 10

COURSE: - PHYSICS-III

**Unit-1 Kinetic Theory of Gases: Ideal Gas:** Kinetic model, deduction of Boyle's law, interpretation of temperature, estimation of rms speeds of molecules. Brownian motion, estimate of the Avogadro number. Law of Equipartition of energy, specific heat of monatomic gas, extension to di- and tri- atomic gases, behavior at low temperatures. Adiabatic expansion of an ideal gas, applications to atmospheric physics.

Real Gas: Van der Waals gas, Equation of state, nature of Van der Waals forces, comparison with experimental P-V curves. The critical constants; gas and vapour. Joule expansion of ideal gas and Vander Waals gas, Joule coefficient, estimates of J-T cooling.

Liquefaction of gases: Boyle temperature and inversion temperature. Principle of regenerative cooling, liquefaction of hydrogen and helium. Refrigeration cycle, meaning of efficiency.

**Unit-2 Thermodynamics:** The laws of thermodynamics: The Zeroth law, various indicator diagrams, works done by and on the system, first law of thermodynamics, internal energy as a state function and other applications. Reversible and irreversible changes, Carnot cycle and its efficiency, Carnot theorem and the second law of thermodynamics, Different versions of the second law, practical cycles used in internal combustion engines. Entropy, principle of increase of entropy.

The thermodynamic scale of temperature; its identity with the perfect gas scale. Impossibility of attaining the absolute zero; third law of thermodynamics.

Thermodynamic relationships: Thermodynamic variables: extensive and intensive, Maxwell's general relationships, application to Joule – Thomson cooling and adiabatic cooling in a general system, Clausius-Clapeyron Latent heat equation.

Thermodynamic potentials and equilibrium of thermodynamical systems, relation with thermodynamical variables. Cooling due to adiabatic demagnetization, Production and measurement of very low temperatures.

**Unit-3 Statistical Physics:** The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a priori probabilities, probability distribution and its narrowing with increase in number of particles. The expressions for average properties. Constrains, accessible and inaccessible states, distribution of particles with a given total energy into a discrete set of energy states.

Some universal laws: The  $\mu$  space representation, division of  $\mu$  space into energy states and into phase cells of arbitrary size, applications to one-dimensional harmonic oscillator and free particles. Equilibrium between two systems in thermal contact, bridge with macroscopic physics. Probability and entropy, Boltzmann entropy relation. Statistical interpretation of second law of thermodynamics. Boltzmann canonical distribution law and its applications; Rigorous form of equipartition of energy.

**Unit-4 Maxwellian distribution of speeds in an ideal gas:** Distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines. Black Body

Radiation :Pure temperature dependence, Stefan-Boltzmann law, pressure of radiation, Spectral distribution of Black Body radiation. Wien's displacement law, Rayleigh-Jean's law, the ultraviolet catastrophe, Planck's quantum postulates,

Planck's law, complete fit with experiment. Interpretation of behaviour of specific heats of gases at low temperature .

**Unit-5 Quantum Statistics:** Transition to quantum statistics; “h” as a natural constant and its implications, cases of particle in a one dimensional box and one-dimensional harmonic oscillator. Indistinguishability of particles and its consequences, Bose- Einstein and Fermi-Dirac conditions; applications to liquid helium, Free electrons in a metal, and photons in blackbody chamber. Fermi level and Fermi energy. Transport Phenomena : Transport phenomena in gases; Molecular collisions, mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure.

### TEXT AND REFERENCE BOOK

- “Thermal Physics” G.G. Agarwal and H.P. Sinha, Ram Prasad & Sons , Agra.
- “Heat and Thermodynamics” Satya Prakash and Singhal, Pragati Prakashan Meerut.
- “Unified Physics” R. P. Goyal ,Shivlal, Agrawal & Co. Agra.
- ”Introduction to Statistical Mechanics” B. B. Laud (MacMillan, 1981).
- “Statistical Physics” F. Reif (Tata McGraw-Hill, 1988).
- “Statistical Physics” K. Huang (Wiley Eastern K. Huang, 1988).
- "Praboth Bhoutiki" Kher, Choube , & Upadhyay, Yugboth Offset Pvt. , Ltd, Raipur.
- Statistical Physics " S.K.Sinha , Narosa Pub. Kolkatta.



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

SEMESTER- **Third Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50MIN.M:17**

**COURSE CODE: 3BSC3, CREDIT:-4**

**COURSE: - PRACTICAL PHYSICS-III**

List of Experiments:

1. Study of conversion of mechanical energy into heat
2. Heating efficiency of electrical kettle with varying voltages.
3. Study of temperature dependence of spectral density of radiation
4. Resistance thermometry
5. Thermo-emf thermometry
6. Conduction of heat through poor conductors of different Geometries.
7. Experimental study of probability distribution for a two-option system using a coloured dice.
8. Study of statistical distributions on nuclear disintegration data.

**TEXT AND REFERENCE BOOK**

- Practical Physics, Dr. S.L. Gupta & Dr. V. Kumar, Pragti Prakashan Meerut
- Degree level practical Physics, Sharma, Singh & Prashad, Bharti Bhawan Publication Patna-6.
- Experiment in Engineering Physics-M.N. Awadhanulu, A.A. Dani & P.M. Pokle, S.Chand Pub. New Delhi.
- Prabodh Prayogik Bhoutiki, Dr. P.K.Upadhayay, Yugbodh offset Pvt. Ltd. Raipur
- A text book of Engineering Physics Practical Das, Robinson & Kumar University Science press New Delhi
- Practical Phywsics, Chattopadhyay



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Third Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 70 MIN. M: 23

COURSE CODE: **3BSC4**, CREDIT:-4

ASSIG. MAX.M: 30 MIN. M: 10

COURSE: - CHEMISTRY-III

**UNIT I Thermodynamics-1** Definition of thermodynamic terms: System, surrounding, Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.

First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's Law: Joule Thomson coefficient and inversion temperature.

Calculation of  $w$ ,  $q$ ,  $dU$  and  $dH$  for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process. Thermochemistry: Standard state, standard enthalpy of formation: Hess's Law of heat summation and its application. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermochemical data, temperature dependence of enthalpy, Kirchoff's equation.

Second Law of Thermodynamics- Need for the law, different statements of the law, Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature.

**UNIT II**

**Thermodynamics-II** (a) Concept of entropy: Entropy as a state function, entropy as a function of  $P$  &  $T$ , entropy change in physical change, Clausius inequality, entropy as criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data, Gibbs and Helmholtz functions, Gibbs function ( $G$ ) and Helmholtz function ( $A$ ) as a thermodynamic quantities,  $A$  and  $G$  as a criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of  $G$  and  $A$  with  $P$ ,  $V$  and  $T$ .

(b) Chemical equilibrium Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chateliers's principle. Reaction isotherm and reaction isochore: Clapeyron equation and Clausius- Clapeyron equation, applications.

(c) Buffers: Mechanism of buffer action, Henderson-Hazel equation, Hydrolysis of salts.

(d) Corrosion: types, theories and methods of combating it.

### Inorganic Chemistry

**UNIT III Chemistry of elements of I transition series:** Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds such as carbides, oxides and sulphides. Complexes illustrating relative stability of their oxidation states, coordination number and geometry chemistry of elements of II and III transition series: General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry

**UNIT-IV (a) Coordination Compounds:** Werner's coordination theory and its experimental verification, EAN Concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, VBT of transition metal complexes.

(b) Oxidation and Reduction: Use of redox potential data, analysis of redox cycle, redox stability in H<sub>2</sub>O: Frost, Latimer and Pourbaix diagram. Principles involved in the extraction of elements.

### Organic Chemistry

**UNIT-V (a) Electromagnetic Spectrum:** Absorption Spectra; UV absorption spectroscopy: Absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation.

Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones. IR absorption spectroscopy; molecular vibrations, Hook's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

(b) Alcohols: Classification and nomenclature. Monohydric alcohols: nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding, acidic nature, reactions of alcohols. Dihydric alcohols: nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)<sub>4</sub> and HIO<sub>4</sub>] and pinacole-pinacolone rearrangement. Trihydric alcohols-nomenclature and methods of formation, chemical reactions of glycerol

(c) Phenols: Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols: resonance stabilization of phenoxide ion. Reactions of phenols: electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Manasse reaction and Riemer-Tiemann reaction

(d) Ethers and Epoxides Nomenclature of ethers and methods of their formation, physical properties. Chemical reactions: cleavage and auto oxidation. Ziesel's method. Synthesis of epoxides. Acid and base-catalysed ring opening of epoxides, orientation of epoxide ring opening, reaction of Grignard and organolithium reagents with epoxides.

### TEXT AND REFERENCE BOOK

- Inorganic Chemistry (Part-I, Part-II), R.L. Dutta, NBS Publication.
- Unified Chemistry, Dr. M.M.Tandon, Shival Agrawal & Comp.
- Synthetic Organic Chemistry, O.P.Agrawal, Krishna Prakashan Media Ltd.
- Physical Chemistry, K.L.Kapoor, Macmillan Pub. India, Ltd



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Third Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50MIN.M:17**

**COURSE CODE: 3BSC4, CREDIT:-4**

**COURSE: - PRACTICAL CHEMISTRY-III**

Time: 6 hours

Inorganic Chemistry 18 marks

Calibration of the fractional weights, pipettes and burettes. Preparation of standard solutions. Dilution of 0.1 M to 0.001 M solutions.

Quantitative analysis -Volumetric analysis.

- (a) Determination of acetic acid in commercial vinegar using NaOH.
- (b) Determination of alkali content- antacid tablet using HCl.
- (c) Estimation of calcium content in chalk as calcium oxalate by permagnometry.
- (d) Estimation of hardness of water by EDTA

Gravimetric analysis:

Barium as barium sulphate

Organic Chemistry Laboratory Techniques 18 marks

A. Thin layer chromatography

Determination of R<sub>f</sub> values and identification of organic compounds.

- (a) Separation of green leaf pigments (spinach leaves may be used).
- (b) Preparation and separation of 2,4-dinitrophenylhydrazones of acetone, 2-butanone, hexane-2 and 3-one using toluene and light petroleum (40:6).
- (c) Separation of a mixture of dyes using cyclohexane and ethylacetate (8:5:1.5). B. Paper chromatography: Ascending and Circular Determination of R<sub>f</sub> values and identification of organic compounds
  - (a) Separation of a mixture of phenylalanine and glycine, alanine and aspartic acid, leucine and glutamic acid. Spray reagent ninhydrin.
  - (b) Separation of a mixture of DL-alanine, glycine and L-leucine using nbutanol: acetic acid: water (4:1:5). Spray reagent ninhydrin.
  - (c) Separation of monosaccharides- a mixture of D-galactose and Dfructose using n-butanol: acetone: water (4:1:5). Spray reagent-aniline hydrogen phthalate.



**TEXT AND REFERENCE BOOK**

- Experiments & calculations in chemistry, Dr.S.S.Dara, S.Chand& Company Lmt.
- Unified Chemistry, Dr. M.M.N. Tandon, ShivalalAgrawal& Com.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Third Semester**

**PROGRAMME: BACHELOR OF SCIENCE (B.SC MATHS)**

**THEO. MAX. M: 70 MIN. M: 23**

**COURSE CODE: 3BSC5, CREDIT:-4**

**ASSIG. MAX.M: 30 MIN. M: 10**

**COURSE: - MATHEMATICS-III**

**PRACTICAL MAX.M:50MIN.M:17**

**Unit -1** Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion . Series of non-negative terms. Comparison test, Cauchy's integral test, Ratio test. Raabe's test ,logarithmic test. Leibnitz's theorem. Absolute and conditional convergence.

**Unit -2** Continuity of functions of one variable , sequential continuity. Properties of continuous functions. Uniform continuity. Chain rule of differentiability. Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives. Limit and continuity of functions of two variables.

**Unit -3** Series Solution of Differential Equations-Power series Method, Bessel's Equation Bessel's function and its properties, recurrence and generating relations. Legendre's

**Unit -4** Laplace transformations, Linearity of the Laplace transformation, Existence theorem of Laplace transforms, Laplace transforms of derivatives and integrals. Shifting theorem . Differentiation and integration of transforms. Inverse Laplace transforms, Convolution theorem. Applications of Laplace transformation in solving linear differential equations with constant coefficients.

**Unit -5** Analytical conditions of equilibrium of Coplanar forces. Catenary. Forces in three dimensions. Velocities and accelerations along Radial and transverse direction

**TEXT AND REFERENCE BOOK**

- H.K.Pathak, Calculus & Differential equation & Mechanics.
- B.R. Thakur, Differential equation.
- Erwin Kreyzing, Advanced Engineering Mathematics, New York.
- S.C.Malik, mathematical Analysis, Wiley esterm, Ltd New Delhi.
- P.K.Jain & S.K.Kaushik, An introduction to Real Analysis, Chand & Co. New Delhi.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Fourth Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 35 MIN. M: 12

COURSE CODE: **4BSC1**, CREDIT:-2

ASSIG. MAX.M: 15 MIN. M: 05

COURSE: -ENGLISH LANGUAGE AND SCIENTIFIC TEMPER

**UNIT – I**

1. Tina Morris : Tree
2. Nissim Ezekiel : Night of the Scorpion
3. C.P. Snow : Ramanujan
4. Roger Rosenblatt : The Power of WE
5. George Orwell : What is Science?
6. C.Rajagopalachari: Three Questions
7. Desmond Morris : A short extract from the Naked Ape
8. A.G. Gardiner : On the rule of the road

**UNIT – II** Comprehension of an unseen passage.

**UNIT – III** Letter Writing : Formal Letters, Informal letters, Applications.

**UNIT – IV** Report Writing.

**UNIT – V** Language Skills

Correction of common errors in sentence structure : usage of pronouns, subject/ verb agreement word order, gender; compound nouns, collective nouns, possessives, articles and prepositions. (advanced)

**TEXT AND REFERENCE BOOK**

- Essentials of English Grammar by Sultan Chand & Sons
- English Grammar and Composition by Wren & Martin
- Scholar's Senior English Grammar and Composition, T.R. Bhanot, H. Martin, Scholar Publishing House (P) Ltd.
- English Language and Scientific Temper- Madhya Pradesh Hindi Granth Academy



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

SEMESTER- **Fourth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 35 MIN. M: 12**

**COURSE CODE: 4BSC2, CREDIT:-2**

**ASSIG. MAX.M: 15 MIN. M: 05**

**COURSE: -ENVIRONMENTAL STUDY**

:

**UNIT – I Problem of natural resources**

- (a) Problem of water resources – Utilization of surface and ground water, over utilization, flood, drought, conflicts over water, dams-benefits and problem.
- (b) Problems of forest resources – uses and over utilization, deforestation, utilization of timber, dams and its effect on forests and tribes.
- (c) Problems of land resources – Land as a source, erosion of land, man-induced landslides and desertification.

**UNIT – II Bio-diversity and its protection –**

- (a) Value of bio-diversity – Consumable use : Productive use, Social, alternative, moral aesthetic and values.
- (b) India as a nation of bio-diversity and multi-diversity at global, national and local levels.
- (c) Threats to bio-diversity – Loss of habitat, poaching of wildlife, man-wildlife conflicts.

**UNIT – III Human Population and Environment**

- (a) Population growth, disparities between countries.
- (b) Population explosion, family welfare Programme.
- (c) Environment and human health.

**UNIT – IV Multidisciplinary nature of environmental studies :**

- (a) Natural resources
- (b) Social problems and the environment
- (c) Eco system.

**UNIT – V Environmental Wealth :**

- (a) Rivers, ponds, fields and hills.
- (b) Rural, Industrial, Agricultural fields.

(c) Study of common plants, insects and birds.

**TEXT AND REFERENCE BOOK**

- Environment & Ecology, P.K.Pandey, Goel Publication.
- Environment & Ecology, Dr.J.P.Sharma, Laxmi Publication.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Fourth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 70 MIN. M: 23**

**COURSE CODE: 4BSC3, CREDIT:-4**

**ASSIG. MAX.M: 30 MIN. M: 10**

**COURSE: - PHYSICS-IV**

**Unit-1**

Waves: waves in media ; speed of transverse waves on a uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves, typical measurements. waves over liquid surface ; gravity waves and ripples. group velocity and phase velocity, their measurements.

Superposition of waves : Linear homogeneous equations and the superposition principle, idea of nonlinear waves, non-validity of superposition principle and consequences. Standing waves ,Standing waves as normal modes of bounded systems, examples, harmonics and the quality of sound , examples. Chladni's figures and vibrations of a drum. Production and detection of ultrasonic and infrasonic waves and applications.

**Unit-2** Acoustics: Noise and Music , The human ear and its responses , limits of human audibility, intensity and loudness, bel and decibel, the musical scales, temperament and musical instrument.

Reflection, refraction and diffraction of sound; Acoustic impedance of a medium, percentage reflection and refraction at a boundary, impedance matching for transducers, diffraction of sound, principle of a sonar system, sound ranging.

Applied acoustics : Transducers and their characteristics. Recording and reproduction of sound, various systems, measurements of frequency, waveform, intensity and velocity. The acoustics of halls, reverberation period, Sabine's formula.

**Unit-3** Geometrical Optics: Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications. General theory of image formation: cardinal points of an optical system, general relationships for thick lens and lens combinations, Lagrange equation of magnification, telescopic combinations, telephoto lenses and eyepieces.

Aberration in images: Chromatic aberrations, achromatic combination of lenses in contact and separated lenses. Monochromatic aberrations and their reductions; aspherical mirrors and Schmidt corrector plates, aplanatic points, oil immersion objectives, meniscus lens. Optical instruments: Entrance and exit pupils, need for a multiple lens eyepiece, common types of eyepieces.

**Unit-4** Interference: Interference of light; The principle of superposition, twoslit interference, coherence requirement for the sources, optical path retardations, lateral shift of fringes, Rayleigh refractometer and other applications. Localised fringes; thin films, interference by a film with two non-parallel reflecting surfaces, Newton's rings.

Haidinger fringes ( Fringes of equal inclination). Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines. Intensity distribution in multiple beam interference, Fabry-Perot interferometer and etalon.

**Unit-5** Fresnel Diffraction : Fresnel half period zones, plates, straight edge, rectilinear propagation.

Fraunhofer Diffraction: Diffraction at a slit, phasor diagram and integral calculus methods, the intensity distribution, diffraction at a circular aperture and a circular disc, resolution of images, Rayleigh criterion, resolving power of telescope and microscope. Outline of phase contrast microscopy.

Diffraction & Polarization : Diffraction gratings: Diffraction at N parallel slits, intensity distribution, plane diffraction grating, reflection grating and blazed gratings. Concave grating and different mountings. Resolving power of a grating and comparison with resolving powers of prism and of a Fabry-Perot etalon.

Double refraction and optical rotation: Refraction in uniaxial crystals, its electro magnetic theory. Phase retardation plates, double image prism. Rotation of plane of polarization, origin of optical rotation in liquids and in crystals

### **TEXT AND REFERENCE BOOK**

- "Physical Optics". A.K. Ghatak, TMH, New Delhi.
- "Optics and Atomic Physics" ( D.P. Khandelwal Himalaya Publishing House, Bombay, 1988).
- "Fundamental of Optics" Jankins and white(Tata McGraw – Hill)
- Praboth Bhoutiki , "Kher , Choube & Upadhyay", Yugbodh Publication, Raipur.
- "Optics". B.K. Mathur.
- "Vibration and Waves" K K. Srivastava, Anusandhan Publication, Kanpur.
- "Oscillations and Waves" Satya Prakash, Pragati Publication Agra.
- "Sound". Khanna and Bedi
- "Unified Physics" R. P. Goyal, Shivrulal, Agrawal & Co. Agra.
- "A Text Book of Sound" N. Subrahmanyam & Brij Lal ,Vikash Pub.New Delhi.
- Acoustics , Durga Prasad,Student Friends Pub. Patna.
- Optics , P.K.Shrivastava , Epsilon Publishing House Kanpur.



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

SEMESTER- **Fourth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50MIN.M:17**

**COURSE CODE: 4BSC3, CREDIT:-4**

**COURSE: - PRACTICAL PHYSICS-IV**

List of Experiments:

1. Study of interference using biprism.
2. Study of diffraction at straight edge.
3. Use of diffraction grating and it's resolving limit.
4. Resolving power of telescope.
5. Polarization by reflection.
6. Study of optical rotation.
7. Refractive index and dispersive power of prism using spectrometer.
8. Speed of waves on a stretched string
9. Measurement of sound intensities with different situation
10. Characteristics of a microphone & loudspeaker system.

### **TEXT AND REFERENCE BOOK**

- Practical Physics, Dr. S.L. Gupta & Dr. V. Kumar, Pragati Prakashan Meerut
- Degree level practical Physics, Sharma, Singh & Prashad, Bharti Bhawan Publication Patna-6.
- Experiment in Engineering Physics-M.N. Awadhanulu, A.A. Dani & P.M. Pokle, S.Chand Pub. New Delhi.
- Prabodh Prayogik Bhoutiki, Dr. P.K.Upadhayay, Yugbodh offset Pvt. Ltd. Raipur
- A text book of Engineering Physics Practical Das, Robinson & Kumar University Science press New Delhi
- Practical Phywsics, Chattopadhyay





## **Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Fourth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 70 MIN. M: 23**

**COURSE CODE: 4BSC4, CREDIT:-4**

**ASSIG. MAX.M: 30 MIN. M: 10**

**COURSE: - CHEMISTRY-IV**

### **UNIT I**

Phase equilibrium Statement and the meaning of the terms: phase component and the degree of freedom, derivation of the Gibbs phase rule. Phase equilibria of one component system: water, CO<sub>2</sub> and S system. Phase equilibria of two component system: solid liquid equilibria, simple eutectic: Bi-Cd, Pb-Ag system, desilverisation of lead.

Partial miscible liquids: Phenol-water, trimethylamine–water and nicotine-water systems. Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, steam distillation, Nernst distribution law: thermodynamic derivation, applications.

### **UNIT-II**

Electrochemistry Electrical transport- conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of specific conductance and equivalent conductance with dilution.

Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number: Definition and determination by Hittorf method and moving boundary method. Application of conductivity measurements: determination of degree of dissociation, determination of K<sub>a</sub> of acids, determination of solubility product of sparingly soluble salt, conductometric titrations.

Definition of pH and pK, determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods.

**UNIT III** (a) Chemistry of Lanthanides Elements: electronic structure, oxidation states, ionic radii and lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds.

(b) Chemistry of Actinides: General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, Similarities between the later actinides and later lanthanides.

(c) Acids and Bases: Arrhenius, Brønsted-Lowry, Lux-Flood, Solvent system and Lewis concepts of acids and bases.

(d) Non-aqueous Solvents: Types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid NH<sub>3</sub> and liquid SO<sub>2</sub>

#### **UNIT IV**

(a) Aldehydes and ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes and ketones from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol perkin and knovenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction.

(b) Carboxylic Acids: Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids, reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction.

Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: Methods of formation and effect of heat and dehydrating agents. Methods of formation and chemical reactions of halo acids, hydroxyl acids, malic, tartaric and citric acids.

#### **UNIT- V**

Organic Compounds of Nitrogen Preparation of nitroalkanes and nitroarenes. Chemical reaction of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media, Picric acid.

Halonitroarenes: reactivity, structure and nomenclature. Structure and nomenclature of amines, physical properties and stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Amine salt as phase transfer catalysts. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-Phthalamide reaction, Hoffmann bromamide reaction, Reactions of amines, electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acid. Synthetic transformation of aryl diazonium salts, azo coupling.

#### **TEXT AND REFERENCE BOOK**

- Inorganic Chemistry (Part-I, Part-II), R.L. Dutta, NBS Publication.
- Unified Chemistry, Dr.M.M.Tandon, Shivrati Agrawal & Comp.
- Synthetic Organic Chemistry, O.P.Agrawal, Krishna Prakashan Media Ltd.
- Physical Chemistry, K.L.Kapoor, Macmillan Pub. India, Ltd



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

SEMESTER- **Fourth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50MIN.M:17**

**COURSE CODE: 4BSC4, CREDIT:-4**

**COURSE: - PRACTICAL CHEMISTRY-IV**

Time: 6 hour

Organic Chemistry 12 marks

Qualitative analysis

Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.

Physical Chemistry 12 marks

Transition temperature

1. Determination of transition temperature of given substance by thermometric, dilatometric method (e.g.) ( $MnCl_2 \times 4H_2O/SrBr_2 \times 2H_2O$ ).

Phase equilibrium

1. To study the effect of solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquid (e.g., phenol water system) and to determine the concentration of that soluble in phenol water system.

2. To construct the phase diagram of two component (e.g., diphenyl amine benzophenone) by cooling curve method.

Thermochemistry 12 Marks

1. To determine the enthalpy of neutralization of weak acid/weak base versus strong acid/ strong base and determine the enthalpy of ionization of the weak acid/ base.

Inorganic chemistry-Quantitative Volumetric Analysis

1. Estimation of ferrous and ferric by dichromate method.

2. Estimation of copper using thiosulphate.

Viva 6 Marks

Sessional 8 Marks

**TEXT AND REFERENCE BOOK**

- Unified Practical, Dr. M.M.N.Tandon, Shivalal Agrawal & Comp.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Fourth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 70 MIN. M: 23**

**COURSE CODE: 4BSC5, CREDIT:-4**

**ASSIG. MAX.M: 30 MIN. M: 10**

**COURSE:-MATHS-IV**

**Unit -1** Partial differentiation. Change of variables. Euler's Theorem on homogeneous function, Taylor's theorem for functions of two variables. Jacobians, Envelopes, Evolutes.

**Unit -2** Maxima, minima and saddle points of functions of two variables. Beta and Gamma functions. Double and triple integrals. Dirichlet's integrals.

**Unit -3** Partial Differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than general methods. Charpit's general method of solution, Partial differential equations of second and higher orders. Homogeneous and non- Homogeneous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficients.

**Unit -4** Complex numbers as ordered pairs. Geometric representation of Complex numbers, Continuity and differentiability of Complex functions. Analytical function, Cauchy Riemann equation, Harmonic function, Mobius transformations, fixed point, cross ratio.

**Unit -5** Group-Automorphisms, inner automorphism. Group of Automorphism, Conjugacy relation and centraliser. Normaliser. Counting principle and the class equation of a finite group. Cauchy's theorem for finite abelian groups and non abelian groups. Ring homomorphism. Ideals and Quotient Rings

**TEXT AND REFERENCE BOOK**

- H.K.Pathak, Advanced Calculus, Partial Differential Equation, Complex analysis & Abstract Algebra.
- B.R. Thakur, Advanced Calculus, Partial Differential Equation, Complex analysis & Abstract Algebra.
- S.C. Malic, mathematical Analysis, Wiley Eastern Ltd New Delhi.
- P.K.Jain & S.K.Kaushik, An introduction to Real Analysis.
- P.B. Bhattacharya, Abstract Algebra



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

SEMESTER- **Fifth Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 35 MIN. M: 12

COURSE CODE: **5BSC1**, CREDIT:-2

ASSIG. MAX.M: 15 MIN. M: 05

COURSE: -HINDI LANGUAGE (BHASHA KAUSHAL AUR SANCHAR SADHAN)

भाषा कौशल एवं संचार साधन

इकाई - 1

1. भारतीय संस्कृति
2. भारतीय समाज व्यवस्था
3. सभ्यता एवं संस्कार
4. वैश्विक चेतना
5. समन्वयीकरण (भारतीय एवं अंतर्राष्ट्रीय सदंर्भ में)

इकाई - 2

1. धर्म
2. न्याय
3. दर्शन
4. नीति
5. साहित्य

इकाई - 3

1. संचार साधन : सम्पर्क के नए क्षितिज
2. समाचार पत्र
3. भारतीय प्रेस परिषद्
4. रेडियो
5. दूरदर्शन

इकाई - 4

1. सिनेमा
2. रंगमंच
3. संगीत
4. चित्र, मूर्ति, स्थापत्य कला
5. शिल्प कला

इकाई - 5

1. कम्प्यूटर

2. दूरभाष: विज्ञान की सौगात
3. मंत्रं (कहानी): प्रमे चंद्र
4. मातृभूमि (कविता): मैथिलीशरण गुप्त
6. साहित्यकार का दायित्व: डॉ. प्रेम भारती

**TEXT AND REFERENCE BOOK**

- संदर्भ पुस्तक – मध्यप्रदेश हिन्दी ग्रंथ अकादमी भोपाल द्वारा प्रकाशित पुस्तक



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Fifth Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 35 MIN. M: 12

COURSE CODE: **5BSC2**, CREDIT:-2

ASSIG. MAX.M: 15 MIN. M: 05

COURSE: -COMPUTER & INFORMATION TECHNOLOGY

**BASICS-I**

**Unit I :**

**INTRODUCTION TO COMPUTER ORGANIZATION –I**

History of development of Computer system concepts. Characteristics, Capability and limitations.

Generation of computer. Types of PC's Desktop. Laptop, Notebook. Workstation & their Characteristics.

**Unit II :**

**INTRODUCTION TO COMPUTER ORGANIZATION –II**

basic components of a computer system Control Unit, ALU. Input/Output function and Characteristics, memory RAM, ROM, EPROM, PROM.

**Unit III :**

**INPUT & OUTPUT DEVICES**

Input Devices : Keyboard, Mouse, Trackball. Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen.

Output Devices: Monitors Characteristics and types of monitor, Video Standard VGA, SVGA, XGA,

LCD Screen etc. Printer, Daisy wheel, Dot Matrix, Inkjet, Laser, Line Printer. Plotter, Sound Card and Speakers.

**Unit IV :**

**STORAGE DEVICES :** Storage fundamental primary Vs Secondary. Various Storage Devices magnetic Tape. Cartridge Tape, Data Drives, Hard Drives, Floppy Disks, CD, VCD, CD-R, CD-RW, Zip Drive, DVD, DVD-RW.

**Unit V :**

**INTRODUCTION TO OPERATING SYSTEM :** Introduction to operating systems, its functioning and types. basic commands of dos & Windows operating System.

Disk Operating System (DOS) - Introduction, History and Versions of DOS.

DOS Basics - Physical Structure of disk, Drive name, FAT, file & directory structure and naming rules, booting process, DOS system files.

DOS Commands - **Internal** - DIR, MD, CD, RD, Copy, DEL, REN, VOL, DATE, TIME, CLS, PATH, TYPE etc. **External** CHKDSK, SCOPE, PRINT DISKCOPY, DOSKEY, TREE, MOVE, LABEL, APPEND, FORMAT, SORT, FDISK, BACKUP, MODE, ATTRIB HELP, SYS etc.

### **TEXT AND REFERENCE BOOK**

- Computer Fundamentals, 6<sup>th</sup> Edition PradeepK.SinhaPritiSinha BPB Publication





**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Fifth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50 MIN.M:17**

**COURSE CODE: 5BSC2, CREDIT:-2**

**COURSE: -PRACTICAL COMPUTER & INFORMATION TECHNOLOGY**

**BASICS-I**

DOS :

- DOS commands : Internal & External Commands.
- Special batch file : Autoexec, Bar Hard disk setup.

Windows 98:

- Desktop setting : New folder, rename bin operation, briefcase, function. Control panel utility.
- Display properties: Screen saver, background settings.

Ms-Word:

- Creating file: save, save as HTML, Save as Text, template, RTF Format.
- Page setup utility: Margin settings, paper size setting, paper source, layout.
- Editing: Cut, paste special, undo, redo, find, replace, goto etc.
- View file: page layout, Normal Outline, master document, ruler header, footer, footnote, full screen.
- Insert: break, page number, symbol, date & time, auto text, caption file, object, hyperlink, picture etc.
- Format: font, paragraph, bullets & numbering, border & shading, change case, columns.
- Table : Draw label, insert table, cell handling, table auto format, sort formula



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Fifth Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 70 MIN. M: 23

COURSE CODE: **5BSC3**, CREDIT:-4

ASSIG. MAX.M: 30 MIN. M: 10

COURSE:- PHYSICS-V

**Unit-1 Theory of Relativity:**

Reference systems, inertial frames, Galilian Invariance and conservation laws, propagation of light, Michelson-Morley experiment; search for ether. Postulates for the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition theorem, variation of mass with velocity, mass - energy equivalence, particle with zero rest mass.

Origin of Quantum Theory: Failure of classical physics to explain the phenomena such as a black-body spectrum, photoelectric effect , Ritz combination principle in spectra. stability of an atom, Planck's radiation law, Einstein's explanation of photoelectric effect. Bohr's quantization of angular momentum and its application to hydrogen atom, limitations of Bohr's theory.

**Unit-2 Quantum Mechanics:**

Wave-particle duality and uncertainty principle; de Broglie's hypothesis for matter waves; the concept of wave and group velocities, evidence for diffraction and interference of particles, experimental demonstrations of matter waves. Consequence of de Broglie's concepts; quantization in hydrogen atom; energies of a particle in a box, wave packets, Heisenberg's uncertainty relation for  $p$  and  $x$ , its extension to energy and time.

Consequence of the uncertainty relation; gamma ray microscope, diffraction at a slit, particle in a box, position of an electron in a Bohr's orbit, Schrödinger's equation. Postulates of quantum mechanics; operators, expectation values, transition probabilities, applications to a particle in one and three dimensional boxes, harmonic oscillator, reflection at a step potential, transmission across a potential barrier.

**Unit-3 Atomic Physics:**

Solution of Schrodinger equation for Hydrogen atom; natural occurrence of quantum numbers- $n$ ,  $l$  and  $m$ , the related physical quantities. Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure. screening constants for alkali spectra for  $s, p, d$  and  $f$  states, selection rules, Singlet and triplet fine structure in alkaline earth spectra. L-S and J-J couplings.

Weak Spectra: Continuous X-ray spectrum and its dependence on voltage, Duane and Hundt's law. Characteristic X-rays. Moseley's law; doublet structure of X-ray spectra. X-ray absorption spectra.

#### Unit-4 Molecular Spectra :

Discrete set of electronic energies of molecules, quantization of vibrational and rotational energies, determination of internuclear distance, pure rotational and rotation-vibration spectra  
Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra.

Spectroscopy : Raman Effect, Stokes and anti-stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman Spectroscopy.

Spectroscopic techniques: Sources of excitation, prism and grating spectrographs for visible, UV and IR, absorption spectroscopy, double beam instruments, different recording systems.

#### Unit-5 Nuclear Physics:

Interaction of charged particles and neutrons with matter, working of nuclear detectors, G-M counter, proportional counter, scintillation counter, cloud chamber, spark chamber and emulsions technique.

Structure of nuclei, basic properties ( $I$ ,  $\mu$ ,  $Q$  and binding energy), deuterium binding energy, p-p and n-p scattering and general concepts of nuclear forces. Beta decay, range of alpha particle, Geiger-Nuttall law. Gamow's explanation of alpha decay, beta decay, continuous and discrete spectra.

Nuclear reactions, channels, compound nucleus, direct reaction (concepts). Shell model, Liquid drop model, Nuclear fission and fusion (concepts), energy production in stars by p-p and carbon - nitrogen cycles (concepts).

#### TEXT AND REFERENCE BOOK

- Introduction to Modern Physics H. S. Mani and G. K. Mehta;“ (Affiliated East-West Press. 1989)”.
- “Prospective of modern physics”. A. Belser.
- ; “Introduction to atomic physics” H. E. White. TMH, Delhi.
- “Introduction to Molecular Physics”. Barrow;
- ; “Optics and Atomic Physics” (D. P. Khandelwal Himalaya Publishing House, Bombay, 1988).
- “ Unified Physics” R. P. Goyal Shiv lal Agrawal & Co. Agra
- "Prabodh Bhoutiki (Physics)". Kher , Choube & Upadhyay Yugbodh offset raipur
- “Nuclear Physics”. D. C. Tayal, Himalaya Publishing House New Delhi
- “Atomic Physics. J. B. Rajan
- "Quantum Physics" Satya Prakash Sharma Pragati Prakasan meerut
- "Introduction to Relativity" Gupta & Kumar, Pragati Prakasan meerut
- Modern Physics, F.K. Richtmyer, E.H. Kennard & Jain Cooper TMH New Delhi



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

SEMESTER- **Fifth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50MIN.M:17**

**COURSE CODE: 5BSC3, CREDIT:-4**

**COURSE:-PRACTICAL PHYSICS-V**

1. Determination of Planck's constant.
2. Determination of  $e/m$  using Thomson's method.
3. Determination of  $e$  by Millikan's method.
4. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses electron to proton).
5. Absorption spectrum of iodine vapour.
6. Study of alkali or alkaline earth spectra using concave grating.
7. Study of Zeeman effect for determination of Lande  $g$ -factor.
8. Study of Raman spectrum using laser as an excitation source.
9. Determination of percentage of absorption of light by photometer



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

SEMESTER- **Fifth Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 70 MIN. M: 23

COURSE CODE: **5BSC4**, CREDIT:-4

ASSIG. MAX.M: 30 MIN. M: 10

COURSE: - CHEMISTRY-V

## UNIT I

### Spectroscopy - I

- (a) Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.
- (b) Rotational spectrum of diatomic molecules. Energy levels of a rigid rotator (semi classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotator, isotope effect.
- (c) Raman spectrum, concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules, application of Raman spectrum.

## UNIT II

### Spectroscopy - II

- (a) UV Spectroscopy : Electronic excitation, elementary idea of instrument used, Applications to structure determination of organic molecules. Woodward-Fieser rule for determining  $\lambda_{max}$  of  $\alpha, \beta$ -unsaturated carbonyl compounds.
- (b) Infrared Spectrum : Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

## UNIT III

**Bioinorganic Chemistry - I** Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin, Biological role of alkali and alkaline earth metal ions with special reference to  $Ca^{2+}$ . Nitrogen fixation.

Bioinorganic Chemistry - II Role of metal ions in biological process, Na/K pump, metal complexes as therapeutic agents anticancer agents, antiarthritits drugs and chelation therapy.

#### **UNIT IV**

Hard and Soft Acids and Bases (HSAB) Classification of acids and bases as hard and soft, Pearson's HSAB concept, acid-base strength and hardness and softness, Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.

Gravimetric Analysis Principles of gravimetric estimation, supersaturation, co-precipitation, post-precipitation and Ash treatment with respect to the estimation of Ba, Zn and Cu.

Water Analysis Hardness, types of hardness-Temporary, permanent and total hardness, acidity and alkalinity, BOD, COD and DO.

#### **UNIT V**

Carbohydrates - I Classification and nomenclature, monosaccharide, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharide, erythro and threo diastereoisomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters, determination of ring size of monosaccharide, cyclic structure of D(+) glucose, mechanism of mutarotation. Structures of ribose and deoxyribose.

Carbohydrates - II An introduction to glycosidic linkages in di- and poly-saccharides. Reducing and non reducing sugars. Structure determination of maltose, sucrose, starch and cellulose.

#### **TEXT AND REFERENCE BOOK**

- Inorganic Chemistry (Part-I, Part-II), R.L. Dutta, NBS Publication.
- Unified Chemistry, Dr.M.M.Tandon, ShivrAm Agrawal & Comp.
- Synthetic Organic Chemistry, O.P.Agrawal, Krishna Prakashan Media Ltd.
- Physical Chemistry, K.L.Kapoor, Macmillan Pub. India, Ltd.
- Spectroscopy, H.Kaur



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

SEMESTER- **Fifth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50 MIN.M:17**

**COURSE CODE: 5BSC4, CREDIT:-4**

**COURSE: - PRACTICAL CHEMISTRY - V**

Time: 6 hour

Inorganic Chemistry 12 Marks

Analysis of inorganic mixture containing five radicals with at least one interfering radical (phosphate, borate, oxalate or fluoride).

Organic Chemistry 12 Marks

Preparation:

- (i) Acetylation
- (ii) Benzoylation
- (iii) meta-Dinitrobenzene
- (iv) Picric acid

Physical Chemistry 12 Marks

(i) Effluent Analysis

Identification of cations and anions in different water samples.

(ii) Water analysis

To determine the amount of dissolved oxygen in water samples in ppm units.

Viva 06 Marks

Sessional 08 Marks

### **TEXT AND REFERENCE BOOK**

- Unified Chemistry, Dr. M.M.N.Tandon, ShivalAgrawal & Company.
- Experiment & Calculations in Engineering Chemistry, Dr. S.S. Dara, S.Chand & Com. Ltd.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Fifth Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 70 MIN. M: 23

COURSE CODE: **5BSC5**, CREDIT:-4

ASSIG. MAX.M: 30 MIN. M: 10

COURSE:- MATHEMATICS-V

**Unit -1** Riemann integral, Integrability of continuous and monotonic functions, The fundamental theorem of integral calculus, Mean value theorems of integral calculus, Partial derivatives and differentiability of real-valued functions of two variables.

**Unit -2** Schwarz and Young's theorem, Implicit function theorem, Fourier series of half and full intervals, Improper integrals and their convergence, Comparison test, Abel's and Dirichlet's tests, Frullani's integral, Integral as a function of a parameter.

**Unit -3** Definition and examples of vector spaces, subspaces, Sum and direct sum of subspaces. Linear span, Linear dependence, independence and their basic properties. Basis, Finite dimensional vector spaces, Existence theorem for basis, Invariance of the number of elements of a basis set, Dimension, Dimension of sums of vector subspaces.

**Unit -4** Linear transformations and their representation as matrices, The Algebra of linear transformations, The rank- nullity theorem, Eigen values and eigen vectors of a linear transformation, Diagonalisation. Quotient space and its dimension.

**Unit -5** Binary Relations, Equivalence Relations, Partitions and Partial Order Relation . Graphs, Multigraphs, Weighted Graphs, Paths and Circuits, Shortest Paths. Trees and their properties.

**TEXT AND REFERENCE BOOK**

- H.K.Pathak, Real Analysis, Linear Algebra, Discrete Mathematics.
- B.R.Thakur, Real Analysis, Linear Algebra, Discrete Mathematics.
- M.K.Gupta, Discrete Mathematics.
- P.K.Jain & S.K.Kaushik, An Introduction to Real Analysis.
- K.B.Dutta, Matrix & Linear algebra.





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

SEMESTER- **Sixth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 35 MIN. M: 12**

**COURSE CODE: 6BSC1, CREDIT:-2**

**ASSIG. MAX.M: 15 MIN. M: 05**

**COURSE:- ENGLISH LANGUAGE AND ASPECTS OF DEVELOPMENT**

### **Unit 1**

1. William Wordsworth : “The World is Too Much With Us”
2. K. Aludiapillai : “Communication Education and Information Technology”
3. “Democratic Decentralisation”
4. S. C. Dubey : “Basic Quality of Life”
5. Sister Nivedita : “The Judgment Seat of Vikramaditya”
6. Juliun Huxley : “War as a Biological Phenomenon”
7. Robert Frost : “Stopping by Woods on a Snowy Evening”
8. Ruskin Bond : “The Cherry Tree”

**Unit II** Short Essay of about 250-300 words

**Unit III** Translation of a short passage from Hindi to English

**Unit IV** Drafting CV, writing e-mail message for official purpose

**Unit V** Language Skills :

One-word substitution, homonyms, homophones, words that confuse, Punctuation, Idioms

Note : Scheme of Marks

### **Unit I**

- This will include 5 objective type questions based on text and language skills. (1x5=5 marks)
- This will also include short-answer questions from text. One question will be asked from each lesson (total 8 questions) and 5 have to be attempted (3x5 = 15 marks)

### **TEXT AND REFERENCE BOOK**

- Essentials of English Grammar by Sultan Chand & Sons
- English Grammar and Composition by Wren & Martin

- A Practical Guide to English Translation and Composition by K.P. Thakur ( BharatiBhawan Publishers)
- Scholar's Senior English Grammar and Composition, T.R. Bhanot, H. Martin, Scholar Publishing House (P) Ltd.
- English Language and Aspects of Development, published by M. P. Hindi Granth Academy



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Sixth Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 35 MIN. M: 12

COURSE CODE: **6BSC2**, CREDIT:-2

ASSIG. MAX.M: 15 MIN. M: 05

COURSE:-COMPUTER & INFORMATION TECHNOLOGY BASICS-II

**Unit I –**

**Word Processing : Word**

Introduction to word Processing.

- MS Word: features, Creating, Saving and Operating Multi document windows, Editing Text selecting, Inserting, deleting moving text.
- Previewing documents, Printing document to file page. Reduce the number of pages by one.
- Formatting Documents: paragraph formats, aligning Text and Paragraph, Borders and shading, Headers and Footers, Multiple Columns.

**Unit II**

**Introduction to Excel**

Excel & Worksheet :

- Worksheet basic.
- Creating worksheet, entering data into worksheet, heading information, data text, dates, alphanumeric, values, saving & quitting worksheet.
- Opening and moving around in an existing worksheet.
- Toolbars and Menus, keyboard shortcuts.
- Working with single and multiple workbook coping, renaming, moving, adding and deleting. coping entries and moving between workbooks.
- Working with formulas & cell referencing.
- Autosum.
- Coping formulas
- Absolute & Relative addressing.

**Unit III**

**INTRODUCTION TO POWER POINT**

- Features and various versions.
- Creating presentation using Slide master and template in various colour scheme.
- Working with slides make new slide move, copy, delete, duplicate, lay outing of slide, zoom in or out of a slide.
- Editing and formatting text: Alignment, editing, inserting, deleting, selecting, formatting of text, find and replace text.

#### **Unit IV**

##### **POWER POINT – II**

- Bullets , footer, paragraph formatting, spell checking.
- Printing presentation Print slides, notes, handouts and outlines.
- Inserting objects Drawing and Inserting objects using Clip Arts picture and charts.
- Slide sorter, slide transition effect and animation effects.
- Presenting the show making stand alone presentation, Pack and go wizards.

#### **Unit V**

Evolution, Protocol, concept, Internet, Dial-up connectivity, leased line, VSAT, Broad band, URLs, Domain names, Portals. E-mail, Pop & web based Email. Basic of sending and receiving Emails, Email & Internet Ethics, Computer virus, Antivirus software wage, Web Browsers.

#### **TEXT AND REFERENCE BOOK**

- Computer Fundamentals 6<sup>th</sup> Edition Pradeep Ku. Sinha&PritiSinha, BPB Publications.



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

SEMESTER- **Sixth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50 MIN.M:17**

**COURSE CODE: 6BSC2, CREDIT:-2**

**COURSE: -PRACTICAL COMPUTER & INFORMATION TECHNOLOGY**

**BASICS-II**

DOS :

- DOS commands : Internal & External Commands.
- Special batch file : Autoexec, Bar Hard disk setup.

Windows 98:

- Desktop setting : New folder, rename bin operation, briefcase, function. Control panel utility.
- Display properties: Screen saver, background settings.

Ms-Word:

- Creating file: save, save as HTML, Save as Text, template, RTF Format.
- Page setup utility: Margin settings, paper size setting, paper source, layout.
- Editing: Cut, paste special, undo, redo, find, replace, goto etc.
- View file: page layout, Normal Outline, master document, ruler header, footer, footnote, full screen.
- Insert: break, page number, symbol, date & time, auto text, caption file, object, hyperlink, picture etc.
- Format: font, paragraph, bullets & numbering, border & shading, change case, columns.
- Table : Draw label, insert table, cell handling, table auto format, sort formula



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Sixth Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 70 MIN. M: 23

COURSE CODE: **6BSC3**, CREDIT:-4

ASSIG. MAX.M: 30 MIN. M: 10

COURSE:- PHYSICS-VI

**Unit-1 Overview:** Crystalline and glassy forms, liquid crystals, glass transition. Crystal structure: Periodicity, lattices and bases, fundamental translation vectors, unit cell, Wigner-Seitz cell, allowed rotations, lattice types, lattice planes. Common crystal structures. Laue's theory of X-ray diffraction, Bragg's law, Laue patterns.

Bonding: Potential between a pair of atoms; Lennard-Jones potential, concept of cohesive energy, covalent, Vander Waal, ionic and metallic crystals Magnetism: Atomic magnetic moment, magnetic susceptibility, Dia, Para and Ferromagnetism, Ferro magnetic domains. Hysteresis.

**Unit-2 Thermal properties:** Lattice vibrations, simple harmonic oscillator, second order expansion of Lennard-Jones potential about the minimum, vibrations of one dimensional monoatomic chain under harmonic and nearest neighbour interaction approximation. Concept of phonons, density of modes (1-D). Debye model; Lattice specific heat low temperature limit, extension (conceptual) to 3-D. Band Structure: Electrons in periodic potential; nearly free electron model (qualitative), energy band, energy gap, metals, insulators, semiconductors.

Motion of electrons: Free electrons, conduction electrons, electron collisions, mean free path, conductivity and Ohm's law. Density of states. Fermi energy, Fermi velocity, Fermi-Dirac distribution.

**Unit-3 Semiconductors:** Semiconductors ; Intrinsic-semiconductors, electrons and holes, Fermi Level , Temperature dependence of electron and hole concentrations. Doping: impurity states, n and p type semiconductors, conductivity, mobility, Hall Effect, Hall Coefficient.

Semiconductor devices: Metal-semiconductor junction, p-n junction, majority and minority carriers, diode, Zener and tunnel diodes, light emitting diode, transistor, solarcell.

Power supply: Diode as a circuit element, load line concept, rectification, ripple factor, Zener diode, voltage stabilization, IC voltage regulation. Transistors : Characteristics of a transistor in CB, CE and CC mode, graphical analysis of the CE configuration, low frequency equivalent circuits, h-parameters, bias stability, thermal runaway.

FETs: Field effect transistors, JFET volt-ampere curves, biasing JFET, ac operation of JFET, source follower. MOSFET, biasing MOSFET, FET as variable voltage resistor.

**Unit-4 Amplifiers- I:** Small signal amplifiers ; General Principle of operation, classification, distortion, RC coupled amplifier, gain frequency response , input and output impedance, multistage amplifiers.

Amplifier- II: Transformer coupled amplifiers, Equivalent circuits at low, medium and high frequencies, emitter follower, low frequency common source and common drain amplifier, Noise in electronic circuits.

Oscillators: Feedback in amplifiers, principle, its effects on amplifiers, characteristics.

Principle of feedback amplifier, Barkhausen criteria, Hartley, Colpitt and Wein bridge oscillators.

**Unit-5 Laser:** Laser system: Purity of a spectral line, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients. Spontaneous and induced emissions, conditions for laser action, population inversion.

Types of Lasers ( gas and solid state), Pulsed lasers and tunable lasers, spatial coherence and directionality, estimates of beam intensity, temporal coherence and spectral energy density.

### **TEXT AND REFERENCE BOOK**

- “Solid State Electronic Devices”, B.G.Streetmann; II<sup>nd</sup> Edition (Prentice-Hall of India, New Delhi, 1986).
- “Electronic Devices, Circuits and Applications W.D. Stanley;” (Prentice-Hall, New Jersey, USA, 1988).
- “Electronics Fundamentals and Applications”, J.D. Ryder; II<sup>nd</sup> Edition (Prentice-Hall of India, New Delhi, 1986).
- “Microelectronics”, Int J. Millman and A Grabal; International Edition (McGraw-Hill Book Company, New York, 1988).
- “Unified Physics”. R.P. Goyal, Shiv Lal Agrawal & Co. Agra
- "Prabodh Bhoutiki " Kher , Choube & Upadhyay Yogbodh offset Pvt. Ltd. Raipur
- “Hand Book of Electronics”. Gupta and Kumar, Pragati Prakashan Meerut
- “Principle of Electronics”. V. K. Mehta, S. Chand New Delhi
- "Laser & Non Linear Optics" B.B.Loud



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

SEMESTER- **Sixth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50 MIN.M:17**

**COURSE CODE: 6BSC3, CREDIT:-4**

**COURSE:- PRACTICAL PHYSICS-VI**

1. Characteristic of a transistor.
2. Characteristic of a tunnel diode.
3. Hysteresis curve a transformer core.
4. Hall probe method for measurement of resistivity.
5. Specific resistance and energy gap of a semiconductor.
6. Study of voltage regulation system.
7. Study of regulated power supply.
8. Study of Lissajos figures using a CRO.
9. Study of VTVM.
10. Study of RC coupled amplifiers
11. Analysis of a given band spectrum.
12. Study of crystal faces.
13. Study of laser as a monochromatic coherence source

### **TEXT AND REFERENCE BOOK**

- Practical Physics, Dr. S.L. Gupta & Dr. V. Kumar, Pragti Prakashan Meerut
- Degree level practical Physics, Sharma, Singh & Prashad, Bharti Bhawan Publication Patna-6.
- Experiment in Engineering Physics-M.N. Awadhanulu, A.A. Dani & P.M. Pokle, S.Chand Pub. New Delhi.
- Prabodh Prayogik Bhoutiki, Dr. P.K.Upadhayay, Yugbodh offset Pvt. Ltd. Raipur
- A text book of Engineering Physics Practical Das, Robinson & Kumar University Science press New Delhi





**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Sixth Semester**

PROGRAMME: BACHELOR OF SCIENCE (MATHS)

THEO. MAX. M: 70 MIN. M: 23

COURSE CODE: **6BSC4**, CREDIT:-4

ASSIG. MAX.M: 30 MIN. M: 10

COURSE:- CHEMISTRY-VI

**UNIT I**

(a) Photochemistry Interaction of radiation with matter, difference between thermal and photochemical process. Law of photochemistry-Grotthus-Draper law, Stark-Einstein law, Beer-Lambert's law. Determination of rate constant of unimolecular reactions. Electronic transitions, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes .

(b) Physical properties and molecular structures Optical activity, polarization-(Clausius-Mossotti equation), orientations of dipoles in an electrical field, dipole moment, induced dipole moment, measurement of dipole moment temperature and refractivity method. Dipole moment and structure of molecules, magnetic properties- paramagnetism, diamagnetism and ferromagnetism.

**UNIT II**

(a) Solutions, dilute solutions and colligative properties-I Ideal and non ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solutions-colligative properties. Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurements, determination of molecular weight from osmotic pressure.

(b) Solutions, dilute solutions and colligative properties-II Elevation of boiling point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation of boiling point and depression in freezing point. Experimental methods of determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solute.

**UNIT III**

Inorganic polymers Introduction and scope of inorganic polymers, special characteristics, classification, homo and hetero atomic polymers and their applications. Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

**UNIT IV**

Organometallic chemistry

- (a) Definition, nomenclature and classification of organometallic compounds. Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti.
- (b) A brief account of metal-ethylenic complexes and homogeneous hydrogenation; mononuclear carbonyls and the nature of bonding in metal carbonyls. Transition metal organometallic compounds with bonds to hydrogen and boron.
- (c) Metal nitrosyls: modes of coordination, nature of bonding and probable applications.

#### **UNIT V**

- (a) Organometallic compounds Organomagnesium compounds-the Grignard reagents-formation, structure and synthetic applications, organozinc compounds, formation and chemical reactions, Organolithium compounds-formation and chemical reactions.
- (b) Organosulphur compounds Nomenclature, structural features, method of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine.
- (c) Amino acids Classification, structure, stereochemistry of amino acids, acid base behaviour, isoelectric point, general methods of preparation and properties of  $\alpha$ -amino acids
- (d) Proteins and peptides Introduction to peptides linkage, synthesis and end group analysis of peptides, solid phase synthesis, classification, properties and structure of proteins (primary, secondary and tertiary).

#### **TEXT AND REFERENCE BOOK**

- Inorganic Chemistry (Part-I, Part-II), R.L. Dutta, NBS Publication.
- Unified Chemistry, Dr.M.M.Tandon, ShivrulAgrawal & Comp.
- Synthetic Organic Chemistry, O.P.Agrawal, Krishna Prakashan Media Ltd.
- Physical Chemistry, K.L.Kapoor, Macmillan Pub. India, Ltd



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

SEMESTER- **Sixth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**PRACTICAL MAX.M:50 MIN.M:17**

**COURSE CODE: 6BSC4, CREDIT:-4**

**COURSE:- PRACTICAL CHEMISTRY-VI**

Time: 6 hour M.M: 50

Inorganic Chemistry 12 Marks

Complex Compound Preparation:

1. Diaquabis(methyl acetoacetato)nickel(II)
2. Diaquabis(ethyl acetoacetato)cobalt(II)
3. Bis(methyl acetoacetato)copper(II) monohydrate
4. Potassium chlorochromate(IV)
5. Tetraamminecopper(II) sulphate monohydrate
6. Mercury(II) tetrathiocyanatocobaltate(II)
7. Hexaamminenickel(II) chloride

Organic Chemistry 12 Marks

Binary mixture analysis containing two solids: Separation, identification and preparation of derivatives.

Physical Instrumentation 12 Marks

(iii) Job's method

(iv) Mole-ratio method.

Viva 06 Marks

Sessional 08 Marks

### **TEXT AND REFERENCE BOOK**

Experiments & Calculations in engineering chemistry, Dr. S.S. Dara, S.Chand& Company Ltd.



**Dr. C.V. RAMAN UNIVERSITY**

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

SEMESTER- **Sixth Semester**

**PROGRAMME: BACHELOR OF SCIENCE (MATHS)**

**THEO. MAX. M: 70 MIN. M: 23**

**COURSE CODE: 6BSC5, CREDIT:-4**

**ASSIG. MAX.M: 30 MIN. M: 10**

**COURSE:-MATHEMATICS-VI**

**Unit -1** Definition and examples of metric spaces. Neighbourhoods. Limit points. Interior points. Open and closed sets. Closure and interior. Boundary points. Subspace of a metric space. Cauchy sequences. Completeness, Cantor's intersection theorem, Contraction principle. Real numbers as a complete ordered field. Dense subsets. Baire Category theorem. Separable, first and second countable spaces.

**Unit -2** Continuous functions. Extension theorem. Uniform continuity. Compactness, Sequential compactness. Totally bounded spaces, Finite intersection property. Continuous functions and compact sets. Connectedness

**Unit -3** Solution of Equations: Bisection. Secant, Regula Falsi. Newton, Method. Roots of second degree Polynomials, Interpolation, Lagrange interpolation, Divided Differences, Interpolation formulae using Differences, Numerical Quadrature, Newton-Cote's Formulae, Gauss Quadrature Formulae.

**Unit -4** Linear Equations: Direct Methods for Solving Systems of Linear Equations (Gauss elimination, LU Decomposition. Cholesky Decomposition), Iterative methods (Jacobi. Gauss - Seidel Reduction Methods). Ordinary Differential Equations: Euler Method, Singlestep Methods, Runge-Kutta's Method, Multi-step Methods, Milne-Simpson Method. Methods Based on Numerical Integration, Methods Based on numerical Differentiation.

**Unit -5** ELEMENTARY STATISTICS Measures of dispersion-range, inter quartile range, Mean deviation, Standard deviation, moments, skewness and kurtosis. Probability, Continuous probability, probability density function and its applications (for finding the mean, mode, median and standard deviation of various continuous probability distributions) Mathematical expectation, expectation of sum and product of random variables. Theoretical distribution-binomial, Poisson distributions and their properties and use, Moment generating functions.

OR

**Unit -5** PRINCIPLES OF COMPUTER SCIENCE Data Storage of bits Ram Memory. Mass storage. Coding Information of Storage. The Binary System Storing integers fractions, communication errors. Data Manipulation - The Central Processing Unit  
The Stored Program concept. Programme Execution,. Arithmetic/Logic Instruction. Computer-Peripheral Communication. Operation System : The Evolution of Operating System.(Dos,

Window) Operating System Architecture. Coordinating the Machine's Activities. Other Architectures.

OR

Unit -5 MATHEMATICAL MODELING The process of Applied Mathematics. Setting up first order differential equations. Qualitative solution sketching. Stability of solutions. Difference and differential equation models of growth and decay. Single species population model, Exponential and logistic population models.

**TEXT AND REFERENCE BOOK**

- H.K.Pathak, Metric Spaces, Numerical Analysis.
- B.R.Thakur, Metric Spaces, Numerical Analysis.
- P.K.Jain & S.K.Kaushik, An introduction to Real Analysis.
- P.K.Jain & K. Ahamad, Metric Spaces, Narosa Publishing, New Delhi.
- B.S.Grewal, Numerical Method.

**COUNSELING AND STUDY STRUCTURE**

Course Code	Name of the Course	Credit	Total Hours of Study	Counselling and Study Structure (hours)			
				Face to Face Counselling	Self study	Practical	Assignments
<b>SEMESTER-I</b>							
1BSC1	Hindi Language Structure - I	2	60	8	34	-	18
1BSC2	Entrepreneurship Development	2	60	8	34	-	18
1BSC3	Physics-I	4	120	16	44	24	36
1BSC4	Chemistry-I	4	120	16	44	24	36
1BSC5	Maths-I	4	120	16	68	-	36
<b>SEMESTER-II</b>							
2BSC1	English Language and Indian Culture	2	60	8	34	-	18
2BSC2	Development of Entrepreneur	2	60	8	34	-	18
2BSC3	Physics-II	4	120	16	44	24	36
2BSC4	Chemistry-II	4	120	16	44	24	36
2BSC5	Maths-II	4	120	16	68	-	36
<b>SEMESTER-III</b>							
3BSC1	Hindi Language aur Samvedana	2	60	8	34	-	18
3BSC2	Environmental Studies	2	60	8	34	-	18
3BSC3	Physics-III	4	120	16	44	24	36
3BSC4	Chemistry-III	4	120	16	44	24	36
3BSC5	Maths-III	4	120	16	68	-	36
<b>SEMESTER-IV</b>							
4BSC1	English Language and Scientific Temper	2	60	8	34	-	18
4BSC2	Environmental Study	2	60	8	34	-	18
4BSC3	Physics-IV	4	120	16	44	24	36
4BSC4	Chemistry-IV	4	120	16	44	24	36
4BSC5	Maths-IV	4	120	16	68	-	36
<b>SEMESTER-V</b>							
5BSC1	Hindi Language (Bhasha Kaushal aur Sanchar Sadhan)	2	60	8	34	-	18
5BSC2	Computer & Information Technology Basics-I	2	60	8	22	12	18
5BSC3	Physics-V	4	120	16	44	24	36
5BSC4	Chemistry-V	4	120	16	44	24	36
5BSC5	Maths-V	4	120	16	68	-	36
<b>SEMESTER-VI</b>							
6BSC1	English Language and Aspects of Development	2	60	8	34	-	18
6BSC2	Computer & Information Technology Basics-II	2	60	8	22	12	18
6BSC3	Physics-VI	4	120	16	44	24	36
6BSC4	Chemistry-VI	4	120	16	44	24	36
6BSC5	Maths-VI	4	120	16	68	-	36

**STUDY MODULES AND BOOKS INFORMATION**

Course Code	Name of the Course	Module to be used	Publisher
<b>SEMESTER-I</b>			
1BSC1	Hindi Language Structure - I	Module CVRU Published by	Ram Prasad & Sons
1BSC2	Entrepreneurship Development	Module CVRU Published by	Ram Prasad & Sons
1BSC3	Physics-I	Module CVRU Published by	Ram Prasad & Sons
1BSC4	Chemistry-I	Module CVRU Published by	Ram Prasad & Sons
1BSC5	Maths-I	Module CVRU Published by	Ram Prasad & Sons
<b>SEMESTER-II</b>			
2BSC1	English Language and Indian Culture	Module CVRU Published by	Ram Prasad & Sons
2BSC2	Development of Entrepreneur	Module CVRU Published by	Ram Prasad & Sons
2BSC3	Physics-II	Module CVRU Published by	Ram Prasad & Sons
2BSC4	Chemistry-II	Module CVRU Published by	Ram Prasad & Sons
2BSC5	Maths-II	Module CVRU Published by	Ram Prasad & Sons
<b>SEMESTER-III</b>			
3BSC1	Hindi Language aur Samvedana	Module CVRU Published by	Ram Prasad & Sons
3BSC2	Environmental Studies	Module CVRU Published by	Ram Prasad & Sons
3BSC3	Physics-III	Module CVRU Published by	Ram Prasad & Sons
3BSC4	Chemistry-III	Module CVRU Published by	Ram Prasad & Sons
3BSC5	Maths-III	Module CVRU Published by	Ram Prasad & Sons
<b>SEMESTER-IV</b>			
4BSC1	English Language and Scientific Temper	Module CVRU Published by	Ram Prasad & Sons
4BSC2	Environmental Study	Module CVRU Published by	Ram Prasad & Sons
4BSC3	Physics-IV	Module CVRU Published by	Ram Prasad & Sons
4BSC4	Chemistry-IV	Module CVRU Published by	Ram Prasad & Sons
4BSC5	Maths-IV	Module CVRU Published by	Ram Prasad & Sons
<b>SEMESTER-V</b>			
5BSC1	Hindi Language (Bhasha Kaushal aur Sanchar Sadhan)	Module CVRU Published by	Ram Prasad & Sons
5BSC2	Computer & Information Technology Basics-I	Module CVRU Published by	Ram Prasad & Sons
5BSC3	Physics-V	Module CVRU Published by	Ram Prasad & Sons
5BSC4	Chemistry-V	Module CVRU Published by	Ram Prasad & Sons
5BSC5	Maths-V	Module CVRU Published by	Ram Prasad & Sons

<b>SEMESTER-VI</b>				
6BSC1	English Language and Aspects of Development	Module CVRU	Published by	Ram Prasad & Sons
6BSC2	Computer & Information Technology Basics-II	Module CVRU	Published by	Ram Prasad & Sons
6BSC3	Physics-VI	Module CVRU	Published by	Ram Prasad & Sons
6BSC4	Chemistry-VI	Module CVRU	Published by	Ram Prasad & Sons
6BSC5	Maths-VI	Module CVRU	Published by	Ram Prasad & Sons



**DATE SCHEDULE & INSTRUCTIONS FOR SUBMITTING ASSIGNMENTS**

<b>DUE DATE OF SUBMISSION OF ALL ASSIGNMENTS AT THE STUDY CENTRE</b>		
<b>Semester</b>	<b>Assignment No.</b>	<b>Due Date</b>
First Semester	1BSC1 1BSC2 1BSC3 1BSC4 1BSC5	<ul style="list-style-type: none"> <li>• April 30 (for January Session )</li> <li>• October 31 (for July session)</li> </ul>
Second Semester	2BSC1 2BSC2 2BSC3 2BSC4 2BSC5	<ul style="list-style-type: none"> <li>• October 31 (for January session)</li> <li>• April 30 (for July session)</li> </ul>
Third Semester	3BSC1 3BSC2 3BSC3 3BSC4 3BSC5	<ul style="list-style-type: none"> <li>• April 30 (for January Session )</li> <li>• October 31 (for July session)</li> </ul>
Fourth Semester	4BSC1 4BSC2 4BSC3 4BSC4 4BSC5	<ul style="list-style-type: none"> <li>• October 31 (for January session)</li> <li>• April 30 (for July session)</li> </ul>
Fifth Semester	5BSC1 5BSC2 5BSC3 5BSC4 5BSC5	<ul style="list-style-type: none"> <li>• April 30 (for January Session )</li> <li>• October 31 (for July session)</li> </ul>
Sixth Semester	6BSC1 6BSC2 6BSC3 6BSC4 6BSC5	<ul style="list-style-type: none"> <li>• October 31 (for January session)</li> <li>• April 30 (for July session)</li> </ul>

**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 शिक्षा 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 Programme 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 से.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 शिक्षा संस्थान डॉ. सी. वी. रामन् विध्वविद्यालय / 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.cvr.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.

**Note**

-----  
-----  
-----  
-----

A series of horizontal dashed lines for writing, spanning the width of the page.