INFORMATION BROCHURE

Guidelines for
RESEARCH PROGRAMME
DOCTOR OF PHILOSOPHY (Ph.D)

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Web : www.cvru.ac.in

DR. C.V. RAMAN UNIVERSITY

(Established by Government of Chhattisgarh Act No. 13 of 2005
and approved vide UGC Act 2(f) 1956)
Kargi Road Kota Distt. – Bilaspur (Chhattisgarh) India - 495113

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About the University

The Dr. C.V. Raman University (CVRU), Bilaspur, established in November 2006 at Kargi road, Kota-Bilaspur of Chhattisgarh, in a tribal area of India was the maiden higher education venture of its parent body the AISECT Group of Universities, which has over the years emerged as India's leading higher education group. In a short span of time, CVRU Bilaspur has emerged as a research and educational hub of Central India and is endeavoring to introduce skill-based learning in the higher education framework. Named after the first Nobel laureate in the field of science, Dr. C.V. Raman, the University seeks to generate a cadre of highly skilled professionals who have the requisite technical know-how, coupled with adequate skills, to be able to address the industry's growing need for skilled workforce. Dr. C.V. Raman observed that the real growth of a country is in the hearts, minds, bodies and souls of the young men & women of the country. His sentiments were echoed in the words of Dr. A.P.J. Abdul Kalam, the Ex-Scientist-President of India, who said that "Education should form the central focus of national development and nation building". So, these words of C.V. Raman & Dr. A.P.J. Abdul Kalam inspire to the prime objective of Dr. C.V. Raman University. The University has been setup on 3rd November 2006 and inaugurated on 14th October 2007, with its distinctive objectives in view. It has been setup in a tribal scheduled area of Chhattisgarh with a view to take up education, research, training and extension activities in this under-developed region of the state. Spread across a lush green campus of over 60 acres, CVRU Bilaspur is the first university in Chhattisgarh to be awarded an ISO 9001:2008 certification. The University is recognized under Section 2(f) of the UGC Act and approved by the various regulatory bodies such as AICTE, NCTE, BCI, PCI & member of AIU. Accredited with B+ Grade by NAAC & owing to its various innovations and initiatives, the University has been a recipient of several prestigious awards, including the Rajiv Gandhi Achievers Award, World Education Award, Dubai, and Best in Skill Development Award, Smart University Award, Chhattisgarh Achievers Award, Swacchh campus award and a NIELIT felicitation for effective higher education courses. Through its various Faculties, the University offers a range of Ph.D, Postgraduate (PG), Undergraduate (UG), integrated & diploma programmes in a number of disciplines like Science, Commerce, Management, Arts, Law, Education, Physical Education, Pharmacy, Engineering and Technology among different streams & departments. With world-class infrastructure, experienced faculty members and innovative methodology of imparting education, the University ensures that its students get the right balance of skills & employability enhancement, research-based learning and digitized-Learning.

The university is also contributing to the fulfillment of overall development of students and goal of the state of Chhattisgarh, i.e. University provides higher education facilities in tribal area, approximately 60% students of this university belongs SC/ST/OBC and rural area.

Vision

Dr. C. V. Raman University will have a transformative impact on society through continual innovation in education, research, creativity and entrepreneurship incorporating social, ethical, human and spiritual values.

Mission

- To create transformative educational experience for students focused on deep disciplinary knowledge problem solving, leadership, communication and interpleural skill, and personal health and wellbeing.

- Creating a collaborative environment open to the free exchange of ideas, where research, creativity, innovation and entrepreneurship can flourish.
- Ensuring individuals can achieve their full potential.
- To impact society in a transformative – regionally, nationally and globally by engaging with partners outside the traditional border of the University campus.

Values:

- Dedication, reflected in our distinctive work ethic and in our commitment to excellence.
- Impact, reflected in our commitment to address critical issues facing society regionally, nationally and globally.
- Collaboration, reflected in our interdisciplinary approach, our focus on internal and external partnership and our capacity to create new fields of inquiry.
- Creativity, reflected in our openness to new ideas and forms of expression, intellectual curiosity, willingness to take risks and entrepreneurial spirit.
- Empathy and compassion, reflected in our focus on improving the human condition and on the personal development of the members of our community.
- Inclusion, related in a culture and climate that seeks, welcomes and advances talented minds from diverse background.
- Integrity, reflected in our adherence to the highest ethical standards in personal and professional behavior and in our commitment to transparency and accountability in governance and everything we do.
- Sustainability, reflected in our shared commitment to lead by example in preserving and protecting our natural resources and in our approach to responsible financial planning.

Objectives

- To make provisions for research, advancement and dissemination of knowledge.
- To create & nurture higher levels of intellectual abilities
- To provide quality education that enables students to achieve bright professional careers.
- To establish state of the art facilities for the students
- To maintain the standards of degree, diploma, certificate & other academic distinctions in accordance with the norms laid down by concerned regulatory bodies.

Facilities available at CVRU

1. **Central library**

- Well qualified and experienced staff to take care of the smooth library working.
- A collection of around 40,000 text and reference books on varied subjects to cater to the needs of variety of users.
- Subscription to 217 journals and periodicals giving an insight to the latest developments.
- Around 600 CDs and floppies containing learning material, software and CBTs.
- Well-furnished Reading Halls.
- Coverage by Intercom System and Dialup services.
- Aesthetic Interiors

- Adequate seating arrangement.
- Separate CD (C-Documents) Section.

2. Infrastructure Facilities

- Sufficient classroom with smart class facility.
- Air- conditioned conference hall of 300 seating capacity with Audio-Video Projection & Video conference facility.
- Air-conditioned hall in new administrative building with the capacity of 100 and also 1 board room for conducting meetings.
- Moot court of 50 seating capacity**.**

3. Sports facilities –

- Playgrounds**:** A playground each for cricket & football Games and Basketball, Volleyball & Badminton Courts separately.
- One Gymnasium is available in boy's hostel.

4. Hostel Facilities:

For Boys

Number of boy's hostels available in campus is 2 with each block of capacity of 250 inmates and each block contains1, 3 &4 seater rooms. Facilities available in hostels are Wi-Fi, Infirmary, Mess & Dining Hall, Common Room, indoor game facility.

For Girls

Number of girls hostels available in campus is 1 with a of capacity of 80 inmates and contains 1-, 3- & 4-seater rooms. Facilities available in hostels are Wi-Fi, Dining Hall and Common Room.

5. Canteen:

We have one canteen and one NESCAFE available in Campus.

6. Medical Facility :

The university has its own health Center and dispensary comprising of two full time medical superintendents, i.e., one chief medical officer Dr. Avijit Royzada (M.D.) and one medical supervisor to cater to the needs of the medical services. The CVRU health Center and the dispensary of the university within its premises offers full time medical facilities for the students, faculties, non-teaching staff, administrative staff and other employees of the university. The dispensary provides service in the hostels also extends its emergency services too throughout the campus. All the students, staff, faculty and other employees of the university are provided medicines at free of cost. One medical officer and one assistant medical officer along with a medical compounder are appointed to take care of CVRU health center and help to avail the medical facility for each and every one in the university premises. The health center of the university consists of the complete first aid facility, primary medical treatment facility as well as some of the diagnostic equipment and sufficient pharmaceutical medical store.

The following facilities are available in the medical dispensary:

- Sphygmomanometer
- ECG machine
- Stethoscope
- Stretcher and wheel chair
- Patient table
- Well managed medical almirah for proper medicine storage
- Blood pressure instrument
- Blood sugar testing instrument (Glucometer)
- Electronic BP-Measuring machine
- Weight-machine
- Biochemical lab for Hb-test & blood group test.
- Nursing table
- Clinical laboratory facility
- Pulse-oxymeter machine
- Sterilizer machine
- Electric water heater

Besides this, we are also having an MOU with the Sai Baba Nursing Home, at Ring Road, Bilaspur in which for the special cases emergency and serious treatment, the students of our university are recommended and referred for the further treatment free of cost to the nursing home.

7. Banking Facility

A branch of "**Bank of India**" with an **ATM facility is in the University Campus** and the other 2 ATM Punjab National Bank, & State Bank of India are at the University Entrance Gate and also one stationary shop is available inside the campus for the benefit and academic requirements of the students.

8. Transport Facilities

The university runs a fleet of 14 busses to help students and staff members' employee to and fro from regions around the city. The bus service is available over a 35km radius around the institute. A nominal fee is collected for the transportation at a yearly basis. Details of the routes and their respective timings are also available. This service is offered to provide hassle-free and safe transportation. Parents are urged to convince their wards to travel in the college busses only in view of safety issues on the highway. We also provide special pre-arranged transportation services for field trips and sporting events within the state.

Research Programme (Ph.D.)

Dr. C.V. Raman University offers Ph.D. Programme through various disciplines. Award of Ph.D. degree will be made on the basis of academic achievements in research work and published work as well as the papers presented in seminars, conferences etc. in various disciplines.

The University also encourages interdisciplinary areas through a system of co-supervision and provides excellent opportunities for such programmes. The research work shall be an original work characterized either by the discovery of facts, or by a fresh approach towards the interpretation and application of facts. It shall demonstrate the candidate's capacity for critical examination and sound judgment and shall represent original contribution to the existing knowledge.

The degree of Doctor of Philosophy (Ph.D.) is awarded for research work in areas recognized by the academic departments of the University. The degree of Doctor of Philosophy (Ph.D.) will be awarded in the discipline of the department in which the candidate is registered.

⇨ Faculties & Subjects offering Ph.D. Programme are:

Faculties	**Subjects**
Engineering & Technology	*Electronics & Communication Engg., Electrical Engg., Computer Science Engg. Mechanical, Civil*
Science	*Physics, Chemistry, Mathematics, Microbiology, Zoology, Rural Technology*
Commerce & Management	*Management, Commerce*
Education &Physical Education	*Education, Physical Education*
Arts	*Geography, Economics, History, Sanskrit, Hindi, Library & Information Science, Sociology, English*
Information Technology	*Information Technology, Computer Science*
Law	*Law*

⇨ Eligibility:

For Ph.D. Programme:

A candidate for the degree of Doctor of Philosophy must, at the time of application, hold Master's degree with at least 55% marks [50% marks in case of SC/ST/PH/VH/category candidates (non creamy layer)] or an equivalent grade of Deemed University or any other University incorporated by any law for the time being in force and recognized by the University.

⇨ Admission Procedure:

Application form for university entrance examination (UET) for Ph.D must be submitted in the prescribed format at the University office on or before the due date declared by the University. Entrance test will be conducted by the university; After Entrance Exam short listed candidates will be intimated for interview followed by final merit list and thereafter takes admission as per rules.

Documents to be submitted at the time of admission:

1. All mark sheets from 10^{th} to P.G. (Photocopy 1 set)
2. Original TC/CC certificate
3. Original Migration Certificate
4. Gap certificate (If applicable)
5. 2 Pass port size photographs
6. NOC (If applicable)

⇨ Fees Structure:

The fee structure of Ph.D. Programme will be as per fee fixation committee of Govt. of Chhattisgarh or as decided by Board of Management (BoM) of the University.

⇨ Structure Of Entrance Examination:

The entrance exam for admission to Ph.D. Programme consists of one theory paper of 100 marks having two sections. The duration of examination will be of 2 hours.
Section I- Contains 50 questions (multiple choices) to assess the candidate's, quantitative ability, data interpretation, analysis, synthesis, reasoning, basics of computing and research aptitude (50 marks)

Section II consisting of 50 questions (multiple choices) to assess the candidates capability of defining certain concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form(50 marks).

⇨ The syllabus for Entrance exam:

Subject Wise syllabus for entrance exam is as follows:

(1)Faculty of Engineering

Subjects Name

(i) Computer Science & Engineering

(ii) Electronics Communication & Engineering

(iii) Electrical Engineering

(iv) Civil Engineering

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Computer Science and Engineering

High Performance Computer Architecture: Basic Computer architecture. Performance Analysis, Architectural classification schemes, Memory models, Pipelining, RISC CISC, VLIW architectures, data dependency and interconnection network. Fault Tolerance and Scalability. Modeling Performance. Pipelined Systems. Interconnection Networks. Processor Array. Multi-computers. Multiprocessors. Systolic Array. Vector Processors. Structured Memory Design for Parallel Systems – Symmetric Shared, Distributed Shared and Synchronization. Grid computing.

Data structures and Algorithms: the notion of abstract data types, stack, queue, list, set, string, tree, binary search tree, heap, graph, tree and graph traversals, connected components, spanning trees, shortest paths, hashing, sorting, searching, design techniques (greedy, dynamic, divide and conquer, Algorithm design by induction), asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes t P, NP, NP-hard, NP-complete.

Concepts of object-oriented programming - Basic Concept of OOP Benefit of OOP Object Oriented language Structure of C++ Program Compiling and Linking Operators and expressions Looping Concepts Arrays and Structure, Functions Class Object Constructor and Destructors Polymorphism Factions Overloading Operators Overloading Inheritance pointer and Virtual Function Life I/O and Templates

Operating Systems :Synchronization Mechanisms. Process Deadlocks. Resource Models. Local and Global states. Distributed Operating Systems. Event Ordering. Timestamps. Distributed Mutual Exclusion. Token and Non-token based Algorithms. Comparative Performance Analysis. Concurrency Control. Shared Memory. File Systems. Agreement Protocols for handling Processor Failures. Coordination of Processes and related Algorithms. Failure Handling and Recovery Mechanisms. Multiprocessor Operating Systems and related Thread Handlings.

Software Engineering: SDLC, planning and managing the project, design, coding, testing, implementation, maintenance. Personal Software Process. Team Software Process. Usability. Agile Methods. Process Models- Iterative, Scrum, XP, and Evo. Requirements Engineering. Advanced UML, Petri net. Domain specific modeling. Systems Modeling Language. Meta modeling. Software architecture and design patterns. Software metrics. Software reliability. Advanced testing techniques.

Database Systems: Review of Database Systems. Web-enabled Database Systems. Storage and File Structures. Indexing and Hashing. Concurrency. Recovery. Query Processing. Query Optimization. Object Oriented DBMS. Extended Relational Model. Spatial databases. Multimedia Databases. Distributed Databases. Active Databases. Temporal Databases. Deductive Databases. Mobile Databases.

Data Communication and Computer Networks: Seven Layer OSI Model. TCP/IP details.IPv4 and IPv6 Protocols and its Applications. Real Time Communication Protocols. High speed local and wide area networks. Virtual networks. Network security. Broadband networks. Introduction to intelligent networking. Performance analysis of networks. Transmission media, data encoding, Multiplexing, Flow and error control, Network devices switches, Gateways, Routers, Network security cryptography, Digital signature, Firewalls, Routing concepts, ATM.

Reference Books:

- Computer System Architecture – M. Morris Mano
- Software Engineering By Roger Pressmen
- Software Engineering By Pankaj jalote
- Oops With C++ - E. Balagurusamy
- Data Base System Concepts - Mc Graw Hill – Korth, Silber chats
- Data structure – Seymour Lipchitz
- Object Oriented Interface and Data Base – Prentice Hall of India
- Software Engineering By Roger Pressmen
- Software Engineering By Pankaj jalote
- Data Communication & Networking – Behrour A. Forougan
- Computer Networks – Andrew s. Tenenbaum

DR.C.V. RAMAN UNIVERSITY BILASPUR (C.G)

Subject: Electronics & Communication Engineering

Electronic Devices and Circuits: p-n junction diode, BJT, JFET, MOS capacitor, MOSFET, Special diodes,

Advanced Analog Circuits: Differential and operational amplifier and its applications'. Sinusoidal oscillators; criterion for oscillation; Passive & Active filters, Power supplies.

Advanced Digital circuits: Logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinational circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift-registers. Semiconductor memories.

Microprocessors AND Microcontroller :-(8085, 8086, 8051): architecture, programming, memory and I/O interfacing.

VLSI: Introduction, integrated circuits fabrication process, oxidation, diffusion, ion implantation, photolithography, MOSFET, BIMOSFET.

Power Electronics and Drives: Semiconductor power diodes, transistors, thyristors,triacs, GTOs, MOSFETs and IGBTs - static characteristics and principles of operation;

Artificial intelligence: -Artificial Neural Network, Fuzzy systems, Neuro-fuzzy systems and genetic algorithms, Simulation tools used in electronics and communication Engineering.

Control Systems: Basic control system components; block diagrammatic description, reduction of block diagrams. Open loop and closed loop (feedback) systems and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems

Communications Techniques: Analog communication systems, SNR calculations for AM and FM for low noise conditions. Digital communication systems: PCM, DPCM, ASK, PSK, FSK

Microwave Communication Engineering: Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Basics of Antennas and Wave propagation: Dipole antennas; radiation pattern; antenna gain.

Text book and Reference book

- 1)microelectronics
- 2) digital fundamentals: Floyd & jain :Pearson education
- 3) digital electronics: A.P. Malvino; tmh
- 4)Automatic Controle System, B.C,Kuo,PHI
- 5)Control System Engineering, L.Nagrath And Gopal ,New Pearson Education
- 6)power electronics, Rashid, PHI
- 7)Microprocessor And Interfacing-D.Hall, TMH
- 8)The 8051 Microcontrller and Embedded Systems using Assembly and c.Mazidi,PHI
- 9)Modern VLSI Design by Wolf, Pearson Education Pub
- 10)Electromagnetic Waves And Antennas: K.D. Prasad, Khanna Pub
- 11)Electronic communication system; George F. Kennedy: TMH

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Electrical Engineering

Electric Circuits and Fields: KCL, KVL, node and mesh analysis; sinusoidal steady-state analysis, resonance, Thevenin's, Norton's and Superposition and Maximum Power Transfer theorems, two-port networks, three phase circuits; Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions; Ampere's and Biot-Savart's laws; inductance; dielectrics; capacitance.

Electrical Machines: Single phase transformer, tests, regulation and efficiency; three phase transformers, parallel operation; autotransformer; DC machines, armature reaction and commutation, starting and speed control of motors; three phase induction motors, performance characteristics, starting and speed control; synchronous machines, regulation and parallel operation of generators, motor starting, characteristics.

Power Systems: Basic power generation concepts; transmission line models and performance; cable performance, insulation; corona and radio interference; distribution systems; voltage control; power factor correction; symmetrical components; fault analysis; circuit breakers; system stability concepts, swing curves; HVDC transmission.

Control Systems: Principles of feedback; transfer function; block diagrams; steady-state errors; Routh and Niquist techniques; Bode plots; lag, lead and lead-lag compensation; controllability and observability.

Electrical and Electronic Measurements: Bridges and potentiometers; PMMC, moving iron, dynamometer and induction type instruments; measurement of voltage, current, power, energy; instrument transformers; digital voltmeters and multimeters; phase, time and frequency measurement.

Analog and Digital Electronics: Characteristics of diodes, BJT, FET; amplifiers; oscillators and feedback amplifiers; operational amplifiers - characteristics and applications; timers; combinational and sequential logic circuits; multiplexer; Schmitt trigger; multi-vibrators; sample and hold circuits; A/D and D/A converters.

Power Electronics and Drives: Thyristors, Triacs, GTOs, MOSFETs and IGBTs; phase control rectifiers; bridge converters - fully controlled and half controlled; principles of choppers and inverters; basis concepts of adjustable speed dc and ac drives.

Advanced Topics in Electrical Engineering: Artificial Neural Network, Fuzzy systems, Neuro-fuzzy systems and genetic algorithms, Simulation tools used in Electrical Engineering.

Text book and Reference book

- A course in Electrical and Electronics measurement and Instrumentation : Sawhney, Dhanpat Rai pbs
- Digital Elctronics : A.P. Malvino
- Control System Engineering : L. Nagrath and Gopal , New age international publications
- Electric Machinery : P.S. Bhimbra
- Power System Engineering :Nagrath& Kothari
- Power Electronics : P.S. Bhimbra
- Network Analysis :Valkenburg,PHI pbs
- Engineering Electromagnetics :Hayt, TMH pbs

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Civil

STRUCTURAL ENGINEERING

Mechanics: Simple stress and strain relationship: Stress and strain in two dimensions, principal stresses, stress transformation, Mohr's circle. Simple bending theory, flexural and shear stresses. Bending moment and shear force in statically determinate beams.

Concrete Structures : Properties of concrete, basics of mix design, Concrete design – analysis of ultimate load capacity and design of members.

Steel Structures: Analysis and design of tension and compression members, beam and beam – columns, column bases.

GEOTECHNICAL ENGINEERING

Soil Mechanics: Origin of soils, soil classification, three-phase system, fundamental definitions. Permeability & seepage, effective stress principle, consolidation, compaction, shear strength.

Foundation Engineering: Earth pressure theories, effect of water table, layered soils, Stability of slopes-infinite slopes, finite slopes. Foundation types – foundation design requirements, Earth quack, Liquefaction

WATER RESOURCES ENGINEERING

Fluid Mechanics and Hydraulics : Properties of fluids, principle of conservation of mass, momentum energy and corresponding equations, Bernoulli's equation, laminar and turbulent flow, flow in pipes. Hydraulic jump. Kinematics of flow, velocity triangles and specific speed of pumps and turbines.

Irrigation : Duty, delta, estimation of evapo-transpiration. Crop water requirements. Design of lined and unlined canals, waterways, head works, gravity dams and spillways.

ENVIRONMENTAL ENGINEERING

Water requirements: Quality standards, basic unit processes and operations for water treatment, Drinking water standards, water requirements, distribution of water. Sewage and sewerage treatment, quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, sludge disposal, effluent discharge standards.

Air Pollution: Types of pollutants, their sources and impacts, air pollution control, air quality standards and limits.

TRANSPORTATION ENGINEERING

Highway Planning: Geometric design of highways, testing and specifications of paving materials, design of flexible and rigid pavements.

Traffic Engineering: Traffic characteristics, theory of traffic flow, intersection design, traffic signs and signal design.

***Reference Books*:**

Structural Analysis – R.C. Hibber (Pearson Publication)
Structural Analysis – Ghali, A. & Neville, M. (Chapman & Hall Publication. 1974)
Properties of Concrete – Neville, A.M., (Pitman Publishing Limited, London)
Reinforced Concrete Limit State Design – Jain, A.K. (Nem Chand & Bros. Roorkee, 1993)
Design of Steel Structures – E.H.Gaylord and C.N. Gaylord (Mc Graw Hill, New York)
Steel Structures: Design and Behaviour – C.G.Salmon and J.E.Johnson (Harper and Row, New York)
Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill, New Delhi)
Geotechnical Engineering Principles and Practice – Donald P. Coduto (Prentice Hall of India, New Delhi)
Foundation Engineering (2nd Edition) – Peck,R.B., Hanson (W.E. and Thornburn. W.H. Johan Wiley, New York
Mechanics of Fluid – Irving H. Shames (McGraw Hill)
Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)

(2)Faculty of Science

Subjects Name

(i) Physics

(ii) Chemistry

(iii) Mathematics

(iv) Microbiology

(v) Zoology

(vi) Botany

(vii) Biotechnology

(viii) Rural Technology

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Physics

Mathematical Physics: Dimensional analysis, Vector algebra and vector calculus, Linear algebra, Matrices, Linear differential equations, Elementary probability theory, Binomial, Poisson and normal distributions, Fourier series, Fourier and Laplace transforms, Elements of complex analysis.

Classical Mechanics: Newton's law, central forces, Kepler's law and planetary, motion, Lagrange and Hamilton's formalisms, Special theory of relativity – Lorentz transformations, time dilation, Length contraction, Relativistic kinematics, Variation of mass with velocity, Mass – Energy equivalence, Relation between energy and momentum.

Electromagnetic Theory & Acoustic wave: Gauss's Law and its applications, Laplace and Poisson equations, Magnetostatics : Bio-Savart's law, Ampere's theorem, Electromagnetic induction, Faraday's law, Maxwell's equations, Scalar and vector potentials, Electromagnetic waves and their reflection , Refraction, Interference, diffraction, polarization, Poynting vector, Energy and momentum ;electromagnetic waves, acoustics, acoustical holography, acoustic radiation, acoustic transmission.

Quantum Mechanics: Physical basis of quantum mechanics, Wave – Particle duality, De-Broglie hypothesis, Wave packet and group velocity, , Heisenberg's uncertainty principle, Schrodinger equation (time dependent and time independent), Eigen value problems such as particle- in- a- box, Harmonic oscillator etc.

Thermodynamics and Statistical Physics: Law of thermodynamics and their consequences, Macro state and microstates, Phase space, Probability ensembles, Partition function, Free energy, Calculation of thermodynamic quantities, Classical and quantum statistics, Degenerate Fermi gas, Black body radiation and Planck's distribution law, Bose- Einstein condensation, First and second order phase transitions.

Atomic and Molecular Physics: Quantum states of an electron in an atom, Electron spin, Spectra of one-and many-electron atoms, Relativistic corrections for energy levels of hydrogen, Hyperfine structure and isotopic shift, Width of spectral lines, LS & JJ coupling, Zeeman, Paschen Back and Stark effect, X-ray spectroscopy, Electron spin resonance, Nuclear magnetic resonance, lasers.

Solid State Physics: Atomic structure and bonding in materials. Crystal structure of materials, unit cell and space lattices, , Miller indices of planes and directions, Concept of amorphous, Single and polycrystalline structures and their effect on properties of materials, Crystal growth techniques, Free electron theory, Band theory of solids; metals, semiconductors and insulators, Hall effect, superconductivity, Fermi level, energy gap.

Nuclear and Particle Physics: Basic nuclear properties, Size, Shape, Charge distribution, Spin and Parity, Mass defect, Binding energy, semi-empirical mass formula, Liquid drop model, Nature of nuclear force, Nuclear shell model, Alpha decay, Beta decay, Gama decay, Laws of radioactivity, Nuclear reactions, Compound nuclei and direct reactions, Controlled and uncontrolled chain reaction, critical mass, fission and fusion, Nuclear reactor , Elementary particles.

Electronics: Semiconductor devices & physics P-N-Jn. depletion region, barrier potential, Transistors, Bipolar junction Transistors, Field effect transistors, UJT,SCR, Rectifier circuits, , Logic gates and symbols, Boolean algebra & Karnaugh map, DeMorgan's theorem, Basic digital logic circuits, Optoelectronic devices including solar cells; photonic devices; Photo detectors and LEDs, Digital techniques and applications (Registers Counters, Comparators and similar circuits); ICs; modulation & demodulation, AM,PM,FM;A/D and D/A convertors; Sensors.

Text & Reference Books:

[1] Mathematical Physics: Mary L B
[2] Statistical Physics: TMH-1988; F.Reif
[3] Introduction to Modern Physics: H.S. Mani & G.K. Mehta
[4] Solid State Electronic evices: B.G.Streetmann
[5] Introduction to Solid State Physics: C. Kittel
[6] Electronics Fundamental & Applications: J.D. Ryder

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Chemistry

INORGANIC CHEMISTRY

Main Group Elements : S-N compounds Sulphur-phosphorus compounds: Molecular sulphides such as P_4S_3, P_4S_7, P_4S_9 and P_4S_{10}.Phosphours-nitrogen compounds: Phosphazines. Other P-N compounds. Boron-nitrogen compounds:
Metal Complexes: Valence bond theory and its limitations. Ligand field theory: Splitting of d orbital's in different ligand fields Jahn-Teller effect MO diagrams of complexes with and without π bonds. Spectral & Magnetic properties of complexes.
Nuclear Chemistry: Nuclear reactions: Types of nuclear reactions. Spontaneous and reduced fission. Principles of working of the reactors of nudear power plants. Breeder reactor. Nuclear fusion reaction.
Analytical Principles: Volumetric methods: Theories of indicators: Acid-base, redox, metallochromic, indicators. Complexation Precipitation Redox titrations. Gravimetric methods: Mechanism of precipitate formation. Aging of precipitates. Precipitation from homogeneous solutions. Co precipitation and post precipitation. Contamination of precipitates. Washing, drying and ignition of precipitates.
Water treatment: Hardness, Alkalinity, Domestic water treatment Chemical analysis of water, D.O., B.O.D, C.O.D., T.D.S.

PHYSICAL CHEMISTRY

Quantum Mechanics: Introduction to Classical Mechanics: The blackbody radiation, photoelectric effect, Compton Effect and atomic spectra. Failure of classical mechanics to explain these phenomena. Quantum mechanical explanations.
Chemical Kinetics: Theories of reaction rate: Influence of temperature on reaction rate. Arrhenius equation and its limitations, activation energy. Collision theory and absolute reaction rate theory. Free energy of activation and volume of activation. Thermodynamic formulation of reaction rate. Effects of pressure and volume on the velocity of gas reaction.
Surface Chemistry: The colloidal state: Multimolecular, macromolecular and associated colloids. Stability of collids. The zeta potential. Kinetic, optical and electrical properties of colloids: Electrophoresis, electroosmosis, sedimentation potential and streaming potential Catalysis: Mechanism and theories of homogeneous and heterogeneous catalysis. Acid-base and enzyme catalysis.
Thermodynamics: Intensive and extensive properties. Exact differentials. Intrinsic energy, enthalpy, entropy, free energy and their relations and significances. Maxwell relations. Thermodynamic equations of state. Joule-Thomson effect. Joule-Thomson coefficient for van der Waals' gas. The third law of thermodynamics. .
Spectroscopy: Energy levels in molecules, rotational, vibrational, electronic NMR and ESR spectroscopy.

ORGANIC CHEMISTRY

Principles of organic chemistry: Inductive, mesomeric, electromeric effect. Carbocations, carbanions, carbens. Addition, Elimination, Substitution reactions
Chemistry of Polymers: Types and mechanism of polymerization reactions. Step-growth, free radical, addition, ionic polymerizations. Copolymers. Characterization of polymers. Manufacture and applications of polyolefins, thermoplastics, polyamides, polyesters, polyurethanes, epoxies and industrial polymers.
Chemistry of natural products- Biosynthesis of terpenes and alkoloids. Carbohydrate protein and nucleic acid.
Organic Photochemistry: Photochemical processes. Energy transfer, sensitization and quenching. Singlet and triplet states and their reactivity. Photoreactions of carbonyl compounds, enes, dienes, and arenes. Norrish reactions of acyclic ketones. Applications of photoreactions in laboratory and industrial synthesis.
Separation Techniques: Chromatographic methods: Classification of chromatographic separations. Theory of chromatography. Applications of chromatographic methods: Adsorption and partition chromatography. Paper, thin layer and column chromatographic methods.

Text & Reference Books:

[1] F.A.Cotton and G. Wilkinson, "Advanced Inorganic Chemistry", John Wiley & Sons
[2] J.March, "Advanced Organic Chemistry", Wiley
[3] Gurdeep Raj , "Advanced Physical Chemistry
[4] I.L.Finar, "Organic Chemistry" Vol 2, Longman

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Mathematics

Linear Algebra : Finite dimensional vector spaces; Linear transformations and their matrix representations, rank; systems of linear equations, Eigen values and Eigen vectors, minimal polynomial, Cayley-Hamilton Theorem, diagonalisation, Hermitian, Skew-Hermitian and unitary matrices; Finite dimensional inner product spaces, Gram-Schmidt ortho normalization process, self-adjoint operators.

Complex Analysis: Analytic functions, conformal mappings, bilinear transformations; complex integration; Cauchy's integral theorem and formula; Liouville's theorem, maximum modulus principle; Taylor and Laurent's series; residue theorem and applications for evaluating real integrals.

Real Analysis : Sequences and series of functions, uniform convergence, power series, Fourier series, functions of several variables, maxima, minima; Riemann integration, multiple integrals, line, surface and volume integrals, theorems of Green, Stokes and Gauss; matric spaces, completeness, Weierstrass approximation theorem, compactness; Lebesgue integral, Fatou's lemma, dominated convergence theorem.

Ordinary Differential Equations : First order ordinary differential equations, existence and uniqueness theorems, systems of linear first order ordinary differential equations, linear ordinary differential equations of higher order with constant coefficients; linear second order ordinary differential equations with variable coefficients; method of Laplace transforms for solving ordinary differential equations, series solutions; Legendra and Bessel functions and their orthogonality.

Algebra: Normal subgroups and homomorphism theorems, automorphisms; Groupactions, Sylow's theorems and their applications; Euclidean domains, Principle ideal domains and unique factorization domains. Prime ideals and maximal ideals in commutative rings; Fields, finite fields.

Functional Analysis : Banach spaces, Hahn-Banach extension theorem, open mapping and closed graph theorems, principle of uniform boundedness; Hilbert spaces, orthonormal bases, Riesz representation theorem, bounded linear operators.

Probability and Statistics : Probability space, conditional probability, Bayes theorem, independence, Random variables, joint and conditional distributions, standard probability distributions and their properties, expectation, conditional expectation, moments; weak and strong law of large numbers, central limit theorem; Sampling distributions; Testing of hypothesis, standard parametric tests based on normal, Chi-Square, t, F – distributions; Linear regression; Interval estimation.

Text & Reference Books:

[1]. Mathematical Analysis by Rudin,M
[2]. Discrete Mathematics by Truss, Pearson Education
[3]. Linear Algebra by Ramachandra, McGraw Hill Pub.
[4]. Mathematical Statistics by M.Ray, S-Chand Pub.
[5]. Abstract Algebra by S.David, Wiley Pub.
[6]. Ordinary Differential Equation by Garrett, Wiley Pub.

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Microbiology

General Microbiology: History of Microbiology. A brief idea of microbial diversity and scope of microbiology. Principles of classification of microbes; morphological, metabolic and molecular criteria for the classification, a brief introduction to major group of bacteria.

Microbial and Enzyme Technology: Enzymes from microbial sources, large scale production of enzymes, recovery of enzymes, enzyme purification methods – enzyme precipitation, separation by chromatography, enzyme reactors.

.**Microbial Physiology and Biochemistry**: Overview: Scope and importance Structure and function of biomolecules: Carbohydrates, proteins, lipids Enzymes: Characteristics, Ribozymes, co-enzymes. Metabolism: General concepts – application of second law of thermodynamics, redox potential, outline of intermediary metabolism: free energy change of the reactions catabolism – anabolism,.

Microbial Genetics: Nucleic Acids: Structure, physical and chemical properties of DNA and RNA, extra chromosomal DNA- profile, function and evolution. DNA replication, damage and repair, spontaneous and induced mutation, reversion of mutation. .Genetic recombination, Molecular models and mechanism, Gene conversion,Gene expression and regulation, Use of microbes in genetic engineering.

Biochemical and Molecular Techniques: Electrophoresis, Isolation ,purification, Blotting, DNA amplification: PCR, DNA sequencing Genesilencing, Chromatography, Gel filtration, ion exchange , affinity chromatography, TLC, HPLC, Spectroscopy and Microscopy:

Immunology: Introduction to immune system: Innate and adaptive immune responses; Cells and organs of immune system. Antigen antibody interactions and its applications. Immunology in health and disease- autoimmunity, immunodeficiency's hypersensitivity; concept of immunotherapy.

Microbial Genomics : Tools for studying DNA/genes),Genomes: Size, physical structure, genome analysis, gene duplication, Mapping of genome and Functional genomics

Bioprocess Technology and Engineering An introduction to fermentation processes-Range of fermentation process, microbial biomass, microbial enzyme, microbial metabolites, and transformation processes. Microbial growth kinetics. The isolation, preservation and improvement of industrially important and useful microorganisms.

Suggested Reading Material:

1. Wilson K. and Walker J. (2008). Principles and Techniques of Biochemistry and Molecular Biology. Cambridge University Press.
2. Nelson D and Cox MM. (2009). Principles of Biochemistry. W.H. Freeman and Company, New York.
3. Talaro K. P. & Talaro A. (2006). Foundations in Microbiology. McGraw-Hill College Dimensi.
4. Potter GWH and Potter GW (1995). Analysis of Biological Molecules: An Introduction to Principles, Instrumentationand Techniques, Kluwer Academic Publishers.
5. Willey J, Sherwood L. and Woolverton C (2007). Prescott/Harley/Klein's Microbiology, McGraw Hill.
6. Willard, HH and Merritt LL (1986). Instrumental Methods of Analysis. CBS Publishers and Distributors.
7. Williams, BL. and Wilson, K. (1975). A Biologists Guide to Principles and Techniques of Practical Biochemistry.John Wiley and Sons. Inc., New York.
8. Thornburn CC (1987). Isotopes and Radiations in Biology. Butterworth and Co. Ltd., London.
9. Aneja KR. (2005). Experiments in Microbiology, Plant Pathology and Biotechnology. New Age International (P) Ltd,Publishers.
10. Greenwood D (2007). Medical Microbiology. I.K. International.
11. Talaro KP and Talaro A. (2006). Foundations in Microbiology. McGraw-Hill College Dimensi.
12. Willey J, Sherwood L. and Woolverton C (2007). Prescott/Harley/Klein's Microbiology, McGraw Hill.
13. Atlas RM (1997). Principles of Microbiology. McGraw Hill.
14. Nester E.W, Anderson DG and Nester MT (2006). Microbiology. A Human Perspective. McGraw Hill

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Zoology

Non-Chordata and Chordata :A general survey, classification and relationship of the various phyla. Protozoa : Study of the structure, bionomics and life history of Verticella, Paramecium, Monocystic, malaria parasite, Typanosoma. Protozoa & disease. Perifera : Sycon. Coelentorate : Structure and life history of Obelia and Aurelia. Sea anemones, Corals, Aleyonium. Helminths, Structure and life history of planaria.Fasciola. Tacenia, Ascaris, Medical importance of Nematedes. Annelida, Neries , earthworm and leech Arthropoda, Palaemon , Scorpion, Cockroach, Mollusea. Unio and Pila, Pearl Formation Modifications of nervous system. Echinodermata , Asterias and its larva. General organisation and characters, outline classification and inter- relationship of proto -chordata. Pisces, Amphibia , Reptilia, Aves and Mammalia. Neoteny and retrogressive metamorphosis. A general study of comparative account of the various systems of vertebrates. Locomotion and respiration in fishes, structure and affinities of Dipnoi.Structural peculiarities of Amphibia. Poisonous and non- poisonous snakes of India, Aerial adaptations of birds. Structural peculiarities and affiniting distribution relation of prototheria and Metatheria.

Ecology and Economic Zoology: Environment : A biotic factors and their role ; Biotic factors -Inter and Intra-specific relations. Ecosystem, Niogeo-Chemical cycles. Adaptation in fresh water, marine and terrestrial habitats. Pollution in air, water and land. Wild life in India and its conservation.

Economic Zoology: Parasitism, Commensalism and Host parasite relationship. Parasitic protozoan's and helminthes of man. Beneficial and harmful insects.

Cell Biology -Structure and function of cell and cytoplasmic constituents: structure of nucleus, plasma membrane, mitochondria, Golgi-bodies, endoplasmic reticulum and ribosome's , cell division, mitosis and meiosis. Gene structure and function: Watson-Crick models of DNA, sex-chromosomes and sex -determination.

Genetics - Mendelian laws of inheritance, linkage and crossing over, mutation and evolution, cytoplasmic inheritance genes and diseases.

Evolution and Systematics - Orgin of life, History of evolutionary thought. Lamarck and his works, Darwin and his works, Sources and nature of organic variation. Natural selection, Isolation. Concept of species and sub-species, principles of classification, zoological nomenclature and international code. Fossils, geological eras, distribution of animal's zoogeographical realms of the world.

Biochemistry -Structure of carbohydrates, lipids, amino-acids, proteins and nucleic acids, glycolysis and Krebs cycle, oxidation and reduction . Oxidative phosphorylagion , energy conservation and release, ATP, cholesterol. Enzymes and coenzymes, Hormones and their functions.

Physiology with special reference to mammals - Composition of blood, blood groups in man , coagulation. oxygen and carbon dioxide transport, nephron and urine formation, mechanism of conduction along axon and across synapse ,neurotransmitters, Vision, Hearing and other receptors, mechanism of contraction of skeletal muscle, role. of salivary gland, liver, pancreases and intestinal glands indigestion. Absorption of digested food, roles of pituitary, thyroid ,parathyroid, pancreas, adrenal testis, ovary and pineal body.

Embryology - Gametogenesis, fertilization, types of eggs, cleavage, development up to gastrulation in Branchiostoma, frog and chick , Metamorphosis in frog; Formation and fate of extra embryonic membranes in chick; formation of amnion, allantcis and classification of placenta in mammals, function, of placenta in mammals.

Suggested Reading Material :

1. M. Kato. The Biology of Biodiversity, Springer.
2. J.C. Avice. Molecular Markers. Natural History and Evolution, Chapman & Hall, New York.
3. E.O. Wilson. Biodiversity, Academic Press, Washington.
4. G.G. Simpson. Principle of Animal Taxonomy. Oxford IBH Pub. Co.
5. E. Mayer. Elements of Taxonomy.
6. E.O. Wilson. The Diversity of Life (The College Edition), W.W. Northern & Co.
7. B.K. Tikadar. Threatened Animals of India, ZSI Publication, Calcutta.
9. Jorgensen, S.E., Fundamentals of Ecological Modelling, Elsevier New York.

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Botany

Microbiology - Viruses and Bacteria Structure, classification and reproduction. General Account of infection, immunity and serology: Microbes in industry and agriculture.

Pathology - Knowledge of important plant disease in India caused by fungi. Modes of infection and methods of control.

Plant Groups - Structure, reproduction, life- history, classification, evolution, ecology and economic importance of algae , fungi, bryophytes, pteridophytes and gymnospems.

Morphology, anatomy and embryology of Angiosperms - Tissues and tissue systems. Morphology and anatomy of stem, root and leaf (including development aspects and anomalous growth), Morphology of flower. Structure of anther and ovule, fertilization and Development of seed.

Taxonomy - Principles of nomenclature and classification of angiosperms. Modern trends in Taxonomy. A general knowledge of the more important families of angiosperms.

Cell Biology - Cell as unit of structure and functions. Ultra structure function and interrelationships of plasma membranes endoplasmic reticulum, mitochondria, ribosomes chlorplasts and nucleus, Chromosomes- chemical and physical nature behavior during mitosis and meosis.

Genetics and Evolution - Mendelian concept of genetics. Development of the gene concept Nucleic acids their structure and role in reproduction and protein synthesis. Genetic code and regulation. Mechanism of microbial recombination. Organic evolution evidences, mechanism and theories.

Physiology : Photosynthesis history, factors, mechanism and importance. Absorption and conduction of water and salts. Transpiration, Major and minor essential elements and their role in nutrition, Nitrogen fixation and nitrate reduction Enzymes, Respiration and fermentation. General account of growth. Plantharmones and their functions. Photo-periodism. Seed dormancy and germination.

Ecology - Scope of ecology , structure . function and dynamics of ecosystems, Plant communities and succession. Ecological factors. Applied aspects of ecology including conservation and control of pollution.

Economic Botany - General account of important sources of food, fiber , wood and drugs.

Suggested Reading Material :

- Basra, A.S. & Basra, R.K. 1997. Mechanisms of environmental stress resistance in plants, Harwood Academic Publishers, The Netherlands.
- Chopra, V.L. & Pagoda, R.S. 1988. Approaches for incorporating drought and salinity resistance in crop plants, Oxford & IBH Publishing Co. Pvt. Ltd., ND
- Gupta, U.S. 1985. Physiological aspects of dry land farming, Oxford & IBH
- Journal of Bioscience, Special issue: Cellular Stress Response, 1998.23(4):Oct., The Indian Academy of Sciences, Bangalore
- Kramer, P.J. 1983. Water relations of plants, Academic Press Inc., NY
- Levitt, 1972, 1980.
- Nilsen, L. & Orcutt, 1998. Physiology of plants under stress :Abiotic factors Orcutt
- Paleg, L.G. & Aspinall, D. 1981. Physiology and biochemistry of drought resistance in plants, Academic Press, NY.
- Singh, Randhir& Sawhney, S.K. 1988. Advances in frontier areas of plant biochemistry, Prentice-Hall of India Pvt. Ltd., New Delhi

Dr. C.V. Raman University Bilaspur(C.G.)

Subject: Biotechnology

Biochemistry: Biomolecules and their conformation; Weak inter- molecular interactions in biomolecules; Chemical and functional nature of enzymes; Kinetics of single substrate and bi-substrate enzyme catalyzed reactions; Bioenergetics; Metabolism (Glycolysis, TAC and Oxidative phosphorylation); Membrane transport and pump; Cell cycle and cell growth control; Cell signaling and signal transduction.

Molecular Biology and Genetics: Molecular structure of genes and chromosomes; DNA replication and control; Transcription and its control; Translational processes; Regulatory controls in prokaryotes and eukaryotes; mendelian inheritance; Gene interaction; Complementation; Linkage, recombination and chromosome mapping; Extra chromosomal inheritance; Chromosomal variation; Population genetics; Transposable elements, Molecular basis of genetics diseases and applications.

Bioprocess Engineering: Kinetics of microbial growth, substrate utilization and product formation: Simple sü-uctured models; Sterilization of air and media; Batch, fed-batch and continuous processes; Aeration and agitation; Mass transfer in bioreactors; Rheology of fermentation fluids; Scale-up concept; Design of fermentation media; Various type of microbial and enzyme reactors; Instrumentation in bioreactors.

Plant and Animal Biotechnology: Special features and organization of plant cells; Totipotency; Regeneration of plants; Plant products of industrial importance; Biochemistry of major metabolic pathways and products; Autotrophic and heterotrophic growth; plant growth regulator and elicitors; Cell suspension culture development; methodology, kinetics of growth and production formation, nutrient optimization; Production of secondary metabolites by plant suspension culture; Hairy root cultures and their cultivation. Techniques in raising transgencies.

Immunology: The origin of immunology; Inherent immunity; Humoral and cell mediated immunity; Primary and secondary lymphoid organ; Antigen; B and T cells and Macrophages; Major histocompatibility complex (MHC); Antigen processing and presentation; Synthesis of antibody and secretion; Molecular basis of antibody diversity; Polyclonal and monoclonal antibody; Complement; Antigen-Antibody reaction; Regulation of immune response; Immune tolerance; Hyper sensitivity; Autoimmunity; Graft versus host reaction.

Recombinant DNA Technology: Restriction and modification enzymes; Vectors; Plasmid, bacteriophage and other viral vectors, cosmid, Ti plasmid, yeast artificial chromosomes; cDNA and genomic DNA library; Gene cloning; Expression of cloned gene; Transposons and gene targeting; DNA labeling; DNA sequencing; DNA fingerprinting; Southern and northern blotting; In -situ hybridization; Site-directed mutagenesis; Gene transfer technologies; Gene therapy.

Proteomics : Protein analysis (includes measurement of concentration, aminoacid composition, N-terminal sequencing); 2-D electrophoresis of proteins; Microscale solution isoelectricfocusing; Peptide fingerprinting; LC/MS-MS for identification of proteins and modified proteins; MALDI-TOF; SAGE.

Tools for genome analysis:-RFLP, DNA fingerprinting, RAPD, , Linkage and Pedigree analysis-physical and genetic mapping, Primer design; PCR: its types and applications, Site Specific Mutagenesis

Reference Books:

I. Principle of Biochemistry, Nelson D and Cox MM. (2009). W.H. Freeman and Company, New York,

2. Analysis of Biological Molecules: An introduction to Principles, Instrumentation and Techniques, Potter GWH and Potter GW (1995). Kluwer Academic Publisher.

3. Instrumental methods of Analysis. Willard, HH and Merritt LL (1986). CBS Publisher and Distributors,

4. Isotopes and radiations in Biology. Thornburn CC (1987). Butterworth and Co. Ltd., London.

5. Prescott/Harley/Klein's, Willey J, Sherwood L. and Woolverton C (2007). McGraw Hill,

Dr. C.V. Raman University Bilaspur(C.G.)

Subject: Rural Technology

Rural technology for sustainable development: - Definition, concept and scope of rural technology in present scenario, Appropriate technology, characteristics of technology, characteristics of innovation, concept and factor related to the technology transfer. Definition, concept & Importance of ITKs, Scouting and Documenting ITKs.

Rural Development: concepts, strategies and experience, Rural Society and Panchayat Raj, Characteristics of Rural life, Rural Social structure..

Rural development program for rural area upliftment- Poverty Alleviation Programmes, Programmes for self & Wage Employment and Social Security Current Strategy, Rural Basic Services and Infrastructure, Natural Resources Management and Environment, Other programs, IRDP, TRYSEM, CAPART, MGNERGA, WDP, SGSY, PMKVY, NRLM, NRHM, UBA etc **.**

Agriculture Development- Basics of Sustainable Agriculture- Definition, Positive and negative Aspects of Modern and Sustainable Agriculture. Principles and Elements of Sustainable Agriculture

Sustainable rural technology for livelihood improvement- Lac Production Technique- Insect morphology, History of lac production, Important host for lac production, Lac cultivation practices **Mushroom Production**- Introduction, Medicinal and Poisonous mushroom, Production technology of Oyster mushroom, Paddy Straw mushroom and Button mushroom.

Apiculture- honey bees and their types, bee colony organization, area of distribution, bee equipments, management of pests and disease, honey formation and characterization. By-Products of honey bees.

Mulberry and non-mulberry Sericulture- Species of silk worms, Production of mulberry and non-mulberry silk in India, Rearing of tasar and mulberry silk worm, pest predators of tasar and mulberry silk worm, tasar and mulberry industries in Chhattisgarh, problem of tasar and mulberry culture.

Fundamentals of Research in Rural Technology -Objectives, Why do we conduct research?, How do we KNOW?, What is Science?, What are the assumptions of Science?, What is the aim of Social Science including Rural Education?, How important is research methodology?, How does research proceed?, What are the types of research?, Let us sum up.

Text & Reference Books:

[1] Hand Book of Agriculture – ICAR publication.
[2] Grain Management:To Ensure Food Security, Dr. Anupam Tiwari, Marks Books, New Delhi
[3] Fundamental Of Agriculture- Arun Katyayan
[4] Rural Development, G. R. Madan
[5] Rural Sociology, A. R. Desai
[6] Pancahyati Raj Institution, G. S. Bal
[7] An introduction of Sericulture, G & J Sulochana
[8] Mushroom Culture in India – Neeta Bhal
[9] Lac cultivation – C.R. Negi
[10] Lac production technique – ILRI Publication Ranchi
[11] Research in Education, James V Kahn & John w Best
[12] Guide to the successful thesis and dissertation Vth Edition

(3)Faculty of Commerce &Management

Subject Name

(i) Management

(ii) Commerce

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Management

Management Process & Organizational Behavior-Overview: Functions and Principles of management; Management Thought and Concepts; Management Decision Making Processes and Types. Overview of Organizational Behaviour; Understanding and managing Individual Behavior-personality, Perception, Values, Attitudes, Learning and Motivation; Group Dynamics and Team Work. Leadership; Overview of Organizational Development: Organizational structure; Organizational design; OD Interventions &Change Management.

Managerial Economics-Overview of Micro-Economics : Basic Concepts of Demand and Supply; Demand Analysis; Production Function; Cost-Output Relations; market Structures; Pricing theories; Overview of macro-Economics; National Income Concepts; Budgeting.

Quantitative Techniques Overview of Probability: Types of Probability distributions (e.g. Binomial, Poisson, Normal and Exponential).Co-relation & Regression Analysis; Overview of Sampling: Sampling distributions; Tests of Hypothesis; Large and small samples. Univariate and Bivariate Data Analysis: t-test, z-test, Chi-square tests; ANOVA.

Strategic Management- Overview of Strategic Management: Concept of Corporate Strategy; BCG Model; GE-9 Cell Model ; Value Chain Analysis; SWOT & TOWS Analysis; Porter's Generic Strategies; Competitor Analysis. Overview of Strategy Formulation and Implementation at Corporate and Business level. Strategic Control.

Ethics in Business Overview of Ethical issues in Business: Value Based Organizations; Ethical Issues on Individual in Organizations; Gender Issues; Ecological Consciousness; Environmental Ethics; Social Responsibilities of Business; Corporate Governance and Ethics; Benefits of Corporate Social Responsibility.

Human Resource management Overview of HRM: Concepts and Perspectives in HRM; HRM in Changing Environment, Overview of HR Planning: Objectives Process and Techniques; Job Analysis; Recruitment and Selection, Induction; Training and Development; Performance & Potential Appraisal, Overview of Industrial Relations: Wage Policy and Determination; Trade Unions; Dispute Resolution and Grievance Management; Labour Welfare .Overview of e- HRM.

Finance-Overview of Financial Accounting; Analysis of Balance Sheet Statement, Overview of Cost Accounting: Costing Methods and Techniques, Overview of Financial Management: Fund Flow Analysis; Management of Working Capital, Overview of Capital Budgeting: Capital Budgeting Decisions; Capital Structure and Cost of Capital. Overview of Dividend Policy: Determinants; Long-term and Short-term Financing Instruments; Mergers and Acquisitions.

Marketing Management: Overview of Marketing: Marketing Mix, Market Segmentation, Targeting and Positioning; Overview of Product Management; Product Mix Decisions; Product Life Cycle, New Product Development, Branding; Pricing Methods and Strategies. Overview of Promotional Management: Promotion Mix; Advertising; Personal selling; Supply Chain Management; Viral & Niche Marketing; Customer Relation management. Overview of e-Marketing: Uses of Internet as Marketing Medium; Issues in Branding, Market Development, advertising and Retailing on Internet.

Production Management: Overview of Production management: Demand Forecasting for Operations; Production Scheduling; Work Measurement; time and Motion Study; Statistical Quality Control; Facility Location; Layout Planning. Overview of Operations Research: Linear programming; Transportation model; Inventory control; Queuing theory; Decision theory; PERT/CPM.

Information System-Overview of MIS: Application of Information Systems in management; MIS and Decision Making; System Analysis and Design. Overview of Database Management System; Overview of E-Commerce:

Text & Reference Books:

[1] Stoner and Freeman, Management, Prentice Hall, N. Delhi.
[2] Adam, E E& Ebert, RJ. Production & Operation Management, New Delhi , PHI.
[3] Amrine Harold T. etc. Manufacturing Organization and management. Englewood Cliffs, New Jersey, PHI Inc.
[4] Baker, Michael J., Marketing : An Introductory Text, McMillan Press Ltd., 1996.
[5] Czinkota, Michael R., Massaki, Kotabe and David Mercer B., Marketing Management :Text and Cases,Blackwell Publishers, Massachusetts, 1997.
[6] Hampton , john . Financial Decision Making. Englewood Cliffs, New Jersey, Prentice Hall Inc.
[7] Van Baumol, W.J. Economic Theory and Operations Analysis, New Delhi, Prentice Hall Inc.
[8] Richard I.Levin and David S.Rubin, Statistics for Management (Seventh Edition), Prentice Hallof India, New Delhi.
[9] Gupta, S. P. and Gupta, M.P, Business Statistics, Sultan Chand and Sons, New Delhi, 1997.
[10] A A Thompson Jr., A J Strickland III, J E Gamble, Crafting & Executing Strategy – The Quest for Competitive Advantage, Tata McGraw Hill, 4th ed., 2005.
[11] Ranjan Das, Crafting the Strategy: Concepts and Cases in Strategic Management, Tata McGraw Hill, 2004.
[12]Laura P. Hartman & Joe DesJardins, *Business Ethics: Business Ethics and values, Francis Cherunilum*

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Commerce

Business Environment: Meaning and Elements of Business Environment, Economic Environment , Economic Policies , Economic Planning. Competition policy, Consumer protection, Environment protection Liberalization , Privatization and globalization, Second generation reforms , Industrial policy and implementation. Industrial growth and structural changes.

Financial & Management Accounting : Basic Accounting concepts, Capital & Revenue, Financial statements. Partnership Accounts : Admission, Retirement, Death, Dissolution and cash Distribution. Advanced Company Accounts : Issue, Forfieture, Purchase of Business, Liquidation, Valuation of shares, Amalgamation, Absorption and Reconstruction , Holding company accounts. Cost Management Accounting: Ratio Analysis, Funds Flow Analysis , Cash Flow Analysis, Marginal costing & Break-even analysis, Standard costing, Budgetary control, Costing for decision making, Responsibility accounting.

Business Economics: Nature & uses of Business Economics, Concept of Profit & Wealth maximization. Demand Analysis & Elasticity of Demand, Curve Analysis Law Utility Analysis & Indifference Curve analysis, Laws of Returns and Law of Variable proportions.

Business Statistics & Data Processing: Data types , Data collection and analysis, Sampling, need , errors, & method of sampling, Normal Distribution , Hypothesis testing, Analysis and Interpretation of data. Correlation and Regression , small sample tests-t-test, F-test and chi-square test

Business Management: Concept of management Planning: Objectives, Strategies, Planning process, Decision-making. Staffing: Leading, Motivation, Leadership, Committees, Communication. Controlling: Corporate Governance and Business Ethics.

Marketing Management: The evolution of marketing concepts, Concepts of Marketing, Marketing mix, Marketing environment, Product decision, Pricing decision, Distribution decision.

Financial Management: Capital Structure, Financial & Operating leverage Cost of capital, Capital budgeting, Working capital management. Dividend Policy.

Human Resources Management: Concepts, Role and Functions of Human Resource management, Human Resource planning, Recruitment & Selection. Training & Development, Succession planning. Compensation : Wage & Salary Administration

Banking & Financial Institutions: Importance of Banking to Business, Types of Banks & Their functions

Development Banking : IDBI, IFCI, SFCs, UTI, SIDBI.

International Business: World Trade Organisation: Its function & policies.

Reference Books:

- Chisnall, Peter M : The Essonce of Marketing Research Prentice Hall, New Delhi.
- Davis ,J.J.: Advertising Research, Prentice Hall, New Delhi.
- Hooda, R.P.: Statistics for Business and Economics. Macmillan India, New Delhi.
- Adhikary K: Conomic Environment of Business, Sultan Chand & Sons. New Delhi.
- Ahluwalia. I. J: Industrial Growth in India, Oxford University Press. New Delhi.
- Aswathappa K: Legal Environment of Business, Himalaya Publication New Delhi.
- Ghose Biswanath: Economic Environment of Business, Vikas Publication. New Delhi.
- Agrawal, K.N. Deeksha Agrawal : Business on the Net : What's & How's of E-Commerce MacMillan. New Delhi.
- Agrawal, K.N. Deeksha Agrawal : Business on the Net :bridge to the Online Store form: MacMillan. New Delhi.
- Diwan Prag & Sunil Sharma : Electronic Commerce : A Manager's guide to E-Business, Vanity Books International, Delhi.

(4) Faculty of Education and Physical Education

Subject Name

(i) Education

(ii) Physical Education

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Education

1. **Philosophical & sociological foundation of Education.**

- Relationship of education & philosophy.
- Western schools of philosophy- Idealism, Naturalism, and Pragmatism.
- Contributions of John Dewey, Vivekananda, Tagore &M.K. Gandhi in the field of educational.
- Relationship of education & Sociology.
- Sociology of Education & Educational sociology.
- Meaning and Factors influencing Social Change.

2. **Psychological Foundation of Education.**

- Educational psychology- concept, nature & scope.
- Meaning & Factors influencing Growth & Development.
- Theories of Learning- Pavlov's classical, Skinner's operant conditioning, learning by Insight, Lewin's Field Theory.
- Learning & Motivation.
- Intelligence- its meaning, theories & measurement.
- Personality- Type & trait theories, Measurement of personality.

3. **Methodology of Educational Research.**

- Meaning, needs & scope of educational research.
- Fundamental, Applied & Action Research.
- Criteria & Sources for identifying the Research problem.
- Hypothesis- Meaning & types.
- Sampling- concept of population & sample, various methods of sampling.
- Tools & Techniques- Observation, Interview, Questionnaire.
- Inferential Statistics – Mean, Median, Mode, SD, 't' test, one way ANOVA, Chi-square.

Text & Reference Books:

[1] Swroop&saxena - Educational philosophy.
[2] Ramshakal Pandey - Educational philosophy
[3] S.S.Chauhan - Advance Educational Psychology.
[4] S.P.Gupta - Educational Psychology.
[5] Lokesh Koul - Research Methodology.
[6] C.R.Kothari - Research Methodology.

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Physical Education

1. Introduction to and definition, aim and objectives of Physical Education, Historical development of Ancient and Modern Olympic Games, Physical Education in India.
2. Physiology of Muscular activity, respiration& blood circulation, Bioenergetics, Athletic injuries and their management, Doping in Sports.
3. Joints and their movements-planes and axes, Kinetics, Kinematics-linear and angular, levers, Newton's Laws of Linear and Angular motion, Principles of equilibrium and force, spin and elasticity, Mechanical analysis of various sports activities, Mechanical analysis of running, jumping, throwing.
4. Learning process—theories and laws of learning, Motivation, theories and dynamics of motivation in sports, Personality, its dimensions, theories, personality and performance, Psychological factors affecting sports performance—stress, anxiety and aggression, Group dynamics, team cohesion and leadership in sports.
5. Professional courses in Sports and Physical Education in India, Qualities and Qualifications of Physical Educational Personnel.
6. Sports Nutrition and dietary manipulations and Athlete diet, Health-related fitness, obesity and its management, Communicable diseases—their preventive and therapeutic aspect.
7. Aims Objectives, Characteristics and principles of sports training, Training load and periodization, Training methods and specific training programme for development of various motor qualities, Short-term and long-term training plans.
8. Nature, scope and type of research, Formulation and selection of research problem, Sampling—process and techniques, Methods of research, Data collection—tools and techniques, Statistical techniques of data analysis—measures of central tendency and variability, correlation, normal probability curve, t-test, F-tests, Hypothesis formulation, types and testing, Preparation of Synopsis for research Project.
9. Concept of test, measurement and evaluation, Principles of measurement and evaluation Concepts and assessment of physical fitness, motor fitness and motor ability, Skill test for Badminton, Basket ball. Hockey, and Volley ball. Testing psychological variables—competitive anxiety, motivation, and self-concept.
10. Organization and functions of sports bodies, Intramurals and Extramural, Methods and Techniques of teaching, Principles of planning Physical Education lessons, Concept of techniques of supervision.

Text & Reference Books:

[1] Research Process in Physical Education and Sports.
[2] Statistics in Physical Education and Sports.
[3] Sports Training.
[4] Exercise Physiology.
[5] Sports Biomechanics.
[6] Sports Medicine.
[7] Test, Measurement and Evaluation in Physical Education and Sports.
[8] Sports Psychology

(5) Faculty of Arts

Subjects Name

(i) Hindi

(ii) Sanskrit

(iii) English

(iv) Geography

(v) Economics

(vi) Political Science

(vii) History

(viii) Library & Information Science

DR.C.V. RAMAN UNIVERSITY, KOTA, BILASPUR (C.G.)

SUBJECT -हिन्दी

1. **हिन्दी भाषा और उसका विकास** – अपभ्रंश और पुरानी हिन्दी का संबंध, काव्य भाषा के रूप में अवधी का उदय और विकास काव्य भाषा के रूप में ब्रज भाषा का उदय और विकास, साहित्यिक हिन्दी के रूप में खड़ी बोली का उदय और विकास, मानक हिन्दी का भाषा वैज्ञानिक विवरण, हिन्दी की बोलियॉ–वर्गीकरण तथा क्षेत्र, नागरी लिपि का विकास और उसका मानकीकरण।
   हिन्दी भाषा प्रयोग के विविध रूप–बोली, मानक भाषा, संपर्क भाषा, राजभाषा और राष्ट्रभाषा, संचाार माध्यम और हिन्दी।

2. **हिन्दी साहित्य का इतिहास** – हिन्दी साहित्य का इतिहास, दर्शन, हिन्दी साहित्य के इतिहास लेखन की पद्धतियॉ।
   आदिकाल, मध्यकाल, हिन्दी संत काव्य, कृष्ण काव्य, रामकाव्य, रीतिकाल, आधुनिककाल, द्विवेदीयुग, छायावाद, प्रगतिवाद, प्रयोगवाद।

3. **हिन्दी साहित्य की गद्य विधायें** – हिन्दी उपन्यासः प्रेमचन्द पूर्व उपन्यास, प्रेमचन्द और उनका युग, प्रेमचन्द के परवर्ती प्रमुख उपन्यासकारः– हजारी प्रसाद द्विवेदी, फणीश्वरनाथ रेणु, श्रीलाल शुक्ल, रांगेय राघव।
   हिन्दी कहानीः बीसवींसदी की हिन्दी कहानी और प्रमुख कहानी आंदोलन।
   हिन्दी नाटकः हिन्दी नाटक और रंगमंच, विकास के चरण और प्रमुख नाट्यकृतियॉः अंधेरनगरी, चंद्रगुप्त, अंधायुग, आधे–अधूरे, आठवॉसर्ग, हिन्दी एकांकी।
   हिन्दी निबंधः हिन्दी निबंध के प्रकार और प्रमुख निबंधकार – रामचंद्र शुक्ल, हजारी प्रसाद द्विवेदी, कुबेर नाथ राय, विद्या निवास मिश्र, हरिशंकर परसाई।
   हिन्दी की अन्य गद्य विधायें : रेखाचित्र, संस्मरण, यात्रा–साहित्य, आत्मकथा, जीवनी और रिपोर्ताज।

4. **काव्य शास्त्र और आलोचना**–भरतमुनि का रस और उसके प्रमुख व्याख्याकार।
   रस के अव्यव। साधारणीकरण। शब्दशक्तियॉ और ध्वनि का स्वरूप।
   अलंकार– यमक, श्लेष, वक्रोक्ति, उपमा, रूपक, उत्प्रेक्षा, संदेह, भ्रांतिमान, अतिश्योक्त, अन्योक्ति, समासोक्ति, अत्युक्ति, विशेषोक्ति, दृष्टांत, उदाहरण, प्रतिवस्तूपमा, निदर्शना, अर्थान्तरन्यास, विभावना, असंगति तथा विरोधाभास।

5. **भाषा विज्ञान** :–भाषा परिवर्तन के कारण, ध्वनि परिवर्तन के कारण व दिशाएं, अर्थ परिवर्तन के कारण व दिशाएं, हिन्दी भाषा का विकास। देवनागरी लिपि की विशेषताएॅ, हिन्दी शब्द समूह ।

संदर्भ ग्रंथः–

1. हिन्दी साहित्य का इतिहास – डॉ. नरेन्द्र
2. संत काव्य – परशु राम चतुर्वेदी
3. हिन्दी साहित्य का काव्यकाल – डॉ. हजारी प्रसाद द्विवेदी
4. हिन्दी साहित्य की भूमिका – डॉ. हजारी प्रसाद द्विवेदी

Dr. C.V. Raman University, Kota, Bilaspur (C.G.)

Subject: संस्कृत

1. वैदिक साहित्य – देवताओं का परिचय–इन्द्र, अग्नि, विष्णु, रूद्र, उषस्, सवितृ, वरूण, वृहस्पति। विषय वस्तु– ऋग्वेद, यजुर्वेद, सामवेद, अथर्ववेद, ब्रह्मण, आरण्यक, उपनिषद्, वेदाङ्गों का सामान्य परिचय, निरूक्त, (प्रथम एवं द्वितीय अध्याय) वैदिक एवं लौकिक संस्कृत में अन्तर

2. व्याकरण एवं भाषा विज्ञान– सन्धि, समास, शब्दरूप, धातुरूप, कृदन्त, तद्धिति, कारक–सिद्धान्त कौमुदी के अनुसार, भाषा की परिभाषा एवं प्रकार (परिवार मूलक एवं आकृति मूलक) भाषाओं का वर्गीकरण, ध्वनि संबंधी नियम।

3. दर्शन – ईश्वर कृष्ण की सांख्यकारिका–पुरूष–स्वरूप, प्रकृति–स्वरूप, सृष्टिक्रम, सदानन्दकावेदान्तसार–अज्ञान, पञ्चीकरण, अध्यारोप, जीवन मुक्ति, केशवमिश्र की तर्कभाषा प्रमाण–प्रत्यक्ष, अनुमानः उपमान, शब्द।

4. संस्कृत साहित्य – निम्नलिखित ग्रन्थों का सामान्य अध्ययन–
   - पद्य – नैषधीय चरित, शिशुपालवध, रघुवंश, मेघदूत।
   - गद्य – कादम्बरी, दशकुमारचरित, हर्षचरित,।
   - नाटक – अभिज्ञानशाकुन्तल, उत्तररामचरित, वेणीसंहारः, मृच्छकटिक।

5. नाट्यशास्त्र – भरत–नाट्यशास्त्र–प्रथमतथा द्वितीय अध्याय
   दशरूपक–प्रथम प्रकाश

6. काव्यशास्त्र – काव्य प्रकाश–काव्य प्रयोजन, काव्यहेतुकाव्य लक्षण, काव्य भेद, काव्यशक्ति, अभिहितान्वयवाद, अलंकार–अनुप्रास, उपमा, रूपक, उत्प्रेक्षा, वक्रोक्ति, विभावना, श्लेष,
   ध्वन्यालोक–प्रथमउद्योत

संदर्भ ग्रन्थ सूची

1. वैदिक साहित्य का इतिहास–आचार्य बलदेव उपाध्याय
2. निरूक्त–आचार्य विश्वेश्वर
3. लघुसिद्धान्त कौमुदी–गिरजादत्त त्रिपाठी
4. भाषा विज्ञान–डॉ. भोलानाथ तिवारी
5. काव्य प्रकाश–आचार्य विश्वेश्वर
6. ध्वन्यालोक–आचार्य विश्वेश्वर
7. संस्कृत साहित्य का इतिहास–आचार्य बलदेव उपाध्याय

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: English

The paper will cover the study of English literature from Shakespeare to 1950. A first hand reading of the prescribed texts and critical ability is required to be tested.

I Literary Forms

Poetry	:	Lyric, Ode, Sonnet, Elegy, Satire, Epic, Blank verse, Ballad, Rhyme
Drama	:	Tragedy, Comedy, Melodrama, One Act Play, Masque, Theatre of the Absurd, Allegany, satire, Monologue, soliloquy.

II William Shakespeare: General Questions on the writer and a critical study of the Following works Hamlet, The Tempest

III A critical study of the following poets with reference of the poems shown against each of their Poetry

Milton	:	Sonnets
Pope	:	An Essay on Man
Johnson	:	The Vanity of Human Wishes
Wordsworth	:	Tintern Abbey. Ode to Immortality
Keats	:	Odes
Tennyson	:	Ulysses

IV The works of the following novelists with special reference to the novels mentioned against each.

Dickens	:	Oliver Twist
Thomas Hardy	:	Tess of the D'urbervilles
Aristotle	:	Poetics
Longinus	:	On the Sublime
Dryden	:	Essay on Dramatic Poesig
Arnold	:	The Study of Poetry

V (a) A critical study of the 20th century writers and their works.

E.M. Forster	:	A Passage to India
D.H. Lawrence	:	Sons and Lovers
G.B. Shaw	:	Saint Joan
W.B. Yeats	:	Byzantium, the Second Coming, a Prayer to My Daughter
T.S. Eliot	:	The Wasteland

V (b) American Literature

Emerson	:	The American Scholar
Thoreau	:	Civil Disobedience
Hawthorne	:	The Scarlet Letter
Eugene O'Neill	:	The Hairy Ape.

Recommended Books:-

1. A History of English Literature - Arthur Compton-Rickett.
2. American Literature - Meenakshi Raman
3. English Language Literature - P.D. Wadgaunkar

DR. C.V. RAMAN UNIVERSITY,
KOTA, BILASPUR (C.G.)
SUBJECT: GEOGRAPHY

1. **Geomorphology:** Origin of the Earth – Theories regarding origin of the earth. Fundamental concepts, endogenetic and Exogenetic forces; Denudation and weathering, Geosynclines, Continental Drift and plate tectonics, Concept of geomorphic cycle, Landforms associated with fluvial, glacial arid, costal and karts.
2. **Economic Geography:** Sectors of economy, Primary, secondary, tertiary and quaternary, Natural resources: renewable and non- renewable.
3. **Regional Planning & Development :** Regional concept in geography, Concept of planning regions, Types of region, Methods of regional delineation, Regional planning in India,
4. **History of Geographical Thoughts :** General character of Geographic knowledge during the ancient period and medieval period , Foundations of Modern Geography
5. **Climatology & Oceanography:** Composition and structure of the atmosphere, Heat budget of the earth, Distribution of temperature, Atmospheric pressure and general circulation of winds. Ocean deposits, Coral reefs, Temperature and salinity of the oceans, Density of sea water, Tides and ocean currents.
6. **Population & Settlement Geography:** Patterns of world distribution, Growth a density of population, patterns and processes of migration. Site, Situation, types, sizes, Spacing, and internal morphology of rural and urban settlements, City-region, primate city, Rank- size rule.
7. **Geography of India:** Physiographic divisions, climate: its regional variations, vegetation types and vegetation regions; Major soil types, Irrigation and agriculture; Population distribution and growth; Settlement patterns; Mineral and power resources, major industries and industrial regions.

Text & Reference Books:

1. Barry R.G. and Choriey P.J. “Atmosphere Weather and Climate rout ledge”, London and Newyork 1998.
2. Davis Richard J.A. : “Oceanography-An Introduction to the marine Environment” ,Wm.C. Brown lowa 1986.
3. Byliss Smith T.P. – “The Ecology of Agriculture Systems”, Cambridge University Press London 1987.
4. Gorgon H.P. – “Geography of Agriculture”, Prentice Hall, New York 1970.
5. Goodies A: “The Nature of the Environment”, Oxford & Blackwell, London 1993.
6. Holms, A: “Principal of Physical Geology”,, Thomas Nelson, London.
7. Husain , Majid :- “ Evolution of Geographical thought “ Rawat Publication , Jaipur
8. Chatterjee S.P. :-“Economic Geography of Asia”, Allied Book Ageney, Calcutta 1984
9. “Center for Science & Environment”, (1988) State of India’s Environment, New Delhi
10. Taylor P.J and Colin Flint 2000: Political Geo Singapore. Pearson Education LTD

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Economics

1) **Consumer behavior** - Law of demand, Elasticity of demand, utility analysis and Indifference -curve techniques, **Producer's behavior** - Production Function, Laws of Returns, Returns, of Scale cost curves. **Price Theory -** Price determination under different maker condition, pricing of factors of production. Keynesian and Modern theory of employment Banking objective and instruments of Central Banking, credit policies in a planned developing economy.
2) **National Income** -Concept and measurement, **International trade**-Theory and policy of international trade , determination of exchange rates ,balance of payment **International Monetary institutions** - I. B.R.D. and I.M.F. Characteristics of under developed economy, human and natural resources, primary, secondary and tertiary sectors in India, mixed economy in India **Types and principles of taxation**. Principles of Public expenditure, objective and instruments of budgetary and fiscal policy in a planned developing economy.
3) **Indian Planning** - Objectives and strategies, planned growth and distributive justice eradication of poverty, problems of Indian planning. **Agricultural development**- Agricultural Policy. Land reforms Green Revolution and its aftermath **Industrial development** - Industrial Policy, Public and private sectors, Regional distribution of Industries in India. Pricing policies for agricultural and industrial outputs. Fiscal and momentary policy in India - Objectives, recent budgetary trends, bank nationalization in India. Reserve Bank and monetary policy in India Recent trends in India's foreign trade and balance of payments.
4) **Economic Systems** - Capitalism, Socialism and mixed economy.

Text & Reference Books:

[1] Stigler G. (1996) Theory of Price, 4th Edition, Prentice Hall of India, New Delhi.
[2] Sen A. (1999) Microeconomics: Theory and Application, Oxford University Press, New Delhi.
[3] Kreps David M. (1990), A Course in Microeconomic Theory, Princeton University Press, Princeton.
[4] Samuelson, P.A. and W.O. Nordhaus (1998), Economics, 16th Edition, Tata McGraw Hill, New Delhi.
[5] Verian H. (2000) Microeconomic Analysis, W.W Norton New Yark.
[6] Michale Perkin (1996) Economics, 3rd Edition, Addison Westey Publishing company, Inc. U.S.A.
[7] Koutsoyiannis, A. (1979), Modern Microeconomics, 2nd edition Macmillan Press, London.
[8] Layard, P.R.G. and A.W. Walters (1978) Microeconomic Theory, McGraw Hill, New Yark.
[9] Ahuja H.L. (2003) Advanced Economic theory: Microeconomic Analysis, 13th Edition, S.Chand and Co. Ltd. New Delhi.
[10] Richard A. Musgrave (1989), Public Finance in Theory and Practice McGraw Hill Book Company, New York.
[11] Buchaman J.M. (1970), The Public Finances, Richard D.Irwin, Homewood.
[12] Jha H. (1998), Modern Public Economics, Routledge, London.
[13] Singh S.K. (1986) Public Finance in Developed and Developing Countries, S. Chand and Company Ltd, New Delhi.
[14] Chelliah R.J. (1971), Fiscal Policy in Underdeveloped Countries.
[15] Hemlata Rao (2006) Fiscal Federalism –Issues and Policies, New Countury Publications, New Delhi.
[16] Atkinson A.B. and J.E. Siglitz (1980). Lectures on Public Economics, Tata Mac Graw Hill, New Delhi.
[17] Comes R. and T.Sandler (1986) The theory of Externalities, Public Goods and Club Goods, Cambridge University Press, Cambridge.
[18] Duff L. (1997), Government and Market, Orient Longman, New Delhi.
[19] Friedman A. 91986), Welfare Economics and Social Choice Theory, Martins Nighoff, Boston. Topic: 2 & 3
[20] Bird R. And O.Aidman (1967) Reading on Taxation in Developing Countries, The John Hopkins University.

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: Political Science

Political Theory & Thought Indian & Western: Comparative Politics and Political Analysis, Evolution of Comparative Politics as a discipline, nature and scope. Approaches to the study of comparative politics: Traditional, Structural Functional, System and Marxist. Constitutionalism: Concepts, Problems and limitation. Forms Government: Unitary Federal, Parliamentary- Presidential. Organs of Government: Executive, Legislature, judiciary- their Interrelationship in comparative perspective. Party System and Pressure Groups; Electoral System. Bureaucracy – types and roles.

Indian Government and politics: National Movement, Constitutional Development and the Making of Indian Constitution. Ideological Bases of the Indian Constitution , Preamble, Fundamental Rights and Duties and Directive Principles. Constitution as Instrument of Socio- Economic Change, Constitutional Amendments and Review. Structure and Process – I : President, Prime Minister, Council of Minister, Working of the Parliamentary System. Structure and Process – II : Governor, Chef Minister , Council of Ministers, State Legislature. Panchayati Raj Institution: Rural and Urban, their working. Federalism: Theory and Practice in India, Demands of Autonomy and Separatist Movements : emerging trends in center state relation. Judiciary : Supreme Corte, high Courts, Judicial review, Judicial Activism Including Public Interest litigation cases, Judicial Relation.

International Relational; Contending Theories and Approaches to the Study of international Relation ; Idealist Realist, System, Game, Communication and Decision Making. Power, Interest and Ideology in International Relation; Elements of Power ; Acquit ion, Use and Limitation of Power, Perception, formulation and Promotion of National Interest, making, Role and Relevance of Ideology in International relation.Arms and Warms: Nature Causes and types of Warms/conflicts including ethnic disputes, conventional, Nuclear bio- chemical warms, deterrence, Arms control and Disarmament.
Peaceful settlement of disputes, conflict resolution, Diplomacy, World Order and Peace Studies. Cold War, Alliances, Nan Alignment, End of Cold War, Globalization. Rights and duties of International Law, Intervention, Treaty Law, Prevention and abolition of War. Political Economic of International relation; new International Economic Order, North- South Dialogue, South-South Cooperation, WTO, Neo- Colonialism and Dependency. Regional and Sub-regional organizations especially SAARC, ASEAN, OPEC, OAS, United Nation; Aims, Objectives, Structure and Evaluation of the working of UN, Peace of Development Perspective, Charter Revision, Power Struggle and Diplomacy within UN, Financing and Peace Keeping operation. India's Role in International affairs : India's Relation with its neighbors, Wars, security concerns and pacts, mediatory Role, distinguishing features of Indian Foreign policy and Diplomacy

Text & Reference Books:

[1] Politics and administration in changing societies-R.K.ARORA
[2] Comparative public administration- R.K.ARORA
[3] Bureaucracy Development and change – A.D.PANT AND S.K.GUPTA
[4] Sociology Thinkers – Ravindra Nath Mukharji
[5] political behaviors– H.H.HYMAN
[6] Theories of international relation – S.BURCHILL
[7] Political through the ages – Appadoraidelhi, Khanna publisher

Dr. C.V. Raman University, Bilaspur (C.G.)

Subject: History

Indian History-

Source - Archaeological Sources, Literary sources, Indus Valley Civilization –origin, date, Extent, characteristics, decline, survival and significance, Vedic period-dating the Vedic social and political institutions, Economic condition, Emergence of Jainism and Buddhism, Foundation of the Maryann Empire-Chandragupta, Asoka and his dhamma, mauryan administration, Economic, art and Architecture, disintegration of the Maryann Empire, Imperial Guptas and Regional State of India.

Medieval Indian History

Source -Archaeological Sources, Literary sources, Administration, The Sultanate– The Gulams, The khaljis, The Tughlaqs and the Lodi's Foundation of the Mughal Empire, Sure Decline of the mugal Empire Etc The Vision Nagar and the Brahmanism- Rise Expansion and Disintegration History of Maratha The Maratha Moment the Foundation of Swaraj By Shivaji Socio Religious Moments- Cultural

Modern Indian History –

Source - Archaeological Sources, Literary sources, Concerns in Modern Indian Historiography- imperialist nationalist Marxist subaltern Rice of British Power –Rice of European power the Establishment and Expansion of British Domination Evolution of Central and Provincial Structure Under The East India Company 1773-1853, Local Self Government – Constitutional Development From 1909-1935,Economic and Social Policies **,**

National Movement and Post Independent- (1947-1964)**,** Rice of Nationalism, Revolt of 1857, Rehabilitation After Partition**,** and Integration of Indian State – The Kashmir Question, The Making of the Indian Constitution.

History of Asia & Word – History of Asia & World

Research in History - Scope and value of History, Objectivity and Bias in History,

Area of research – Proposed, Sources - Primary/ Secondary in the proposed area in research , Modern historical Writing in the researcher's area of research

Text & Reference Books:

[1] Sharma, R.S., Aspects of Ancient Indian Political Ideas and Institutions, Manohar, reprint

[2] Jha, D.N., Prachin Bharat (in Hindi)

[3] Chandra, Satish, Medieval India (Society, the jagirdari crisis and the village), Macmillan

[4] India Ltd., Madras, 1992.

[5] Curtin, P., Cross-Cultural Trade in World History, Cambridge, 1984

[6] Indian History – A.k. Mittal –Shahitya Bhavan Pub.

[7] History of 20th century- Sanjeev Jain

[8] Indian National Movement- Virkeshwar Prasad

[9] History of Maratha- Luniya

Dr. C. V. Raman University Bilaspur (C.G.)

Subject : Library And Information Science

UNIT-I

Information, Information Science Information Society. Information Transfer Cycle. Intellectual Property Right – Concept, Copyright, Censorship .Law of Library Science ,Resource Sharing and Networking Library Movement and Library Legislation in India Library Association in India and UK. Library Association at International Level – FID, IFLA, UNESCO.

UNIT-II

Sources of Information – Primary, Secondary and Tertiary. Biographical Sources, Reference Sources . E-Documents, E-Journals, E-Books. Databases –Bibliographic and Full Text. Reference and information Services . Indexing and Abstracting Services, CAS, SDI .Online Services. Reprographic Services.

UNIT-III

Library Classification – Canons and Principles . Library Classification Schemes CC and DDC. Library Cataloguing - Canons and Principles.Library Cataloguing Codes CCC and AACR-II .Indexing – Pre-Coordinate and Post-Coordinate

UNIT-IV

.Management – Principles Function School of Thought Planning Organisation Structure .Collection Development .Human Resources Management .Financial Management .Total Quality Management TQM

UNIT-V

Information Technology- Components Impact of IT on Society . Telecommunication .Networking .ISDN. Library Automation .Library Networks .National and International Information Systems .Types of Libraries .Digital Libraries .Virtual Libraries. Role of UGC in the growth and development of libraries and Information Center.

Reference Books

1. Classification , Krishan Kumar, Ess Publication

2. Descriptive Question NET/SLET ,SM Tripathi, Ess Publication

3. Cataloging , SS Agrawal, Hindi Gtanth Acdmi Bhopal

4. Pralekhan Aum Suchana Vigyan , SP Sood RB Publication Jaipur

5. Library Automation , A R. Nai Ess Publication

6. Library Management, Saxena

7. Suchana aum Sandrabh Seva Ke Nven Ayam , S M Trapathi Ess Publication

(6) Faculty of Information Technology

Subject Name

(i) Information Technology

(ii) Computer Science

Dr. C.V. Raman University Bilaspur(C.G.)

Subject: - Information Technology

Unit –I

Programming in C and C++: Elements of C-Tokens, identifiers, data types in C. Control structures in C. Sequence, selection and iteration(s), Structured data types in C-arrays, function, union, structure, and pointers. C++ Programming: Elements of C++-Tokens, identifiers, Variables and constants, Data types, Operators, Control statements, Object Oriented Programming Concepts: Class, Object, Instantiation Inheritance, polymorphism and overloading. Functions parameter passing, Constructors and destructors, Templates, Exception.

Unit-II

Data Structure and Graph Theory: Data. Information, Definition of data structure. Arrays, stacks, queues, linked lists, trees, graphs, priority queues and heaps. File Structures: Fields, records and files, Sequential, direct, index sequential and elective files. Hashing, inverted lists and multi-lists. B trees and B + trees.

Graph: Definition, walks, paths, trails, connected graphs, regular and bipartite graphs, cycles and circuits.

Unit-III

Relational Database Design and SQL: E-R diagrams and their transformation to relational design, **Normalization**-1NF, 2NF, 3NF, BCNF, 4NF, Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL), Database objects: views, indexes, sequences, data dictionary.

Unit-IV

Operating System: Types of operating system, virtual memory, paging, fragmentation, mutual exclusion, critical region, Scheduling: CPU scheduling, I/O scheduling, Resource scheduling/Dead-lock and scheduling algorithms, Banker's algorithm for dead-lock handling.

Artificial Intelligent: AI approach, Breadth first, depth first, A, A*, AO*, performance comparison of search techniques, expert systems, decision support system.

Unit-V

Computer Network: OSI reference model, TCP/IP model, Transmission media: wired and wireless, switching, ISDN, ATM, switch, hub, router, repeater, gateway, cryptography. Routing algorithms, network security tools, congestion control.

Software Engineering: System Development Life Cycle(SDLC), waterfall model, prototypes, spiral model, bottom up and top down models, software reengineering.

Text & Reference Books:

[1] Operating System Concept by A. Silberschatz, Peter B. Galvin and Garge Gange , Wiley Publication.

[2] Software Engineering by Roger S. Pressman, McGraw Hill International Edition.

[3] Data Communications and Networking by Behrouz A. Forouzan, Tata McGraw Hill , 2nd Edition.

[4] Database System Concpts by A. Silberschatz, H. F. Korthand S. Sudarshan, McGraw Hill International Edition, fifth Edition.

[5] The Complete Reference, C++ by Herbert Schildt, McGraw Hill International Edition.

[6] Data Structure by Seymour Llpschutz, Tata McGraw Hill Edition.

[7] Artificial Intelligence by Elaine Rich, Kevin Knight and S. B. Nair, McGraw Hill Pvt. Ltd., 3rd edition.

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Subject: Computer Science

Unit-I

Object Oriented Programming and Data Structure: Object Oriented Programming Concepts: Class, Object, Overloading, Functions parameter passing, Constructors and destructors. Inheritance, Templates, Exception Handling, Data, Information, Definition of data structure. Arrays, stacks, queues, linked lists, trees, priority queues and heaps. File Structures: Fields, records and files. Sequential, direct, index sequential, Hashing, B trees and B +trees.

Unit -II

Computer Arithmetic: Propositional (Boolean) Logic, Predicate Logic, Well-formed-formulae (WFF), I Satisfiability and Tautology. Logic Families: TTL, RTL and C-MOS gates. Boolean algebra and Minimization of Boolean functions. Flip-flops-types, race condition and comparison. Design of combinational and sequential circuits. Representation of numbers: Octal, Hexa. Decimal and Binary. 2's complement and l's complement arithmetic. Floating point representation.

Unit -III

Relational Database Management System: E-R diagrams and their transformation to relational design, normalization-INF,2NF,3NF,BCNF and 4NF, Limitations of 4NF and BCNF. SQL : Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language(DCL) commands, Database objects like-Views, indexes, sequences, synonyms, data dictionary.

Software Engineering: System Development Life Cycle (SDLC): Steps, Water fall model. Prototypes, Spiral model. Software Metrics : Software Project Management. Software Design, Coding and Testing.

Unit-IV

Computer Networks : Network fundamentals : Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), Wireless Networks, Inter Networks. Reference Models : The OSI Model, TCP/IP model, Internetworking : Switch/Hub, Bridge, Router, Gateways, Concatenated virtual circuits. Tunneling, Fragmentation Firewalls, Routing: Virtual circuits and datagram. Routing algorithms, Congestion control, Network Security: Cryptography-public key, secret key, Domain Name System (DNS)-Electronic Mail and Worldwide Web (WWW), DNS, Name servers, E-mail architecture and Serves.

Unit-V

Operating Systems: Main functions of operating systems, Multiprogramming, multi processing and multitasking, Memory Management: Virtual memory, paging, fragmentation, Scheduling: CPU scheduling, I/O scheduling, Resource scheduling/Dead lock and scheduling algorithms, Banker's algorithm for dead-lock handling.

Data Warehousing and Mining: Data warehouse, Architecture of a data warehouse methodology, Data modeling strategy, OLAP, OLTP, Architectural component of Data warehousing. Data Mining: Extracting models data mining techniques, classification, regression, clustering, summarization.

Text & Reference Books:

[1] Computer System Architecture by M. Morris Mano, Pearson Education India Publication.

[2] Database System Concept by A. Silberschatz, H. F. Korth and S. Sudarshan, McGraw Hill International Edition.

[3] Operating System Concepts by A. Silberschatz, Peter B. Galvin and Garge Gange, Wiley Publication.

[4] Software Engineering by Roger S. Pressman , McGraw Hill International Edition.

[5] The Complete R, C++ by Herbert Schildt, McGraw Hill International Ediion.

[6] Data Structure by Seymour Lipschutz, Tata McGraw Hill Edition.

[7] Data Mining Concept and Techniques, by J. Han,M. Kamber and J. Pei, Morgan Kaufmann Publication.

(7) Faculty of Law

Subject Name

(i) Law

Dr. C.V. Raman University Bilaspur [C.G.]
Subject: Law

Constitution law of India: preamble, fundamental rights & duties, directive principal of state policy, judiciary, emergency, amendment of the constitution.

Legal theory: Nature and sources of law, positivism, sociological, jurisprudence, theories of punishment, rights & duties, possession & ownership.

Law of crime: General principles: nature & definition of crime, common intention & common object, general exceptions, abetment & conspiracy & abetment, culpable homicide, murder, theft, extortion, mischief.

Law of contracts: General principles: valid contract, definition, offer, acceptance & consideration, capacity to contract - minors contract, mistake, fraud, misrepresentation, coercion, undue influence, contingent contract, frustration of contract, breach of contract.

Law of torts: tortuous liability, vicarious liability, contributory negligence, absolute & strict liability.

Family law (Hindu & Muslim): Sources of family law in India, marriage, divorce, maintenance.
Public international law: sources of international law, recognition, settlement of international disputes, human rights.

Text & Reference Books:

[1] Constitution Law of India : Dr. V. N. Shukla
[2] Legal Theory : Dr. Anurudh Prashad
[3] Law of Crimes : S. N. Mishra
[4] Law of Contract : Awtar Singh
[5] Law of Tort : Ratan Lal DhirajLal
[6] Hindu law :Mulla
[7] Mushlim Law :Fazi
[8] Public International Law : Dr. S. K. Kapur, H. O. Agrawal

Instruction for filling the application form

- Application form should be filled carefully by the candidate.
- Check all the entries in application form.
- Fee of application can be paid through cash/DD in favor of Dr. C. V. Raman University, payable at Bilaspur.
- The candidate must write his/her name and full address at the back side of the D.D.
- The application should be submitted to:

  The Registrar,

  Dr. C.V. Raman University,

  Kargi Road Kota, Bilaspur (C.G.) 495113
- The applicants must attach the photocopy/Xerox of fee receipt/D.D. along with the application form.

Fee Details of Entrance Exam

- Ph.D - 2100/-