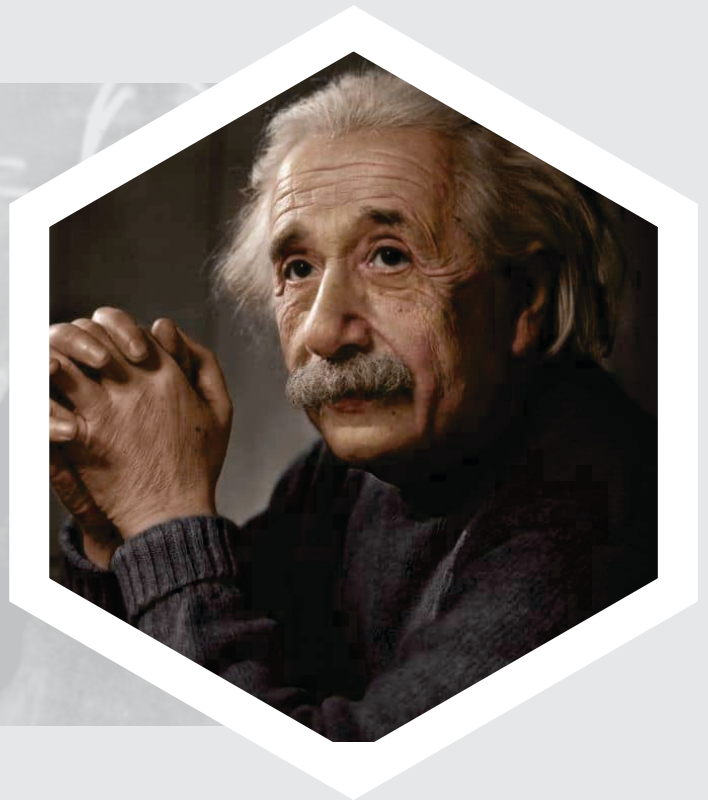


Guideline For  
RESEARCH PROGRAMME



**DOCTOR OF PHILOSOPHY (Ph.D)**



Imagination is the Highest  
form of Research

- Albert Einstein



**DR. C.V. RAMAN UNIVERSITY**

A part of **aisect**india

Bilaspur, Chhattisgarh

Approved by : PCI | AICTE | NCTE | BCI | Member of : AIU | Recognized by : UGC | NAAC Accredited University

Accredited with "A" Grade by NAAC

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

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Web : [www.cvrु.ac.in](http://www.cvrु.ac.in)

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**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

Dr. C. V. Raman University (CVRU), Bilaspur, established on 3rd November 2006 at Kargi Road, Kota, Bilaspur (Chhattisgarh), is the **first private university in the state**, promoted by the AISECT Group of Universities—one of India’s leading higher education networks.

The University has rapidly emerged as a **dynamic centre of excellence in higher education, research, and innovation in Central India**, committed to academic quality, skill development, and societal transformation. It is recognized under **Section 2(f) of the UGC Act** and approved by statutory regulatory bodies including **AICTE, NCTE, BCI, and PCI**, and is a proud member of the **Association of Indian Universities (AIU)**.

Accredited with **NAAC ‘A’ Grade**, the University demonstrates a strong commitment to quality assurance, outcome-based education, and continuous institutional improvement.

Named after the Nobel Laureate **Dr. C. V. Raman**, the University embodies his vision that the true development of a nation lies in nurturing the intellectual, physical, and moral capacities of its youth. The guiding philosophy is further inspired by the ideals of **Dr. A. P. J. Abdul Kalam**, who emphasized education as the cornerstone of national development and innovation-driven growth.

The University is strategically located in a **tribal and rural region of Chhattisgarh**, with a clear mandate to extend the reach of higher education to underserved and marginalized communities. It plays a crucial role in regional development by providing access to quality education to students from **SC/ST/OBC and rural backgrounds**, thereby contributing to inclusive growth and social equity.

Spread across a **lush green campus of over 60 acres**, the University offers a conducive academic environment supported by modern infrastructure, ICT-enabled classrooms, laboratories, research facilities, and student support services.

CVRU offers a wide spectrum of academic programmes including **Diploma, Undergraduate, Postgraduate, Integrated, and Doctoral (Ph.D.) programmes** across diverse disciplines such as:

- Engineering & Technology
- Science
- Commerce & Management
- Arts & Humanities
- Law
- Education & Physical Education
- Pharmacy

The University emphasizes **research-driven learning, interdisciplinary approach, industry-academia collaboration, entrepreneurship development, and digital education practices**. With a focus on employability and innovation, CVRU continuously strives to bridge the gap between academic knowledge and industry requirements.

The institution has also been recognized for its contributions through various awards such as **World Education Award, Best Skill Development Initiative Award, Smart University Award, Swachh Campus Award**, and other recognitions for excellence in higher education.

## **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 a transformative educational experience for students focused on deep disciplinary knowledge, problem-solving, leadership, communication and intrapleural skills, 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 way—regionally, nationally, and globally—by engaging with partners outside the traditional border of the University campus.

## **Core Values**

- Dedication is 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 is reflected in our interdisciplinary approach, our focus on internal and external partnerships, and our capacity to create new fields of inquiry.
- Creativity is reflected in our openness to new ideas and forms of expression, intellectual curiosity, willingness to take risks, and entrepreneurial spirit.
- Empathy and compassion are reflected in our focus on improving the human condition and on the personal development of the members of our community.
- Inclusion, reflected in a culture and climate that seeks, welcomes, and advances talented minds from diverse backgrounds.
- Integrity is reflected in our adherence to the highest ethical standards in personal and professional behaviour and in our commitment to transparency and accountability in governance and everything we do.

## **Objectives**

- To promote research, innovation, and dissemination of knowledge across disciplines.
- To nurture intellectual competence, analytical ability, and critical thinking among students.
- To provide quality education that enhances professional competence and employability.
- To establish and continuously upgrade state-of-the-art infrastructure and research facilities.
- To maintain and enhance academic standards in accordance with national regulatory frameworks.

## **Facilities Available at CVRU**

### **1. Laboratories & Research Facilities**

Dr. C. V. Raman University provides well-equipped laboratories and research facilities to support academic learning, practical training and interdisciplinary research across various disciplines.

These facilities enable students and research scholars to undertake experimentation, innovation and quality research at UG, PG and Ph.D. levels.

#### **Central Research Facilities**

- Central Instrumentation Facility for interdisciplinary research and analytical work
- Access to research databases and digital resources
- Research & Development Cell for promotion and facilitation of doctoral and funded research

#### **Departmental Laboratories**

- Laboratories in:
  - Physics, Chemistry and Life Sciences
  - Biotechnology and Microbiology
  - Engineering & Technology
  - Pharmacy and Applied Sciences
- Facilities for practical training, experimentation and research at UG, PG and Ph.D. levels

#### **Computer & IT Laboratories**

- Modern computer laboratories with updated systems and software
- Facilities for data analysis, simulation and project work
- Campus-wide Wi-Fi connectivity

#### **Specialized Facilities**

- Media Lab (Raman Studios)
- Business Lab (Indian Business Insight Lab)
- Moot Court
- Green House and Herbal Garden
- Museum and Art Gallery

### **2. Central Library**

The Central Library serves as a vital academic resource centre supporting teaching, learning, and research activities.

- Extensive collection of textbooks, reference books, and research publications
- Subscription to national and international journals, periodicals, and e-resources
- Digital library and online database access
- Spacious and well-furnished reading halls
- ICT-enabled library services for students and research scholars

### **3. Infrastructure Facilities**

The University provides modern infrastructure to facilitate effective teaching-learning and research.

- Smart classrooms equipped with audio-visual teaching aids
- Air-conditioned conference hall with advanced presentation and video conferencing facilities
- Seminar halls and board rooms for academic and administrative activities
- Moot court facility for practical legal training
- Well-equipped laboratories and research facilities

### **4. Sports Facilities**

The University promotes physical well-being and sports culture among students.

- Playgrounds for cricket and football
- Dedicated courts for basketball, volleyball, and badminton
- Indoor sports and recreational facilities
- Gymnasium for fitness and health

### **5. Hostel Facilities**

#### **Boys Hostel**

- Multiple hostels with adequate capacity
- Well-furnished single, triple, and four-seater rooms
- Wi-Fi connectivity, mess facility, common room, and indoor games
- Safe and disciplined residential environment

#### **Girls Hostel**

- Separate and secure hostel facility within campus
- Comfortable accommodation with essential amenities
- Dining hall, common room, and Wi-Fi connectivity
- Focus on safety, hygiene, and well-being

### **6. Canteen**

- Hygienic and well-maintained canteen facility
- Availability of nutritious food and refreshments
- Multiple food options within campus

### **7. Medical Facilities**

The University ensures health and well-being of students and staff through its on-campus medical support system.

- Health centre and dispensary within campus
- Qualified medical professionals and support staff
- First aid and primary healthcare services
- Basic diagnostic facilities
- Emergency care and referral support through tie-ups with nearby hospitals

## 8. Banking Facilities

- On-campus banking facility with ATM services
- Easy access to financial services for students and staff
- Additional ATM facilities near campus

## 9. Transport Facilities

- Fleet of buses for students and staff
- Connectivity across nearby regions (approx. 30–35 km radius)
- Safe, reliable, and affordable transportation system
- Special transport arrangements for academic and co-curricular activities

## Research Programme (Ph.D.)

Dr. C. V. Raman University, Bilaspur offers Doctor of Philosophy (Ph.D.) programmes in various disciplines through its recognized Faculties/Departments. The Ph.D. programme is designed to promote advanced research, innovation, and dissemination of knowledge. The research work shall be original and shall demonstrate the candidate's ability to undertake independent investigation leading to a significant contribution to the existing body of knowledge. The award of the Ph.D. degree shall be made in accordance with the provisions of the UGC (Minimum Standards and Procedure for Award of Ph.D. Degree) Regulations, 2022, and the rules of the University. Interdisciplinary research is encouraged through a system of co-supervision.

| Faculties                                 | Subjects   |
|---|--|
| Engineering & Technology                  | Electronics & Communications Engineering, Electrical Engineering, Computer Science Engineering, Mechanical Engineering and Civil Engineering |
| Science                                   | Physics, Chemistry, Mathematics, Microbiology, Biotechnology, Zoology, Botany, Rural Technology  |
| Commerce & Management                     | Commerce & Management  |
| Law                                       | Law  |
| Education & Physical Education            | Education & Physical Education   |
| Arts                                      | Geography, Economics, History, Political Science, Sociology, Library & Information Science, Hindi, English & Sanskrit                        |
| Information Technology & Computer Science | Information Technology & Computer Science  |
| Pharmaceutical Science                    | Pharmaceutical Science   |

## Eligibility for Admission

A candidate seeking admission to the Ph.D. Programme must satisfy the following criteria:

- A Master's degree or a professional degree declared equivalent to the Master's degree by the appropriate statutory regulatory body, with at least **55% marks in aggregate or its equivalent grade** from a recognized University/Institution.
- A relaxation of **5% marks (i.e., 50%)** shall be allowed for candidates belonging to **SC/ST/OBC (Non-Creamy Layer)/PwD/EWS categories**, as per the applicable regulations.
- All qualifications must be obtained from recognized Universities/Institutions and must be in accordance with the norms of the University Grants Commission.

### **Full-Time / Part-Time Ph.D.**

The Ph.D. Programme at Dr. C. V. Raman University is offered in both **Full-Time** and **Part-Time** modes, in accordance with the UGC Regulations, 2022, and the University's own rules. Candidates may choose the mode of enrolment based on their academic background, employment status, and availability for regular research work.

#### **Full-Time Ph.D.**

- A **Full-Time Ph.D. candidate** is expected to devote the major portion of his/her time to research during the tenure of the programme.
- Full-Time registration is generally applicable for candidates who are **not employed in any organization** (teaching, non-teaching, or industry) and who are able to pursue research on a continuous, full-time basis.
- Scholarships/fellowships, if applicable, are normally linked to Full-Time registration as per University and sponsor norms.

#### **Part-Time Ph.D.**

- A **Part-Time Ph.D. candidate** is normally an **employed person** (teaching staff, administrative staff, or working professionals) who undertakes research along with official duties.
- The candidate must have the **necessary permission / No Objection Certificate (NOC), as prescribed in the UGC Ph.D Regulations 2022.** from the employer to register for Part-Time Ph.D.
- The workload of a Part-Time candidate is expected to be **balanced with official responsibilities**, and the candidate must ensure sufficient time and resources for regular academic activities such as experimental work, data collection, seminars, meetings with the supervisor, and submission of progress reports.

As per University norms, the **maximum duration** and certain **minimum residence/attendance requirements** may differ between Full-Time and Part-Time registrations; candidates shall comply with the timelines and procedures specified in the Ph.D. Regulations.

The choice between Full-Time and Part-Time registration shall be indicated in the **application form** and, once approved, may be changed during the programme only with the prior permission of the University's concerned authority, as per the prescribed rules.

### **Admission Procedure**

- Application for admission to the Ph.D. Programme shall be submitted in the **prescribed format** and within the stipulated time notified by the University.

- Admission shall be based on the candidate's performance in the **University Entrance Examination**, followed by an **Interview/Viva-Voce**, as per the UGC Regulations, 2022.
- Candidates who are **qualified in UGC-NET/CSIR-NET (including JRF)/SET/SLET/GATE or any other national-level fellowship/eligibility test recognized by UGC** shall be **exempted from the Entrance Examination**; however, they shall be required to appear for the **Interview/Viva-Voce**.

## Structure of the Entrance Examination

The Entrance Examination for Ph.D. admission shall consist of **one paper of 100 marks**, with a duration of **2 hours**. The paper shall be divided into two sections:

- **Section I: Research Aptitude (50 Marks):** Topics include: Research Methodology, Logical Reasoning, Quantitative Ability, and Data Interpretation.
- **Section II: Subject-Specific (50 Marks):** Questions based on the discipline opted by the candidate (e.g., Management, Commerce, Computer Science, Humanities, etc.).

Candidates securing **minimum 50% marks** (or **45% for reserved categories**) in the Entrance Examination shall be shortlisted for the **Interview/Viva-Voce**.

## Documents Required at the Time of Admission

At the time of admission/verification, the candidate shall submit the following documents (self-attested copies to be retained by the University):

- Academic certificates from **10th onwards** up to Post-Graduation.
- **Original Transfer Certificate / Migration Certificate** (as required by the University and the candidate's category).
- **Original Gap Certificate**, if there is a break in studies.
- Recent **passport-size photographs** (as per prescribed number).
- **No Objection Certificate (NOC)**, if the candidate is currently employed or studying elsewhere, **as prescribed in the UGC Ph.D Regulations 2022**.
- Any other document as specified by the University from time to time.

## Fee Structure

The fee structure for the Ph.D. programme shall be as determined by the Fee Fixation Committee of the Government of Chhattisgarh or as decided by the Board of Management (BoM) of the University.

### ⇒ 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
- (v) Mechanical 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 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 Functions 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 – Behrouz A. Forouzan
- 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 Control 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 Microcontroller 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 Electronics : 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)

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

## (Subject: Mechanical Engineering)

**Engineering Mechanics:** Introduction to Statics, Force Systems, Resultants of Force Systems, Coplanar Equilibrium Analysis, Three-Dimensional Equilibrium, Centroids and Distributed Loads, Virtual Work and Potential Energy. **Mechanics of Materials:** Basic Concepts in Strength of Materials, Design Properties of Materials, Direct Stress, Deformation, and Design, Design for Direct Shear, Torsional Shear, and Torsional Deformation, Shearing Forces and Bending Moments in Beams, Stress due to Bending, Shearing Stresses in Beams, Deflection of Beams, Columns, Pressure Vessels. **Metrology and Inspection:** Mechanical Measurement & Metrology, Linear & Angular Measurement, Measurement of Force, Torque and Strain, Displacement, Velocity/Speed, and Acceleration, Measurement, Temperature measurement, Gear Measurement, Screw Thread Measurement. **Computer Integrated Manufacturing:** Basic concepts of CAD/CAM and their integration tools; additive manufacturing. **Production Planning and Control:** Forecasting models, aggregate production planning, scheduling, materials requirement planning; lean manufacturing. **Inventory Control:** Deterministic models; safety stock inventory control systems. **Operations Research:** Linear programming, simplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.

**Theory of Machines:** Mechanisms and Kinematics, Position and Displacement Analysis, Mechanism Design, Velocity and Acceleration Analysis, Cams: Design and Kinematic Analysis, Gears: Kinematic Analysis and Selection, Belt and Chain Drives, Clutches and Brakes. **Vibrations:** Fundamentals of Vibration, Free Vibration of Single-Degree-of-Freedom, Two-Degree-of-Freedom and Multidegree-of-Freedom Systems, Vibration under General Forcing Conditions, Determination of Natural Frequencies and Mode Shapes. **Machine Design:** Nature of Mechanical Design, Design for Different Types of Loading, Keys, Couplings, and Seals, Shaft Design, Rolling Contact Bearings, Plain Surface Bearings, Springs, Machine Frames, Fasteners, Bolted Connections, and Welded Joints.

**Properties of pure substances,** thermodynamic systems and processes, the behaviour of ideal and real gases, calculation of work and heat in various processes, zeroth and first laws of thermodynamics, the second law of thermodynamics, thermodynamic relations and thermodynamic property charts and tables, availability and irreversibility.

Rankine, Otto, Diesel and Dual Cycles, SI and CI Engines, Engine Systems and Components, Performance characteristics and testing of IC Engines; Fuels; Emissions and Emission Control. Vapour compression refrigeration, Refrigerants and Working cycles, Vapour Absorption systems. Psychometric properties and processes, Comfort and industrial air conditioning, Load calculations and Heat pumps. One-dimensional heat conduction, modes of heat transfer, heat transfer through fins, lumped parameter system, unsteady heat conduction, dimensionless parameters in free and forced convective heat transfer, thermal boundary layer, heat transfer correlations for flow over flat plates and through pipes, heat exchanger performance, effect of turbulence, LMTD & NTU methods; Stefan-Boltzmann law, radiative heat transfer, Wien's displacement law, view factors, black and grey surfaces and radiation network analysis.

**Basic Concepts and Properties of Fluids,** Manometer, Fluid Statics, Buoyancy, Equations of Motion, Bernoulli's equation and applications, Viscous flow of incompressible fluids, Laminar and Turbulent flows, Flow through pipes and head losses in pipes. **Renewable Sources of Energy:** Solar Radiation, Solar Thermal Energy collection - Flat Plate and focusing collectors their materials and performance. Solar Thermal Energy Storage, Applications – heating, cooling and Power Generation; Solar Photovoltaic Conversion; Harnessing of Wind Energy, Bio-mass and Tidal Energy – Methods and Applications, Working principles of Fuel Cells.

**Introduction to Materials Science and Engineering,** Atomic Structure, Mechanical Properties: Fundamentals and Tensile, Hardness, and Impact Testing, Fracture Mechanics, Fatigue, and Creep Behavior, Strain Hardening and Annealing, Principles and Applications of Solidification, Solid

Solutions and Phase Equilibrium, Heat Treatment of Steels and Cast Irons, Nonferrous Alloys, Ceramic Materials, Polymers, Composites

**Machining and Machine Tool Operations:** Machining Technology, Basic Elements and Mechanisms of Machine Tools, General-Purpose Machine Tools, Thread Cutting, Gear Cutting Machines and Operations, Turret and Capstan Lathes, Automated Lathes, Numerical Control and Computer Numerical Control Technology, Nontraditional Machine Tools and Operations, Design for Machining, Automated Manufacturing System.

**Text Books & Reference Books:**

- Singh, A. K. (n.d.). *Mechanics of solids*. PHI.
- Arora, C. P., Arora, S. C., & Domkundwar, S. (n.d.). *Refrigeration and air conditioning*. McGraw Hill.
- Abbasi, T., & Abbasi, S. A. (n.d.). *Renewable energy sources*. PHI.
- Chapman, W. A. J. (n.d.). *Workshop technology*. Viva Books.
- Ganesh Babu, K., & Sridhar, K. (n.d.). *Design of machine elements*. Tata McGraw Hill.
- Kaushish, J. P. (n.d.). *Manufacturing processes*. PHI Learning.
- Khurmi, R. S. (n.d.). *Machine design*. S. Chand.
- Khurmi, R. S. (n.d.). *Applied mechanics*. S. Chand & Co.
- Kumar, K. L. (n.d.). *Fluid mechanics*. PHI.
- Narula, G. K., Narula, K. S., & Gupta, V. K. (n.d.). *Material science*. McGraw Hill Education.
- Sukhatme, S. P. (n.d.). *Heat and mass transfer*. Universities Press.
- White, F. M. (n.d.). *Fluid mechanics*. McGraw Hill.
- Yadav, R. (n.d.). *Applied thermodynamics*. Central Publishing House.

## **(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  $P_4S_{10}$ . Phosphorus-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  $\pi$  bonds. Spectral & Magnetic properties of complexes.

**Nuclear Chemistry:** Nuclear reactions: Types of nuclear reactions. Spontaneous and induced fission. Principles of working of the reactors of nuclear 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 colloids. 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, carbenes. 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 alkaloids. 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; metric 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, Instrumentation and 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. Coelenterate : 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 Nematodes. Annelida, Neris , 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 gymnosperms.

**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 chloroplasts and nucleus, Chromosomes- chemical and physical nature behavior during mitosis and meiosis.

**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. Plant hormones 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.
- Nilson, 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 structured 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 transgenics.

**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:**

1. 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] Panchayati 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, R.J. 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 Hall of 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, Forfeiture, 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

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 बोलियाँ—वर्गीकरण तथा क्षेत्र, नागरी लिपि का विकास और उसका मानकीकरण।  
हिन्दी भाषा प्रयोग के विविध रूप—बोली, मानक भाषा, संपर्क भाषा, राजभाषा और राष्ट्रभाषा, संचार माध्यम और हिन्दी।
2. हिन्दी साहित्य का इतिहास – हिन्दी साहित्य का इतिहास, दर्शन, हिन्दी साहित्य के इतिहास लेखन की पद्धतियाँ।  
आदिकाल, मध्यकाल, हिन्दी संत काव्य, कृष्ण काव्य, रामकाव्य, रीतिकाल, आधुनिककाल, द्विवेदीयुग, छायावाद, प्रगतिवाद, प्रयोगवाद।
3. हिन्दी साहित्य की गद्य विधायें – हिन्दी उपन्यास: प्रेमचन्द पूर्व उपन्यास, प्रेमचन्द और उनका युग, प्रेमचन्द के परवर्ती प्रमुख उपन्यासकार:— हजारी प्रसाद द्विवेदी, फणीश्वरनाथ रेणु, श्रीलाल शुक्ल, रांगेय राघव।  
हिन्दी कहानी: बीसवीं सदी की हिन्दी कहानी और प्रमुख कहानी आंदोलन।  
हिन्दी नाटक: हिन्दी नाटक और रंगमंच, विकास के चरण और प्रमुख नाट्यकृतियाँ: अंधेरनगरी, चंद्रगुप्त, अंधायुग, आधे-अधूरे, आठवाँ सर्ग, हिन्दी एकांकी।  
हिन्दी निबंध: 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 रिपोर्टाज।
4. काव्य शास्त्र और आलोचना—भरतमुनि का रस और उसके प्रमुख व्याख्याकार।  
रस के अव्यव। साधारणीकरण। शब्दशक्तियाँ और ध्वनि का स्वरूप।  
अलंकार— यमक, प्लेश, वक्रोक्ति, उपमा, रूपक, उत्प्रेक्षा, संदेह, भ्रांतिमान, अतिष्योक्त, 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 दिशाएँ, अर्थ परिवर्तन के कारण व दिशाएँ, हिन्दी भाषा का विकास। देवनागरी लिपि की विशिष्टताएँ, हिन्दी शब्द समूह ।

संदर्भ ग्रंथ:—

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

1. वैदिक साहित्य वृहस्पति। — देवताओं का परिचय—इन्द्र, अग्नि, विष्णु, रुद्र, उशस्, सवितृ, वरुण, विषय वस्तु— ऋग्वेद, यजुर्वेद, सामवेद, अथर्ववेद, ब्रह्मण, आरण्यक, उपनिशद्, वेदाङ्गों का सामान्य परिचय, निरुक्त, (प्रथम एवं द्वितीय अध्याय) वैदिक एवं लौकिक संस्कृत में अन्तर
2. व्याकरण एवं भाषा विज्ञान— कौमुदी सन्धि, समास, शब्दरूप, धातुरूप, कृदन्त, तद्धिति, कारक—सिद्धान्त के अनुसार, भाषा की परिभाषा एवं प्रकार (परिवार मूलक एवं आकृति मूलक) भाषाओं का वर्गीकरण, ध्वनि संबंधी नियम।
3. दर्शन — ईश्वर कृष्ण की सांख्यकारिका—पुरुष—स्वरूप, प्रकृति—स्वरूप, सृष्टिक्रम, सदानन्दकावेदान्तसार—अज्ञान, पञ्चीकरण, अध्यारोप, जीवन मुक्ति, केशवमिश्र की तर्कभाषा प्रमाण—प्रत्यक्ष, अनुमानः उपमान, शब्द।
4. संस्कृत साहित्य पद्य — निम्नलिखित ग्रन्थों का सामान्य अध्ययन—  
गद्य — नैशधीय चरित, शिशुपालवध, रघुवंश, मेघदूत।  
नाटक — कादम्बरी, दशकुमारचरित, हर्षचरित,।  
अभिज्ञानशाकुन्तल, उत्तररामचरित, वेणीसंहारः, मृच्छकटिक।
5. नाट्यशास्त्र — भरत—नाट्यशास्त्र—प्रथमतया द्वितीय अध्याय  
दशरूपक—प्रथम प्रकाश
6. काव्यशास्त्र — काव्य प्रकाश—काव्य प्रयोजन, काव्यहेतुकाव्य लक्षण, काव्य भेद, काव्यशक्ति, अभिहितान्वयवाद, अलंकार—अनुप्रास, उपमा, रूपक, उत्प्रेक्षा, वक्रोक्ति, विभावना, प्लेश, ध्वन्यालोक—प्रथमउद्योत

संदर्भ ग्रन्थ सूची

1. वैदिक साहित्य का इतिहास—आचार्य बलदेव उपाध्याय
2. निरुक्त—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 Chorley P.J. “Atmosphere Weather and Climate routeledge”, London and Newyork 1998.
2. Davis Richard J.A. : “Oceanography-An Introduction to the marine Environment” ,Wm.C. Brown Iowa 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 Agency, 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 market 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 monetary 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] Varian H. (2000) Microeconomic Analysis, W.W Norton New York.
- [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 York.
- [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 Country 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. (1986), 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 20<sup>th</sup> 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 GtanthAcadmiBhopal
4. Pralekhana 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 KeNvenAyam , S M TrapathiEss Publication

## **(6) Faculty of Information Technology**

### **Subject Name**

- (i) Information Technology
- (ii) Computer Science

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

## 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 1's complement arithmetic. Floating point representation.

### Unit -III

**Relational Database Management System:** E-R diagrams and their transformation to relational design, normalization-1NF,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 Edition.
- [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

## **(7) Faculty of Pharmaceutical Science**

**Subject Name**

(i) Pharmaceutical Science

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

### **(Subject: Pharmaceutical Sciences)**

**Pharmaceutics:** Classification and manufacturing of conventional dosage forms like solids, semisolids, liquids. Industrial scale manufacturing of tablets and capsules. Need, design, and development of various type of novel drug delivery systems. Principles underlying design of novel drug delivery systems. Prospects and comparison of sustained and controlled release formulations. Biopharmaceutics and Pharmacokinetics of drug/s and importance in formulation design (conventional and novel). Factors affecting bioavailability enhancement of drug/s from oral dosage forms. Pharmacopoeial and noncompendial standards/limits for development of sterile (parenterals and ophthalmics) and non sterile dosage forms, during their life cycle. Pharmaceutical calculations. Drugs and cosmetics Act and rules with respect to manufacture, sales and storage. Pharmacy Act.

**Pharmacology:** General pharmacological principles including Toxicology. Drug-drug interaction, drug disease interactions, drug-food interactions. Pharmacology of drugs acting on Central nervous system, Cardiovascular system, Autonomic nervous system, Gastro intestinal system and Respiratory system. Pharmacology of Autacoids, Hormones, Hormone antagonists, Diuretics. Adverse Drug reactions and side effects. Bioassay development methodologies

**Pharmaceutical Chemistry:** A detailed study of the following classes with respect to drug nomenclature, classification, physicochemical properties, mode of action [MOA], structure activity relationships [SAR], wherever applicable, synthesis of simple & prototype molecules, drug metabolism, therapeutic uses & side effects. Drug resistance, wherever applicable, should be covered in respective classes of drugs: Antiamoebic agents, Anthelmintic agents, Antibacterial sulpha drugs [only], Quinolone antibacterials, Antimycobacterial drugs, Antifungal agents, Antiviral agents including HIV & anti-HIV drugs, Thyroid & anti thyroid drugs, Antiallergic agents, Antiulcer agents & Proton Pump Inhibitors, Hypoglycemic agents, Antimalarials, Sedative-hypnotics, Antiepileptic agents, Neuroleptics, Anti-anxiety drugs, Diuretics, Antibiotics, Steroids. Corticosteroids [gluco- & mineralocorticoids] & anti-inflammatory steroids. Sex steroids. Male & female contraceptive agents. Anabolic steroids, Anticancer agents, Narcotic analgesics, Morphine & all its structural modifications [peripheral & nuclear]. Narcotic agonists & antagonists. Non-narcotic analgesics [NSAIDS]. Adrenergic drugs. Neurotransmitters & their role. General & specific adrenergic agonists & antagonists [up to alpha-2 & beta-2 only], Cholinergic agents. Muscarinic & nicotinic cholinergic agonists & antagonists, Neuronal [transmission] blockers, Drugs used in neuromuscular disorders. Drugs used in the treatment of Parkinson's disease. Central & peripheral muscle relaxants, Hypertensive, antihypertensive & antianginal agents.

**Pharmacognosy:** Introduction to pharmacognosy, Classification of crude drugs, Factor influencing quality of crude Drugs, Evaluation, Quality control and standardization of crude drugs, Carbohydrate containing drugs, Glycoside containing drugs, Tannins containing Drugs, Volatile oil containing drugs, Resins containing drugs, Alkaloid containing drugs, Protein and enzyme containing crude drugs herbal pesticides, Extraction and isolation techniques, Identification and estimation of phytopharmaceuticals, Plant tissue culture, herbal cosmetics, Plant neutraceuticals.

**Pharmaceutical Analysis and Biotechnology:** Principles and applications of the following: Absorption spectroscopy (UV, visible & IR). Fluorimetry, Flame photometry, Potentiometry. Conductometry and Polarography. Pharmacopoeial assays. Principles of NMR, ESR, Mass spectroscopy. X-ray diffraction analysis, different modern chromatographic methods, capillary electrophoresis. PCR, ELISA, blotting, DNA Sequencing. Principles and methods of microbiological assays as per Pharmacopoeia. Methods of preparation of Pharmacopoeial sera and vaccines. Serological and diagnostics tests. Applications of microorganisms in Bio Conversions and in Pharmaceutical industry. rDNA technology: Tools, techniques and applications, Hybridoma technology: Production and applications.

### **Text Books and Reference Books**

- Aulton, M. E., & Taylor, K. (2018). Aulton's Pharmaceutics: The Design and Manufacture of Medicines (5th ed.). Edinburgh, UK: Elsevier.
- Allen, L. V. (2020). Remington: The Science and Practice of Pharmacy (23rd ed.). Philadelphia, PA: Pharmaceutical Press.
- Chien, Y. W. (1992). Novel Drug Delivery Systems (2nd ed.). New York, NY: Marcel Dekker.
- Brunton, L. L., Hilal-Dandan, R., & Knollmann, B. C. (2018). Goodman & Gilman's The Pharmacological Basis of Therapeutics (13th ed.). New York, NY: McGraw-Hill.
- Tripathi, K. D. (2019). Essentials of Medical Pharmacology (8th ed.). New Delhi, India: Jaypee Brothers.
- Ghosh, M. N. (2015). Fundamentals of Experimental Pharmacology (6th ed.). Kolkata, India: Hilton & Company.
- Beale, J. M., & Block, J. H. (2011). Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry (12th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.
- Lemke, T. L., Williams, D. A., Roche, V. F., & Zito, S. W. (2012). Foye's Principles of Medicinal Chemistry (7th ed.). Philadelphia, PA: Lippincott.
- Patrick, G. L. (2017). An Introduction to Medicinal Chemistry (6th ed.). Oxford, UK: Oxford University Press.
- Kokate, C. K., Purohit, A. P., & Gokhale, S. B. (2014). Textbook of Pharmacognosy (50th ed.). Pune, India: Nirali Prakashan.
- Rangari, V. D. (2007). Pharmacognosy and Phytochemistry (Vol. I & II). Pune, India: Career Publications.
- Evans, W. C. (2009). Trease and Evans Pharmacognosy (16th ed.). Edinburgh, UK: Saunders Elsevier.
- Chatwal, G. R., & Anand, S. K. (2013). Instrumental Methods of Chemical Analysis (5th ed.). Mumbai, India: Himalaya Publishing House.
- Silverstein, R. M., Webster, F. X., & Kiemle, D. J. (2014). Spectrometric Identification of Organic Compounds (8th ed.). Hoboken, NJ: Wiley.
- Satyanarayana, U. (2017). Biotechnology (1st ed.). Kolkata, India: Books and Allied.
- Primrose, S. B., & Twyman, R. M. (2006). Principles of Gene Manipulation and Genomics (7th ed.). Oxford, UK: Blackwell Publishing.

## **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 - 5000/-



# डॉ. सी.व्ही. रमन विश्वविद्यालय

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