

# **INFORMATION BROCHURE**

**GUIDELINES**

**FOR**

**DOCTORAL**

**DEGREE PROGRAMME**

**(Ph.D)**



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

KARGI ROAD KOTA BILASPUR (C.G.)

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## **Doctoral Programme (Ph.D)**

Dr C.V.Raman University offers Ph,D degree through various disciplines. The award of Ph.D degree is in recognition of high academic achievements, independent research and application of knowledge to the solution of technical, scientific, economic, social, environmental etc in various disciplines.

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

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

### **(1) Disciplines offering Ph.D Programme are:**

- (i) Engineering and technology
- (ii) Science
- (iii) Computer Science
- (iv) Information technology
- (v) Management
- (vi) Commerce
- (vii) Education
- (viii) Physical education
- (ix) Arts
- (x) Library science

### **(2) Eligibility:**

A candidate for the degree of Doctor of Philosophy must, at the time of application, hold Master's degree with at least 55% marks or an equivalent grade of M.Phil/M.E/M.Tech degree of the University a Deemed University or any other University incorporated by any law for the time being in force and recognized by the University.

Provided that the candidate who has at least 7 years of experience of research/teaching/industry may be permitted to get registered for Ph.D degree, even if he/she does not possess 55% marks at master degree.

### **(3) Admission Procedure:**

3.1 Application form for Ph. D is to be submitted in the prescribed form at the office of the University by the date to be declared by the University.



3.2 University will organize entrance examination once in a year and will declare eligibility list for personal interview.

3.3 Eligible candidates after personal interview may take admission in their specified center of Research.

3.4 Center of Research (Department) will conduct a course work as per recommendation of the supervisor.

3.5 Examination of the course work will be conducted by the centre of Research (Department) with due co-ordination of the University.

3.6 Candidates declared pass (with at least 50% marks) in the examination of course work, should submit synopsis in the prescribed Performa to the University within one month of the declaration of the result.

3.7 University shall organize RDC twice a year preferably in July and January. If synopsis of the candidate is recommended by the RDC, registration of the candidate for Ph.D along with approval of supervisor shall be issued by the University.

#### **(4) Payment of fees and deposits:**

4.1 Application fee for Ph. D entrance examination Rs: 1000-non refundable (Prospectus +Application)

4.2 Other fees:

- |                              |   |  |
|------------------------------|---|--|
| (a) Registration fees        | - | Rs 5000/-  |
| (b) Tuition fees             | - | Rs 10000/- for six months  |
| (c) Library fees             | - | Rs 1000/- for six months   |
| (d) Library caution money    | - | Rs 2000/- (once only) refundable   |
| (e) Identity card            | - | Rs 50/- (once only)  |
| (f) Laboratory fee           | - | Rs 1000/- for six months, for research scholars where laboratory work is involved. |
| (g) Laboratory caution money | - | Rs 2000/- (once only) refundable.  |

4.3 Annual fee is to be paid every year in the month of July.

4.4 Examination fee of Rs 10000/- shall be paid by the candidate prior to the submission of thesis.

4.5 The delay in payment of annual fees may invite cancellation of registration.

4.6 If the thesis submission is done after 30<sup>th</sup> June, candidate will be required to pay the fees for next academic session



**(5) Structure of Entrance Examination:**

The entrance exam for the admission to Ph.D programme consists of one theory paper of 100 marks having two sections with duration of 2 hours.

Section I- Contains 30 questions(multiple choices) to assess the candidates general awareness, verbal ability, quantitative ability, data interpretation, analysis, synthesis, reasoning, basics of computing and research aptitude(30 marks)

Section II consisting of 35 questions (multiple choices) to assess the candidates capability of defining certain concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form(70 marks)

**(6) The syllabus for Entrance exam:**

The syllabus for entrance exam are as follows:



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

Subject: Civil (Ph. D Entrance Test)

### 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.

### 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:**

1. Structural Analysis – R.C. Hibber (Pearson Publication)
2. Structural Analysis – Ghali, A. & Neville, M. (Chapman & Hall Publication. 1974)
3. Properties of Concrete – Neville, A.M., (Pitman Publishing Limited, London)
4. Reinforced Concrete Limit State Design – Jain, A.K. (Nem Chand & Bros. Roorkee, 1993)
5. Design of Steel Structures – E.H.Gaylord and C.N. Gaylord (Mc Graw Hill, New York)
6. Steel Structures: Design and Behaviour – C.G.Salmon and J.E.Johnson (Harper and Row, New York)
7. Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill, New Delhi)
8. Geotechnical Engineering Principles and Practice – Donald P. Coduto (Prentice Hall of India, New Delhi)
9. Foundation Engineering (2nd Edition) – Peck,R.B., Hanson (W.E. and Thornburn. W.H. Johan Wiley, New York 1976)
10. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
11. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)
12. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
13. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
14. Water Supply and Sanitary Engineering – G.S. Birdi (Dhanpat Rai Publications).
15. Principles of pavement Design – Yoder and Witzak
16. Principle and Practices of Highway Engineering – Kadiyali & Lab (Khanna Publishers, Delhi)



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

### Subject: Mechanical Engineering (Ph. D Entrance Test)

**Engineering Mechanics:** Free body and equilibrium; trusses and frames; virtual work; kinematic and dynamics of particles and of rigid bodies in plane motion, including impulse and momentum (linear and angular) and energy formulations; impact.

**Strength of Materials:** Stress and strain, stress-strain relationship and elastic constants, Mohr's circle for plane stress and plane strain, thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns; strain energy methods; thermal stresses.

**Theory of Machines:** Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of slider-crank mechanism; gear trains; flywheels; governors. Kinematic & dynamic analysis of planar mechanism, Lams, Gears & Gear train.

**Vibrations:** Free and forced vibration of single degree of freedom systems; effect of damping; vibration isolation; resonance, critical speeds of shafts.

**Design:** Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted, riveted and welded joints, shafts, spur gears, rolling and sliding contact bearings, brakes and clutches.

**Thermodynamics:** Zeroth, First and Second laws of thermodynamics; thermodynamic system and processes; Carnot cycle; behavior of ideal and real gases, properties of pure substances, calculation of work and heat in ideal processes.

**Fluid Mechanics:** Fluid properties; fluid statics, manometry, buoyancy; control-volume analysis of mass, momentum and energy, fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; boundary layer; elementary turbulent flow; flow through pipes, head losses in pipes, bends etc.

**Power Engineering:** Steam Tables, Rankine, Brayton cycles with regeneration and reheat, Cogeneration & Combined cycles.

**Heat Transfer:** Modes of heat transfer; one dimensional heat conduction, unsteady heat conduction, fins; dimensionless parameters in free and forced convective heat transfer, thermal boundary layer; effect of turbulence; radiative heat transfer, black and grey surfaces, shape factors; heat exchanger performance, LMTD and NTU methods.

**Refrigeration and air-conditioning:** Vapour refrigeration cycle, heat pumps, gas refrigeration, Reverse Brayton cycle; moist air; psychrometric chart, basic psychrometric processes.

**Turbo-machinery:** Pelton-wheel, flow of stream through nozzles & diffusers, Francis and Kaplan turbines-impulse and



reaction principles, velocity diagrams, various types of gas turbines, reciprocating, centrifugal and axial flow compressors, multi-stage compression.

**Unconventional Machining:** EDM, ECM, AJM, LBM, USM, EMB.

**Metrology and Inspection:** Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.

**Operation Research:** Linear programming, Graphical & Simplex method transportation, assignment, network flow models, simple queuing models, PERT and CPM, Game Theory.

**Value Engineering:** Value analysis for cost/value.

**Industrial Engineering :** Production Planning and Control; Forecasting- moving average, exponential smoothing, operations scheduling, assembly line balancing, product development, break even analysis, capacity planning.

#### Reference Books:

- [1]. Engineering Mechanics By I.B.Prasad.
- [2]. SOM by M.Ramarutham
- [3]. TOM by S.S.Ratan
- [4]. Vibration by V.B.Singh
- [5]. Machine design by Sundrajan Murthy
- [6]. Engineering thermodynamics by Domkundwar & P.K.Nag
- [7]. Fluid Mechanics by John David Anderson & Cinjel
- [8]. Power plant Engineering by P.K.Nag
- [9]. HMT by Cinjel
- [10]. RAC by R.C.Khurmi
- [11]. Turbo Machine by Cinjel
- [12]. Metrology by
- [13]. O.R.by Hira Gupta
- [14]. Industrial Engineering by Martang Telsang & O.P.Khanna.





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

### Subject: Electronics & Communication Engineering (Ph. D Entrance Exam)

**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. s. Sinusoidal oscillators; criterion for oscillation; Passive & Active filters, Power supplies.

**Advanced Digital circuits:** Logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinatorial 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 (Ph. D Entrance Test)

**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: Physics (Ph. D Entrance Test)

**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, Gamma 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]. Introduction to Solid State Physics: C. Kittel
- [5]. Solid State Electronic Devices: B.G. Streetmann
- [6]. Electronics Fundamental & Applications: J.D. Ryder



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

Subject: Chemistry (Ph.D Entrance Test)

### 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 orbitals in different ligand fields Jahn-Teller effect MO diagrams of complexes with and without  $\pi$  bonds. Spectral & Magnetic properties of complexes.

**Nuclear Chemistry:** 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, electro-osmosis, sedimentation potential and streaming potential. Catalysis: Mechanism and theories of homogeneous and heterogeneous catalysis. Acid-base and enzyme catalysis.

**Thermodynamics:** Intensive and extensive properties. Exact differentials. Intrinsic energy, enthalpy, entropy, free energy and their relations and significances. Maxwell relations. Thermodynamic equations of state. Joule-Thomson effect. Joule-Thomson coefficient for van der Waals' gas. The third law of thermodynamics.

**Spectroscopy:** Energy levels in molecules, rotational, vibrational, electronic NMR and ESR spectroscopy.



## ORGANIC CHEMISTRY

**Principles of organic chemistry:** Inductive, mesomeric, electromeric effect. Carbocations, carbanions, carbens. Addition, Elimination, Substitution reactions

**Chemistry of Polymers:** Types and mechanism of polymerization reactions. Step-growth, free radical, addition, ionic polymerizations. Copolymers. Characterization of polymers. Manufacture and applications of polyolefins, thermoplastics, polyamides, polyesters, polyurethanes, epoxies and industrial polymers.

**Chemistry of natural products:** Biosynthesis of terpenes and 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, thinlayer and column chromatographic methods.

### 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 (Ph. D Entrance Test)

**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 orthonormalization 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; Legendre and Bessel functions and their orthogonality.

**Algebra:** Normal subgroups and homomorphism theorems, automorphisms; Group actions, Sylow's theorems and their applications; Euclidean domains, Principal 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.





**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: Zoology (Ph.D Entrance Test)

**1. 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, malarial 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, Neries , earthworm and leech Arthropoda, Palaemon , Scorpion, Cockroach, Mollusea. Unio and Pila, Pearl Formation Modifications of nervous system. Echinodermata , Asterias and its larva. General organisation and characters, outline classification and inter- relationship of proto -chordata. Pisces, Amphibia , Reptilia, Aves and Mammalia. Neoteny and retrogressive metamorphosis. A general study of comparative account of the various systems of vertebrates. Locomotion and respiration in fishes, structure and affinities of Dipnoi. Structural peculiarities of Amphibia. Poisonous and non- poisonous snakes of India, Aerial adaptations of birds. Structural peculiarities and affiniting distribution relation of prototheria and Metatheria.

**2. Ecology and Economic Zoology:** Environment : Abiotic 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.

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

**4. 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.

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

**6. Evolution and Systematics:** Origin 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.

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

**8. 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.

**9. 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, allantois 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. Avise. 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.
10. Swartzman, G.L. and S.P.O. Kaluzny. Ecological Simulation Primer Macmillan, New York.
11. C.L. Prosser, Comparative Animal Physiology. W.B. Saunders & Company
12. R. Eckert. Animal Physiology: Mechanisms and Adaptation. W.H. Freeman & Company
13. Molecular Cell Biology, J. Darnell. H. Lodish and D. Baltimore, Scientific American Book INC, USA.
14. Molecular Biology of the Cell, B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson Garland Publishing INC, New York.



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

### Subject: Botany (Ph. D Entrance Test)

- 1. Microbiology** - Viruses and Bacteria Structure, classification and reproduction. General Account of infection, immunity and serology: Microbes in industry and agriculture.
- 2. Pathology** - Knowledge of important plant disease in India caused by fungi. Modes of infection and methods of control.
- 3. Plant Groups** - Structure, reproduction, life- history, classification, evolution, ecology and economic importance of algae , fungi, bryophytes, pteridophytes and gymnosperms.
- 4. 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.
- 5. Taxonomy** - Principles of nomenclature and classification of angiosperms. Modern trends in Taxonomy. A general knowledge of the more important families of angiosperms.
- 6. 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 behaviour during mitosis and meiosis.
- 7. 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.
- 8. 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.
- 9. 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.
- 10. Economic Botany** - General account of important sources of food, fiber , wood and drugs.



### Suggested Reading Material:

- Basra, A.S. & Basra, R.K. 1997. Mechanisms of environmental stress resistance in plants, Harwood Academic Publishers, The Netherlands
- Chopra, V.L. & Pagoda, R.S. 1988. Approaches for incorporating drought and salinity resistance in crop plants, Oxford & IBH Publishing Co. Pvt. Ltd., ND
- Gupta, U.S. 1985. Physiological aspects of dry land farming, Oxford & IBH
- Journal of Bioscience, Special issue: Cellular Stress Response, 1998.23(4):Oct., The Indian Academy of Sciences, Bangalore
- Kramer, P.J. 1983. Water relations of plants, Academic Press Inc., NY
- Levitt, 1972, 1980
- Nilsen, L. & Orcutt, 1998. Physiology of plants under stress :Abiotic factors Orcutt
- Paleg, L.G. & Aspinall, D. 1981. Physiology and biochemistry of drought resistance in plants, Academic Press, NY
- Singh, Randhir & Sawhney, S.K. 1988. Advances in frontier areas of plant biochemistry, Prentice-Hall of India Pvt. Ltd., New Delhi
- Smallwood, M.F., Calbert, C.M. and Bowles, D.J. 1999. Plant responses to environmental stress, BIOS Scientific Publishers Ltd., USA
- Taiz, & Zeiger, 1998. Plant Physiology, Sinauer Associates
- Treshow, M. 1970. Environment and plant response, Mc Graw Hill, NY
- Ammirato, P.V., Evans, D.A. Sharp, W.R. and Yamada, Y.(eds.) 1984. Hand Book of Plant Cell Culture, Mac Millan, N.Y
- Bhojwani, S.S. and Rajdan, S.K. 1998. Plant Cell, Tissue and Organ Culture, Narosa Publ.
- Lal, R. and Lal, S.1993.Genetic Engineering of Plants for Crop Improvement. CRC Press
- Reinert, J. and Bajaj, Y.P.S. 1976. Plant Tissue and Organ Culture. Springer –Verlag
- Street, H.E. 1977. Plant Tissue and Cell Culture, Blackwell Scientific Publ., UK
- Johri, B.M. 1988. Experimental embryology of vascular cryptogams, Narosa Publishing House, New Delhi



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

### Subject: Microbiology (Ph.D Entrance Test)

**1. 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.

**2. 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.

**3. 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,.

**4. Microbial Genetics:** Nucleic Acids: Structure, physical and chemical properties of DNA and RNA, extrachromosomal 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.

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

**6. 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, immunodeficiencies hypersensitivity; concept of immunotherapy.

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

**8. 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: Computer Science and Engineering (Ph.D Entrance Test)

**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.

**Software Systems:** 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, Poisson and other distributions.

**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
- Management And Strategy – Tarun Dhar Diwan



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

### Subject: Information Technology and Engineering (Ph. D Entrance Exam)

**Computer Organization and Architecture:** Computer Architecture System Inter Connection Structure Addressing modes Arithmetic Processor Design Control Unit Organism Storage and Memory Hierarchy and I/O Organization Parallel Computer Models and Program Parallelism Classification of Machine SISD, SIMD and MIND Synchronous Parallel Processing.

**Soft Computing:** Journal Issues and our view of AI Search and Control Strategies Heuristic Search Techniques Knowledge Representation AI Programming Languages LISP Prolog Natural language Processing Parsing Techniques RTN, ATN, Fuzzy System Expert Systems Artificial Neural Network .

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

**Information Systems and Software:** Engineering Software Engineering Paradigm Life Models S/W Requirements Design Concepts and Principles Testing and Maintenance S/W project management Internet and Web technology Internet protocol –TCP/IP,UDP,HTTP Telnet,SMTP,FTP,SNTP.Internet addressing IP V4 And IPV6 HTML,DHTML,SGML,XML,JAVA Scripts Internet Security and Firewalls web site planning and hosting.

**Database Management System:** Type of Data Models , DBMS, Architecture, Object Orientated Database Relationship Model , Storage and File Organization The Relational Data Model database Design Data Replication and Query Processing and Recovery, Security Management, Parallel and Distributed Database.

**Telecomm Switching and Computer Network:** Basic Concepts of telephony System and Topology, Switching, Wearing and Routing, PHTN, ISDN, DSL, ADSL, Switched Packets Data Services ISDN,ATN, Network, Seven Layer of OSI Model, TCP/IP Protocol Suit Cryptography and Digital Signature GSN,CDMA,Mobile IP Frequency Management and Channel Assignment.

#### Reference Books:

- Computer System Architecture – M. Morris Mano
- OOPS With C++ - E. Balagurusamy
- Data Base System Concepts - Mc Graw Hill – Korth, Silber chats
- Management And Strategy – Tarun Dhar Diwan
- 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
- Internet & Internet Engineering – Dahiel , Minoli TMH



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

### Subject: Management (Ph.D Entrance Test)

#### Management Process & Organizational Behavior:

- Overview: Functions and Principles of Management
- Management Thought and Concepts
- Management Decision Making Processes and Types
- Overview of Organizational Behavior
- 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

#### Suggested Readings:

1. Stoner and Freeman, Management, Prentice Hall, N. Delhi.
2. Koontz, O' Donnell Wechrich, Principles of Management, McGraw Hill, New York.
3. Peter F. Drucker, The Practice of Management, Allied Publishers.
4. Robbins S.P., Organisational Behaviour, New Delhi, PHI.
5. Luthans Fred: Organizational Behaviour, TMH New Delhi.
6. Singh, Dalip, Emotional Intelligence at Work, Response Books, Sage Publications, Delhi.
7. Management And Strategy – Tarun Dhar Diwan.

#### 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



### Suggested Readings:

1. Adhikary, M. Business Economics., New Delhi, Excel Books.
2. Baumol, W.J. Economic Theory and Operations Analysis, New Delhi, Prentice Hall Inc.
3. Chopra, O.P., Managerial Economics, New Delhi, Tata Mcgraw Hill.
4. Keat Paul G & Philips K.Y. Young, Managerial Economics, Prentice Hall, New Jersey.
5. Koutsoyiannis, A. Modern Micro Economics, New York, Macmillan.
6. Milgrom, P and Roberts J. Economics, Organisation and Management. Englewood Cliffs, New Jersey, Prentice Hall Inc.

### 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

### Suggested Readings:

1. Richard I. Levin and David S. Rubin, Statistics for Management (Seventh Edition), Prentice Hall of India, New Delhi.
2. Gupta, S. P. and Gupta, M.P, Business Statistics, Sultan Chand and Sons, New Delhi, 1997.
3. Kapoor, V. K., Essentials of Mathematics for Business and Economics, Sultan Chand and Sons, New Delhi, 1999.
4. Kazmier, L. J and Pohl, N. F, Basic Statistics for Business and Economics, McGraw Hill, New York.
5. Gupta S. P. and Gupta, M. P., *Business Statistics*, Sultan Chand and Sons, New Delhi, 1997.
6. C.R. Kothari Research Methodology.

### 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

### Suggested Reading

1. A. A Thompson Jr., A J Strickland III, J E Gamble, Crafting & Executing Strategy – The Quest for Competitive Advantage, Tata McGraw Hill, 4<sup>th</sup> ed., 2005.
2. Ranjan Das, Crafting the Strategy: Concepts and Cases in Strategic Management, Tata McGraw Hill, 2004.
3. Henry, Mintzberg, Bruce, Ahlstrand and Joseph, Lampel (1998). Strategy Safari. Free Press, New York.
4. Gary, Hamel and Prahalad, C. K. (1999). Competing for the Future. HBS Press.
5. Ed. C.A. Montgomery, M.E. Porter, Strategy – Seeking and Securing Competitive Advantage, Harvard Business Review Publications, 1991.



6. Peter F. Drucker, *Managing in a Time of Great Change*, Truman Talley Books /Plume Penguin Group, 1998.
7. *Strategic management and business policy*, C Appa Rao.
8. *Management And Strategy – Tarun Dhar Diwan*.

#### **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

#### **Suggested Reading**

1. Laura P. Hartman & Joe DesJardins, *Business Ethics: Business Ethics and values*, Francis Cherunilum

#### **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

#### **Suggested Reading**

1. Dessler, Gary; *Human Resource Management*, 7<sup>th</sup> International Edition, Prentice Hall, New Jersey, 1997.
2. Fisher, Schoenfeldt and Shaw; *Human Resource Management*, 4<sup>th</sup> Edition, Houghton Mifflin, Boston, 1999.
3. Leap, Terry L., and Micheal D. Crino; *Personnel/ Human Resource Management*, MacMillan, NewYork, 1990.
4. Teboul, James; *Managing Quality Dynamics*, Prentice Hall, New Jersey, 1991.
5. De Cenzo, D. A. and Robbins, S. P., *Human Resource Management*, 5<sup>th</sup> ed., John Wiley, 1994.
6. Monappa, A. and Saiyadain, M., *Personnel Management*, Tata McGraw-Hill, New Delhi, 1966.



### 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

### Suggested Readings

1. Hampton, John. Financial Decision Making. Englewood Cliffs, New Jersey, Prentice Hall Inc.
2. Van Horner, James C. Financial Management and Policy, New Delhi, Prentice Hall of India.
3. Winger, Bernard and Mohan, Nancy, Principles of Financial Management, New York, Macmillan Publishing Company.
4. J.C. Van Horne, Fundamentals of Financial Management, PHI, New Delhi.
5. Weston Brigham, Managerial Finance, McGraw Hill, New York.
6. I.M. Pandey, Financial Management Vikas Pub. House, New Delhi.
7. P. Chandra, Financial Management, TMH, New Delhi.
8. S.C. Kuchhal, Financial Management, Chaityna Publishing House, Aligarh.

### 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

### Suggested Readings

1. Baker, Michael J., Marketing : An Introductory Text, McMillan Press Ltd., 1996.
2. Czinkota, Michael R., Massaki, Kotabe and David Mercer B., Marketing Management: Text and Cases, Blackwell Publishers, Massachusetts, 1997.
3. Kotler, Philip, Marketing Management: Analysis Planning, Implementation and Control, 9<sup>th</sup> Ed., Prentice Hall of India Pvt. Ltd. , New Delhi, 1997.
4. Kotler, Philip and Armstrong, Gary, Principles of Marketing, 6<sup>th</sup> ed., Prentice Hall of India, Pvt. Ltd., New Delhi, 1995.
5. Mc Carthy, E. Jerome and Pessault, William D. Jr., Basic Marketing, Richard D. Irwin Inc. , Homewood, Illinois, 1994.
6. Saxena, Rajan, Marketing Management, Tata McGraw Hill Publishing Company, New Delhi, 1997.



### **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

### **Suggested Readings**

1. Adam, E E & Ebert, RJ. Production & Operation Management, New Delhi , PHI.
2. Amrine Harold T. etc. Manufacturing Organization and management. Englewood Cliffs, New Jersey, PHI Inc.
3. Buffa, E.S. Modern Production Management, John Wiley (New York).
4. Dobler, Donald. W & Lee Lamar Purchasing & Materials Management, New York, Mc Graw Hill.
5. Mayor R, Production and Operation Management.
6. Telsong, Industrial & Production Management.

### **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

### **Suggested Readings**

1. Laudon, Kenneth C, & Jane P.Laudon, Management Information System : Organisation and Technology , PHI Publication.
2. Narayan B. Management Information System, APH, New Delhi 1998.
3. Senn, James A., Analysis and Design of Information Systems, McGraw Hill Publication.
4. Applegate Lynda M., et. Al., Corporate Information Systems Management: Text and Cases, McGraw Hill, New York, 1999.
5. Malcolm Pettu, Introducing Information System Management, Baldwin Publications, London, 1990.
6. Mensching James R., & Dennis A.Adams, Managing an Information System, Prentice Hall, New Jersey.



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

### Subject: Commerce (Ph.D Entrance Test)

**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:

- 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 Storeform: MacMillan. New Delhi.
- Diwan Prag & Sunil Sharma : Electronic Commerce : A Manager's guide toE-Business, Vanity Books International, Delhi.



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

### Subject: Education (Ph.D Entrance Test)

#### Philosophical & sociological foundation of Education:

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

#### 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- it's meaning, theories & measurement
- Personality- Type & trait theories, Measurement of personality

#### 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

#### REFERENCE

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 (Ph.D Entrance Test)**

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.

### **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.



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

### Subject: English (Ph. D Entrance Test)

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  
Drama : Tragedy, Comedy, Farce, Melodrama, One Act Play, Masque

#### 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 them Poetry

Milton : Sonnets  
Pope : Essay of Man  
Johnson : The Vanity of Human Wishes  
Wordsworth : Tintern Abbey. Immortality Ode  
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 Poesie  
Arnold : The Study of Poetry

#### V (a) A critical study of the 20<sup>th</sup> 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 Waste Land

#### (b) American Literature

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



## Reference 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, BILASPUR (C.G.)

### Subject: Sociology (Ph. D Entrance Test)

1. **Nature of Sociology:** Definition, Basic Concept, Community, Institution, Culture, Social Structure, Structure and Role Their Interrelationship, Social Group.
2. **Social Institution:** Marriage, Family, Education, religion, Socialization, Theories of Socialization
3. **Social Stratification:** Social Differentiation, Forms of Stratification, Caste, Class, Gender, social mobility, Social Change
4. **Structural:** Radcliffe Brown, Levi Straus Functional- Durkheim, Malinowski, parsons, Interactionist – Social action, Max Weber , Pareto Bulmer Conflict – Karl Marx , Dahrendorf
5. **The Challenges of Globalization:** Globalization and Social Development, Globalization and Woman’s Development
6. **Meaning and Nature of Social Research:** The scientific methods , the Problem of the Study of Social Phenomena , Objectivity and Subjectivity Fact & value , Quantitative Methods – Survey , Research Design & its types , Techniques of Data Collection
7. **Qualitative Methods:** Statistics in Social Research, Measures of Central Tendency – Mean Median Mode, etc .

#### Reference Books

- 1 Advanced Sociology - Manahan & Manahan
- 2 Elements of Social Research – Baghel & Pandey
- 3 Development of Sociology – G.R. Mohan
- 4 Sociology Thinkers – RavindraNath Mukharji



- 5 Indian Society – R.V. Badi, N.V. Badi
- 6 Social change in modern India - M.N. Srinivas
- 7 Social Change – William F. Ogburn
- 8 The Concept of Sociology – Farley E Eubank





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

### Subject: Economics (Ph. D Entrance Test)

**Economic Systems** - Capitalism, Socialism and mixed economy.

**National Income** -Concept and measurement

**Consumer behaviour** - Law of demand , Elasticity of demand, utility analysis and indifference -curve techniques

**Producer's behaviour** - 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

**Types and principles of taxation** - Principles of Public expenditure, objective and instruments of budgetary and fiscal policy in a planned developing economy

**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

**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 nationalisation in India. Reserve Bank and monetary policy in India

Recent trends in India's foreign trade and balance of payments

**Indian Planning** - Objectives and strategies, planned growth and distributive justice eradication of poverty, problems of Indian planning.



### Basic Reading List:

1. Stigler G. (1996) Theory of Price, 4th Edition, Prentice Hall of India, New Delhi.
2. Sen A. (1999) Microeconomics: Theory and Application, Oxford University Press, New Delhi
3. Kreps David M. (1990), A Course in Microeconomic Theory, Princeton University Press, Princeton.
4. Samuelson, P.A. and W.O. Nordhaus (1998), Economics, 16th Edition, Tata McGraw Hill, New Delhi.
5. Verian H. (2000) Microeconomic Analysis, W.W Norton New 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 MacGraw Hill, New Delhi.
17. Comes R. and T.Sandler (1986) The theory of Externalities, Public Goods and Club Goods, Cambridge University Press, Cambridge.
18. Duff L. (1997), Government and Market, Orient Longman, New Delhi.
19. Friedman A. 91986), Welfare Economics and Social Choice Theory, Martins Nighoff, Boston.Topic: 2 & 3
20. Bird R. And O.Aidman (1967) Reading on Taxation in Developing Countries, The John Hopkins University.



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

### Subject: Geography (Ph.D Entrance Test)

- 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 cycles.
- 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.



## REFERENCE

- Climatology & Oceanography : Lal and Lal
- Geomorphology : Sabindar Singh
- Agriculture Geography : Marjit Husen
- Human Geography : Chanda



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

### Subject: Political Science (Ph. D Entrance Test)

**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.



### Reference Books:

- Politics and administration in changing societies-R.K.ARORA
- Comparative public administration- R.K.ARORA
- Bureaucracy Development and change – A.D.PANT AND S.K.GUPTA
- Sociology Thinkers – RavindraNath Mukharji
- political behaviors– H.H.HYMAN
- Theories of international relation – S.BURCHILL
- Political through the ages – Appadorai delhi, Khanna publisher



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

### Subject: Geology (Ph.D Entrance Test)

- 1) **MINERALOGY AND PETROLOGY:** Concepts of Crystal field theory and mineralogical spectroscopy. Transformation of minerals – polymorphism , polytypism and polysomatism. Petrogenic aspects of of important rocks.
- 2) **STRUCURAL GEOLOGY AND GEOTECTONICS :** Theory of Stress and Strain. Behaviour of rocks under stress.
- 3) **PALEONTOLOGY AND ITS APPLICATIONS :** Theories on origin of life.Organic evolution. Important Invertiberate fossils, vertebrate fossils, plant fossils and microfossils.
- 4) **SEDIMENTOLOGY AND STRATIGRAPHY :** Classification of conglomerates, sandstones and mudstones and carbonate rocks.
- 5) **MARINE GEOLOGYAND PALEOCEANOGRAPHY :** Morphologic and tectonic domains of the ocean floor. Pale oceanography – Approaches to pale oceanographic reconstructions.
- 6) **GEOCHEMISTRY :** Structure and atomic properties of elements. Phase rule and its application in in petrology.
- 7) **ECONOMIC GEOLOGY:** Magmatic, hydrothermal and surface processes of ore formation, ores and metamorphism.
- 8) **APPLIED GEOLOGY:** Remote sensing and GIS,geological interpretation of air photos an imageries. Engineering geology, Engineering properties of rocks and physical characteristics of building stones. Mineral exploration, hydrology, Darcy's law, hydrological characteristics of aquifers.
- 9) **GEOPHYSICS:** Signal processing, field theory , plate tectonics and geodynamics, seismology and tomography, gravimeters and magnetometers, data acquisition from land, air and ship
- 10) **METEOROLOGY:** Climatology, physical meteorology, thermal structure of the atmosphere and its composition.
- 11) **OCEAN SCIENCE:** Physical oceanography and chemical oceanography.

#### Text & References:

- [1]. Civil Engineering Geology, Cyril Senkey Fox
- [2]. Geology & Engineering Leggot R.F.
- [3]. Engineering Geology, B.S. Sathys Narayanswami
- [4]. A text book of Geology, P.K. Mukharjee



## **DR. C.V. RAMAN UNIVERSITY, BILASPUR (C.G.)**

### **Subject: History (Ph.D Entrance Test)**

#### **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 Gourids, The khaljis, The Tughlaqs and the Lodi's Foundation of the Mughal Empire Babar, Humayu, 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, Integration of Indian State – The Kashmir Question ,The Making of the Indian Constitution.

#### **World History**

History of Asia

#### **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

#### **Reference books**

- Sharma, R.S., Aspects of Ancient Indian Political Ideas and Institutions, Manohar, reprint
- Jha, D.N., Prachin Bharat (in Hindi)





- Chandra, Satish, Medieval India (Society, the jagirdari crisis and the village), Macmillan
- India Ltd., Madras, 1992.
- Curtin, P., Cross-Cultural Trade in World History, Cambridge, 1984
- Indian History – A.k. Mittal –Shahitya Bhavan Pub.
- History of 20<sup>th</sup> century- Sanjeev Jain
- Indian National Movement- Virkeshwar Prasad
- History of Maratha- Luniya



## **DR. C.V. RAMAN UNIVERSITY, BILASPUR (C.G.)**

### **Subject: Public Administration (Ph.D Entrance Test)**

**BASIC CONCEPT AND PRINCIPLE:** Meaning , Scope and Significance , Evolution and Status of Discipline ,Comparative Public Administration, Development Administration, Public and private Administration State Versus Market Debate, New Public Administration, New Public Management Perspective Organization ,Hierarchy ,Unity of command ,Span of Control, Authority of Responsibility, ordination ,Centralization and decentralization , line and staff.

**THEROYS OF ADMINISTRATION:** Scientific Management, Classical Theory, Bureaucratic theory, human relation school, behavioural approach system approach

**ADMINISTRATIVE BEHAVIOUR:** decision making, communication, control, leadership theory, theory of motivation.

**ACCOUNTABILITY AND CONTROL:** THE CONCEPT OF ACCOUNTABILITY AND CONTROL: Legislative control, Executive Control ,judicial Control, Citizen and Administration, Role of Civil society ,people's Participation, Right to information

**ADMINISTRATIVE SYSTEM:** Administrative System of INDIA, Administrative System of USA, Administrative System of Great Britain, Administrative System of Great France, Administrative System of Great Japan.

**PERSONAL ADMINISTRATION:** Role of civil service in developing societies, Classification, Recruitment, Training, promotion, pays and service conditions relation with the political executive, administrative Ethics.

**FINANCIAL ADMINISTRATION:** Budget concept and Forms, Formulation of Budget, separation of Railway Budget, Enactment Budget, execution of Budget, Deficit financing, public debt, accounts and audit.

**UNION GOVERNMENT AND ADMINISTRATION IN INDIA:** British legacy, Constitutional context of India administration, the president, the prime minister, the council of minister ,central secretariat ,cabinet secretariat ,prime minister's office, planning commission ,finance, commission, election commission , comptroller and auditor general of India , public enterprises

**CIVIL SERVICES IN INDIA:** recruitment to all India and central services, union public service commission, training of civil servants, generalists and specialists, minister-civil servant relationship

**STATE AND DISTRICT ADMINISTRATION:** governor, chief minister, secretariat, chief secretary, directorates, district collector: changing role

**LOCAL GOVERNMENT:** Panchayati raj, urban local government,

#### **Reference Books :**

1 Public Administration – B.L. Fadia



- 2 Public Administration – Dr. Surendra Kataria
- 3 Public Administration -NCERT Books -
- 4 Management And Strategy – Tarun Dhar Diwan
- 5 Public Administration in India – Uma Maheshwari
- 6 Comparative Administration – Frank , Johnson Goodnow



## **DR. C.V. RAMAN UNIVERSITY, BILASPUR (C.G.)**

### **Subject: Psychology (Ph.D Entrance Test)**

#### **1. Psychology**

- Meaning, Nature, Scope.

#### **2. Learning**

- Concept theories of learning, Skinner, Hull, Tolman, Guthrie
- Fundamentals Principles of Pavlovian Conditioning
- Verbal learning
- Methods of memorizing
- Semantic storage in memory trace theory
- Interface theory and repression theory

#### **3. Human Motivation**

- Concept of drive need incentive and arousal.
- Achievements Motivation
- Measurement of human motivation
- Emotion nature & components
- James Lange Cannon Bard theories of Emotion

#### **4. Intelligence**

- Meaning theories & Measurements

#### **5. Personality**

- Psychoanalytic
- Social
- Psychological theories of personality
- Normal & abnormal behavior concept & criteria
- Symptoms & causes of abnormality
- Classification of abnormal behavior psychoneurosis
- Psychosis, Organic psychosis



## REFERENCES

1. Arun Kumar – Normal Psychology
2. Arun Kumar – Abnormal Psychology
3. S. S. Chouhan – Psychology
4. Arun Kumar – Personality



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

### **Subject : Library And Information Science (Ph.D Entrance Test)**

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, UESCO. 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 . 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 .Management – Principles Function School of Thought Planning Organisation Structure .Collection Development .Human Resources Management .Financial Management .Total Quality Management TQM Information Technology- Components Impact of IT on Society . Telecommunication .Networking .ISDN. Library Automation .Library Networks .National and International Information Systems .Types of Libraries .Digital Libraries .Virtual Libraries. Role of UGC in the growth and development of libraries and Information Center.

#### **Reference Books**

1. Classification , Krishan Kumar, Ess Publication
2. Descriptive Question NET/SLET ,SM Tripathi, Ess Publication
3. Cataloging , SS Agrawal, Hindi Gtanth Acdmi Bhopal
4. Pralekhan Aum Suchana Vigyan , SP Sood RB Publication Jaipur
5. Library Automation , A R. Nai Ess Publication
6. Library Management, Saxena
7. Suchana aum Sandrabh Seva Ke Nven Ayam , S M Trapathi Ess Publication



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

### **PROCEDURE FOR Ph.D. REGISTRATION**

#### **With effect from OCTOBER 2010**

1. Application for Ph.D. is to be submitted in the prescribed format at the research centers (list enclosed) by the date to be declared by the University.
2. DRC (as per Ordinance) at Centre of Research will scrutinize application from eligibility point of view, for entrance examination/personal interview and forward it to the University by the date to be declared by the University.
3. University will organize entrance examination once in a year (if applications are more in number it shall be held twice a year) and will declare eligibility list for personal interview.
4. Eligible candidates after personal interview may take admission in their specified Centre of Research.
5. Centre of Research will conduct course work as per recommendation of the supervisor.
6. Examination of the course work will be conducted by the Centre of Research with due coordination of the University.
7. Candidates declared pass, in the examination of course work, should submit synopsis in the prescribed Performa to the University within one month of the declaration of the result.
8. University shall organize RDC twice a year preferably in July & January. If synopsis of the candidate is recommended by the RDC, registration of the candidate for Ph.D. along with approval of supervisor shall be issued by the University.
9. The rules and regulations as prevailed in Ordinance no. 33 of CVRU will be binding.

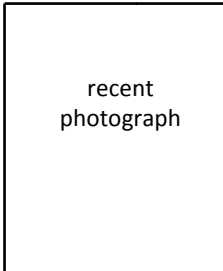


**Dr. C.V.RAMAN UNIVERSITY**

**Application form for appearing in the Entrance Examination/  
Personal Interview for Ph.D. Programme**

**(For filling this application form please refer to the instructions)**

**1. Name in Full (In Block Capital Letters only)**

**2. Date of Birth (enclosed HS/HSS certificate photocopy)**

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**3. Sex**

<b>M</b>	<b>F</b>
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**4. Father's Name**


**5. Mother's Name**


**6. Address for Correspondence with Contact No. & E-mail address**

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**7. Category**

<b>GEN</b>	<b>OBC</b>	<b>SC</b>	<b>ST</b>	<b>Others</b>
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**8. Academic Record (from class 12<sup>th</sup> on wards)**

S. N.	Name of the Exam	Institute/College (Name & Address)	University/Board	Discipline/Subject	Specialization, if any	Year of Passing	% Marks & Division
1							
2							
3							
4							





**GATE/CSIR/UGC, other Fellowship Examination Detail**

	Name of Examination	Examination Discipline	Year	Result
1				
2				
3				

**9. Working/Research Experience/Teaching Experience**

S. N.	Duration		Employer	Position	Nature of Work
	From	To			

**10. Research papers published (Please provide detail in a separate sheet)**

No. of Research Papers published in Journal	No. of Research Papers presented in Conference

**11. Discipline in which the proposed research work is intended to be carried out:** \_\_\_\_\_

**12. Details of Demand Draft**

- a) Amount Rs. \_\_\_\_\_ No. \_\_\_\_\_ Date \_\_\_\_\_  
 b) Issued by (Bank Name & Branch) \_\_\_\_\_

**Declaration by the applicant**

I do hereby declare that all information provided by me on this form are true to the best of my knowledge and belief. I understand that any misrepresentation of facts will result in my dismissal from the programme. If admitted, I shall abide by all the rules and regulations of the University.

**Date :**

**Signature**

**Name :**



## Scrutinization by Departmental Research Committee (DRC)

The applicant is duly recommended/not recommended by DRC.

The candidate is required/not required to appear in entrance test.

Any other remarks.

S. No.	Name of the DRC Member	Status	Signature
1.		Chairman	
2.		Member	
3.		Member	
4.		Member	

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**Forwarded by Head of Institution**

**Signature**

**Principal/Director**



**Dr. C.V.RAMAN UNIVERSITY**  
**Kargi Road Kota Bilaspur(C.G.)**

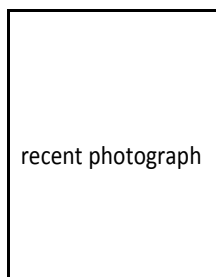
**Ph. D. Entrance Examination/Personal Interview Year .....**

**ADMISSION SLIP**

**Name of the Candidate:** .....

**Address :**

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is permitted to appear in the Entrance Examination/Personal Interview for Ph.D.

The following is to be filled by the invigilator during the examination :

Date of Exam	Signature of the Examinee	Signature of the Invigilator

**Date :**

**Issuing Officer**

**INSTRUCTIONS FOR FILLING THE FORM**

Either TYPE or PRINT the entries on the form neatly All items marked with an asterisk (\*) require you to submit an attested copy of some document. Documents for which attested copies are required are given in the checklist Please tick the items in the checklist you are attaching with this form. The application fee of **Rs. 1000/-** can be paid through demand draft payable to **Dr. C.V.Raman University, Kargi Road Kota, Bilaspur**. The candidate should write his/her name at the back of Demand Draft.



**CHECKLIST (TICK THE ENCLOSED DOCUMENTS) SEND ONLY ATTESTED COPIES (NOT ORIGINALS)**

1. Date of Birth (DOB) Certificate
2. SC/ST/OBC Certificate if applicable
3. GATE/CSIR/UGC score card
4. Copies of mark/grade sheets
5. List of Technical papers published duly signed by the applicant
6. No Objection/relieving Certificate from employer (for employed candidates)
7. The Demand draft for the application as applicable
8. Two self addressed stamped (Rs. 10/- each) envelopes of 23 cm x10 cm.
9. Two self attested passport size photographs.

**LIST OF DISCIPLINES IN WHICH CURRENTLY Ph.D. PROGRAMME IS BEING CARRIED OUT:**

- Engineering & Technology
- Science
- Information Technology
- Computer Science
- Education
- Physical Education
- Library Science
- Arts
- Management
- Commerce.

**THE COMPLETED APPLICATION FORM MUST REACH ON OR BEFORE**

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**The application should be submitted to the Registrar Dr. C.V. Raman University.**