Syllabus

Central University of Jharkhand Research Entrance Test (CUJRET)-2023

CENTRAL UNIVERSITY OF JHARKHAND

(Established under Central Universities Act, 2009)

Website: www.cuj.ac.in

Part A-

RESEARCH METHODOLOGY

RESEARCH METHODOLOGY (COMMON PAPER)

CUJRET- Syllabus – 2023

Unit- I

Introduction to research methodology: Objective and types of research, motivation of research, research methods vs methodology. Types of research, descriptive vs. analytical, applied vs. fundamental, quantitative vs. qualitative, conceptual vs. empirical.

Unit – II

Research problem formulation: Defining and formulation of the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem literature review primary and secondary source. web as source, searching the web, critical literature review, Identifying gap areas from literature review, development of working hypothesis, types of hypothesis.

Unit – III

Research design: Research design, basic principles, need of research design facture design, features of good design, types of research design, important concepts relating to research design, observation and facts, laws and theories, prediction and explanation, induction, deduction, development of models, developing a research plan, exploration, description, measurement scales, validity and reliability.

Unit – IV

Sampling: Concepts of statistical population, sample, sampling frame, sampling error, sample size, characteristics of a good sample, probability and non-probability sampling, determining sample size, practical considerations in sampling and sample size determination.

Unit – V

Data Analysis and Interpretation: Data preparation, univariate analysis (frequency tables, bar charts, pie charts, percentages), bivariate analysis, cross tabulations and chi- square test including testing hypothesis, multivariate analysis, parametric test and non-parametric test.

Unit - VI

Report and Thesis writing: Structure and components of scientific reports, types of reports, significance, different steps in the preparation of reports, layout, structure and language of reports, illustrations tables, bibliography, referencing and footnotes, oral presentation, planning, preparation, practice, use of visual aids, importance of effective communication.

Unit – VII

Research Ethics: Application of results and ethics, Environmental impacts, ethical issues, copyright, royalty, intellectual property rights and patent law trade related aspects of intellectual property rights, reproduction of published material, plagiarism, citation and acknowledgement, reproducibility and accountability.

Part B-

SUBJECT SPECIFIC KNOWLEDGE

PH.D. IN

METALLURGICAL AND MATERIALS ENGINEERING

DMME

PhD Entrance Test Syllabus

Subject: Metallurgical & Materials Engineering

Section 1: Engineering Mathematics

Linear Algebra: Matrices and Determinants, Systems of linear equations, Eigen values and Eigen vectors. Calculus: Limit, Continuity and Differentiability; Partial derivatives; Maxima and minima; Sequences and series; Differential Equations: Linear and non-linear first order ODEs; Higher order linear ODEs with constant coefficients; Probability and Statistics: Definitions of probability and sampling theorems, Mean, median, mode and standard deviation; Random variables; Poisson, normal and binomial distributions; Analysis of experimental data; linear least squares method

Section 2: Metallurgical Thermodynamics

Laws of Thermodynamics: First law – energy conservation, Second law - entropy; Enthalpy, Gibbs and Helmholtz free energy; Maxwell's relations; Chemical potential; Applications to metallurgical systems, solutions, ideal and regular solutions; Gibbs phase rule, phase equilibria, binary phase diagram and lever rule, Reaction kinetics, fundamentals of diffusion, Fick's laws, their solutions and applications. Solidification of pure metals and alloys, nucleation and growth, diffusional solid-state phase transformations (precipitation and eutectoid), martensitic transformation.

Section 3: Physical Metallurgy

Chemical Bonding: Ionic, covalent, metallic, and secondary bonding in materials, Crystal structure of solids – metals and alloys, ionic and covalent solids, and polymers. X-ray Diffraction-Bragg's law, optical metallography, principles of SEM imaging. Diffusion in Solids: Diffusion equation, Phase Transformation: Driving force, Homogeneous and heterogeneous nucleation, growth Kinetics, Solid State Transformations: Precipitation, spinoidal decomposition, ordering, massive transformation, discontinuous precipitation, eutectoid transformation, diffusion less transformations; Precipitate coarsening, Principles of heat treatment of steels, TTT and CCT diagrams; Surface hardening treatments; Recovery, recrystallization and grain growth; Electronic, magnetic and optical properties of materials. Basic forms of corrosion and its prevention

Section 4: Mechanical Metallurgy

Crystal Imperfections: Point, line and surface defects; Plastic deformation by slip and twinning. Dislocation Theory: Edge, screw and mixed dislocations, source and multiplication of dislocations, stress fields around dislocations; Partial dislocations, dislocation interactions and reactions. Strengthening Mechanisms: Work/strain hardening, strengthening due to grain boundaries, solid solution, precipitation and dispersion. Fracture behaviour, Griffith theory, linear elastic fracture mechanics, fracture toughness, fractography, ductile to brittle transition. Fatigue: Cyclic stress strain behaviour - low and high cycle fatigue, crack growth. Mechanisms of high temperature deformation and failure;

Section 5: Manufacturing Processes

Metal Casting: Mould design involving feeding, gating and risering, casting practices, casting defects. Hot, Warm and Cold Working of Metals: Metal forming – fundamentals of metal forming processes of rolling, forging, extrusion, wire drawing and sheet metal forming, defects in forming Metal Joining: Principles of soldering, brazing and welding, welding metallurgy, defects in welded joints in steels and aluminum alloys. Powder Metallurgy: production of powders, compaction and sintering. Non-destructive Testing (NDT): Dye-penetrant, ultrasonic, radiography, eddy current, acoustic emission and magnetic particle inspection methods.

Section 6: Nanomaterials & its properties

Classification and nomenclature of nanomaterials, Various types of synthesis processes. Properties of Nanomaterials: Size and shape dependent optical, thermal, electrical, Magnetic, and catalytic properties. Size effect of Nanomaterials: Size, shape, density, melting point, wet ability and specific surface area.

PH.D. IN
ENERGY ENGINEERING

Syllabus of CUJ Research Entrance Test (CUJRET-2023) of Energy Engineering

1. Energy, energy resource, energy policy, renewable energy
2. Solar Energy: solar resource, solar photovoltaics, solar thermal, solar photocatalysis
3. Materials for energy conversion: photovoltaic materials, selective materials, thermal and chemical energy storage
4. Wind Energy Conversion
5. Hydro Energy conversion and storage
6. Bioenergy conversion and storage
7. Hydrogen Energy and Fuel Cell
8. Electrical engineering: Basics, conversion, transmission, and distribution
9. Mechanical engineering: Heat transfer, Engines
10. Chemical science and engineering: Waste to energy conversion, Fuel, and combustion

PH.D. IN

WATER RESOURCES ENGINEERING/TRANSPORTATION ENGINEERING

Syllabus for PhD Entrance Exam

Transportation Engineering:

Urban transportation problems, travel demand estimation, Trip Generation & distribution models,mode split analysis, traffic assignment, corridor identification, stated preference methods,components of traffic system, traffic studies, microscopic & macroscopic traffic stream models,highway capacity, geometric design of traffic flow systems, design of at grade intersections, parkingfacilities, bicycle & pedestrian facilities-stresses in flexible & rigid pavements, design of flexible & rigid pavements, highway construction and equipment, pavement construction, Evaluation of pavements, Pavement Maintenance.

Geotechnical Engineering

Engineering properties of soils; Compaction and Consolidation; Foundation engineering- types of foundations, Shallow foundations, bearing capacity theories, Deep foundations; Soil Shear strength, Mohr's circle of stress; Earth pressure theories and earth retaining structures, stability of slopes, Terzaghi's one dimensional soil consolidation theory; Laboratory and In-situ testing of soil, Rock mass classification, laboratory and In-situ testing, foundations on rock, tunneling, Soil exploration- sampling, drilling, in-situ tests- bore logs; Ground improvement techniques, Soil-reinforcement

Environmental Engineering: Water standards-Surface water treatment-Distribution of water-Sewage and Sewerage treatment-Primary, secondary and tertiary treatment of waste water-Effluent discharge standards, measurement; Municipal solid waste- characteristics-collection and transportation-Engineered systems for solid waste management.

Water Resources Engineering

Ideal and real fluids, properties of fluids; hydrostatic pressure and its measurement, continuity, momentum and energy equations, kinematics and dynamics of flow; Bernoulli's theorem, laminar and turbulent flow, Flow in pipes, Pipe networks, Darcy- Weisbach and Hazen-Williams equations, Moody's diagram; Concept of boundary layer and its growth, Concept of lift and drag, flow through orifices, weirs and notches; flow in open channels, Forces on immersed bodies, Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude

Channel Hydraulics - Energy-depth relationships, specific energy, critical flow, hydraulic jump, uniform flow, gradually varied flow and water surface profiles; Fluid machinery.

Hydrological cycle and measurement of its components; meteorological parameters and their measurement; precipitation, evaporation, evapotranspiration, watershed, infiltration, analysis of precipitation data; runoff estimation; hydrograph analysis, unit hydrograph theory and application; streamflow measurement; flood routing, hydrological reservoir and channel routing, Infiltration indices and equations, drought and its classification, reservoir capacity, flood estimation and routing, surface run-off models, ground water hydrology - steady state well hydraulics and aquifers; Application of Darcy's Law.

Measurement of distance and area; instruments for surveying and leveling; chain surveying, methods of traversing; measurement of angles and bearings, plane table surveying; types of leveling; theodolite traversing; contouring; total station, introduction to GPS survey, computation of areas and volume.

Mechanics of soil erosion - wind and water erosion; soil erosion types, factors affecting erosion; soil loss estimation; biological and engineering measures to control erosion; terraces and bunds; vegetative waterways; gully control structures, drop, drop inlet and chute spillways; earthen dams.

Watershed characterization and land use capability classification; water budgeting in watershed, rainwater harvesting, check dams and farm ponds.

Water requirement of crops; Duty, delta, evapotranspiration, consumptive use and evapotranspiration; measurement of infiltration, soil moisture and irrigation water infiltration.

Types of irrigation systems and methods;

Design of irrigation channels; lined and unlined, and underground pipelines; irrigation scheduling; surface, sprinkler and micro irrigation methods, design and evaluation of irrigation methods; irrigation efficiencies, Gravity Dams and Spillways; Design of weirs on permeable foundation.

Drainage coefficient; planning, design and layout of surface and sub-surface drainage systems; leaching requirement and salinity control; irrigation and drainage water quality and reuse; non-conventional drainage system, cross drainage structure.

Groundwater occurrence: Darcy's Law, steady and unsteady flow in confined and unconfined aquifers, groundwater exploration techniques; overview of groundwater recharge estimation and artificial recharge techniques.

Types of wells, steady flow through wells; design and construction of water wells; classification of pumps; pump characteristics, pump selection and installation.

PH.D. IN

COMPUTER SCIENCE AND ENGINEERING

CSE

Department of Computer Science & Engineering
School of Engineering & Technology

Syllabus: PhD (CSE)

Discrete Mathematics: Discrete Mathematics: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Monoids. Groups. Graphs: connectivity, matching, coloring. Combinatory: counting, recurrence relations, generating functions.

Digital Logic: Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Computer Organization and Architecture: Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory and secondary storage: I/O interface (interrupt and DMA mode).

Programming and Data Structures: Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Algorithms: Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph traversals, minimum spanning trees, shortest paths

Theory of Computation: Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and contex-free languages, pumping lemma. Turing machines and undesirability.

Operating System: System calls, processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

Databases: ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B− trees). Transactions and concurrency control.

Computer Networks : Concept of layering: OSI and TCP/IP Protocol Stacks; Basics of packet; Data link layer: framing, error detection; Routing protocols; Fragmentation and IP addressing, IPv4, CIDR notation; Transport layer: flow control, UDP, TCP, sockets; Application layer protocols.

PH.D. IN
CHEMISTRY

SYLLABUS

Physical Chemistry:

Basic principles of quantum mechanics. Postulates, operator algebra, exactly-solvable systems, particle-in-a-box, harmonic oscillator and the hydrogen atom, approximate methods of quantum mechanics. Variational principle; perturbation theory and its applications.

Atomic structure and spectroscopy, term symbols, many-electron systems

Chemical bonding, concepts of MO and VB theories. Huckel theory for conjugated π-electron systems.

Chemical applications of group theory, symmetry elements, point groups, character tables, selection rules

Molecular spectroscopy, rotational and vibrational spectra of diatomic molecules, electronic spectra, IR and Raman activities selection rules, basic principles of magnetic resonance

Chemical thermodynamics, laws, state and path functions and their applications, thermodynamic description of various types of processes, Maxwell's relations, spontaneity and equilibria, temperature and pressure dependence of thermodynamic quantities, Le Chatelier principle, phase transitions, phase equilibria and phase rule, thermodynamics of ideal and non-ideal gases and solutions

Electrochemistry, Nernst equation, redox systems, electrochemical cells, Debye-Huckel theory, electrolytic conductance Kohlrausch's law and its applications, ionic equilibria, conductometric and potentiometric titrations

Chemical kinetics, Empirical rate laws and temperature dependence, complex reactions, steady state approximation, determination of reaction mechanisms, collision and transition state theories of rate constants, unimolecular reactions, enzyme kinetics, salt effects, homogeneous catalysis, photochemical reactions

Colloids and surfaces, stability and properties of colloids, isotherms and surface area, heterogeneous catalysis

Solid state, Polymer chemistry, Nanoscience

Inorganic Chemistry:

Atomic structure and Chemical periodicity

Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules (VSEPR Theory).

Concepts of acids and bases

Main group elements and their compounds, allotropy, synthesis, structure and bonding, industrial importance of the compounds

Transition elements and coordination compounds, structure, bonding theories, spectral and magnetic properties, reaction mechanisms

Inner transition elements, spectral and magnetic properties, redox chemistry, analytical applications

Organometallic compounds, synthesis, bonding and structure, and reactivity.

Cages and metal clusters.

Analytical chemistry- separation, spectroscopic, electro- and thermoanalytical methods

Bioinorganic chemistry, photosystems, porphyrins, metalloenzymes, oxygen transport, electron-transfer reactions; nitrogen fixation, metal complexes in medicine.

Characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mossbauer, [illegible] electron spectroscopy and microscopic techniques.

Nuclear chemistry, nuclear reactions, fission and fusion, supramolecular chemistry, environmental chemistry

Organic Chemistry:

IUPAC nomenclature of organic molecules, principles of stereochemistry, Configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.

Aromaticity, Benzenoid and non-benzenoid compounds- generation and reactions

Organic reactive intermediates, Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzynes and nitrenes.

Organic reaction mechanisms involving addition, elimination and substitution reactions, electrophilic, nucleophilic or radical species, determination of reaction pathways

Common named reactions and rearrangements, applications in organic synthesis

Organic transformations and reagents, functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic), regio- and stereoselective transformations.

Concepts in organic synthesis, retrosynthesis, disconnection, synthons, linear and convergent synthesis, umpolung of reactivity and protecting groups

Asymmetric synthesis, Chiral auxiliaries, methods of asymmetric induction-substrate, reagent and catalyst-controlled reactions; determination of enantiomeric and diastereomeric excess, enantiomer discrimination, resolution- optical and kinetic

Pericyclic, principles and applications of photochemical reactions in organic chemistry

Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O, N, S)

Chemistry of natural products: Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenes, steroids and alkaloids. Biogenesis of terpenoids and alkaloids.

Structure determination of organic compounds by IR, UV-Vis, ^{1}H & ^{13}C NMR, Mass spectroscopic techniques.

Medicinal chemistry, green chemistry

PH.D. IN
PHYSICS

physics

Syllabus for the Central University of Jharkhand Research Entrance Test (CUJRET 2023)
Department of Physics, CUJ, Ranchi

Physical Sciences

UG Level Physics and the topics of PG Level Physics as mentioned below:

I. Mathematical Methods of Physics

Dimensional analysis. Vector algebra and vector calculus. Linear algebra, matrices, Cayley-HamiltonTheorem. Eigenvalues and eigenvectors. Linear ordinary differential equations of first & second order,Special functions (Hermite, Bessel, Laguerre and Legendre functions). Fourier series, Fourier and Laplacetrans forms. Elements of complex analysis, analytic functions; Taylor & Laurent series; poles, residues and evaluation of integrals. Elementary probability theory, random variables, binomial, Poisson and normal distributions. Central limit theorem.

II. Classical Mechanics

Newton's laws, Dynamical systems, Phase space dynamics, stability analysis. Central force motions. Two body Collisions-scattering in laboratory and Centre of mass frames. Rigid body dynamics-moment of inertia tensor. Non-inertial frames and pseudo-forces. Variational principle. Generalized coordinates. Lagrangian and Hamiltonian formalism and equations of motion. Conservation laws andcyclic coordinates. Periodic motion: small oscillations, normal modes. Special theory of relativity, Lorentz transformations, relativistic kinematics and mass–energy equivalence.

III. ElectromagneticTheory

Electrostatics: Gauss's law and its applications, Laplace and Poisson equations, boundary value problems. Magnetostatics: Biot-Savart law, Ampere's theorem. Electromagnetic induction. Maxwell's equations in free space and linear isotropic media; boundary conditions on the fields at interfaces. Scalarand vector potentials, gauge invariance. Electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields.

IV. Quantum Mechanics

Wave-particle duality: Schrödinger equation (time-dependent and time-independent).Eigenvalue problems (particle in a box, harmonic oscillator, etc.). Tunneling

physics

Syllabus for the Central University of Jharkhand Research Entrance Test (CUJRET 2023)
Department of Physics, CUJ, Ranchi

Physical Sciences

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Newton's laws, Dynamical systems, Phase space dynamics, stability analysis. Central force motions. Two body Collisions-scattering in laboratory and Centre of mass frames. Rigid body dynamics-moment of inertia tensor. Non-inertial frames and pseudo-forces. Variational principle. Generalized coordinates. Lagrangian and Hamiltonian formalism and equations of motion. Conservation laws andcyclic coordinates. Periodic motion: small oscillations, normal modes. Special theory of relativity, Lorentz transformations, relativistic kinematics and mass–energy equivalence.

III. ElectromagneticTheory

Electrostatics: Gauss's law and its applications, Laplace and Poisson equations, boundary value problems. Magnetostatics: Biot-Savart law, Ampere's theorem. Electromagnetic induction. Maxwell's equations in free space and linear isotropic media; boundary conditions on the fields at interfaces. Scalarand vector potentials, gauge invariance. Electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields.

IV. Quantum Mechanics

Wave-particle duality: Schrödinger equation (time-dependent and time-independent).Eigenvalue problems (particle in a box, harmonic oscillator, etc.). Tunneling

through a barrier. Wave-function incoordinate and momentum representations. Commutators and Heisenberg uncertainty principle. Dirac notation for state vectors. Motion in a central potential: orbital angular momentum, angular momentum algebra, spin, addition of angular momenta; Hydrogen atom. Stern-Gerlach experiment. Time-independent perturbation theory and applications. Variational method. Time dependent perturbation theory and Fermi's golden rule, selection rules. Identical particles. Pauli exclusion principle, spin-statistics connection.

V. Thermodynamic and Statistical Physics

Laws of thermodynamics and their consequences. Thermodynamic potentials, Maxwell relations, chemical potential, phase equilibria. Phase space, micro-and macro-states. Micro-canonical, canonical and grand-canonical ensembles and partition functions. Free energy and its connection with thermodynamic quantities. Classical and quantum statistics. Ideal Bose and Fermi gases. Principle of detailed balance. Black body radiation and Planck's distribution law.

VI. Electronics and Experimental Methods

Semiconductor devices (diodes, junctions, transistors, field effect devices, homo- and hetero-junction devices), device structure, device characteristics, frequency dependence and applications. Opto-electronic devices (solar cells, photo-detectors, LEDs). Operational amplifiers and their applications. Digital techniques and applications (registers, counters, comparators and similar circuits). A/D and D/A converters. Microprocessor and microcontroller basics.

Data interpretation and analysis. Precision and accuracy. Error analysis, propagation of errors. Leastsquaresfitting,

VII. Nuclear and ParticlePhysics

Basic nuclear properties: size, shape and charge distribution, spin and parity. Binding energy, semi-empirical mass formula, liquid drop model. Nature of the nuclear force, form of nucleon-nucleon potential, charge-independence and charge-symmetry of nuclear forces Deuteron problem. Evidence of shell structure, single-particle shell model, its validity and limitations. Rotational spectra. Elementary ideas of alpha, beta and gamma decays and their selection rules. Fission and fusion. Nuclear reactions, reaction mechanism, compound nuclei and direct reactions.

Classification of fundamental forces. Elementary particles and their quantum numbers (charge, spin, parity, isospin, strangeness, etc.). Gellmann-Nishijima formula. Quark model, baryons and mesons. C, P,and T invariance. Application of symmetry arguments to particle reactions. Parity non-conservation in weak interaction. Relativistic kinematics.

VIII. Optics and Applied Optics

Interference. Anti-reflecting films. Color of thin films. Newton's rings. Michelson

interferometer. Fabry Perot interferometer, Resolution and Free spectral range. Fraunhofer diffraction, diffraction by a single slit, double slit, circularaperture,resolving power of microscopes and telescopes, Diffraction grating, Resolving power and Dispersive power, Fresnel diffraction, Zone plate,diffraction due to straight edge. Polarization, linear, circular and elliptical polarizations, Brewster's law and Malus's law, Double refraction, half wave and quarter wave plates, Kerr effect, Pockel's effect, Faraday effect, Fermat's Principle, Ray equation and its solution

Optical Fibers: Structure of optical fibers, Single, multimode and W-profile fibers. Numerical aperture and acceptance angle. Multipath, Material dispersion, their combined effect. Attenuation in optical fibers, Photonic crystal fibers.Wave Propagation in Step-index Fibers, Wave Propagation in Graded-index Fibers, Optical Sources, Photo Detector and Sensors: Photo Detectors, Fiber Optics sensor, Optical fiber fabrication and cabling.

IX Atomic and Molecular Physics

Atomic structure: Rutherford model of atom and its drawbacks, Bohr atom model, Electron orbits, Energy levels and spectra, Effect of nuclear motion on atomic spectra, Spectra of hydrogen-like atoms, Bohr's correspondence principle, Ritz combination principle, Bohr-Sommerfeld Theory

Atoms in Electric and Magnetic Fields: Electron Angular Momentum, Space Quantization, Electron Spin and Spin Angular Momentum, Larmor's Theorem, Spin Magnetic Moment, Stern-Gerlach Experiment, Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton, Atoms in External Electric and Magnetic Fields (qualitative discussion only): Normal and Anomalous Zeeman Effect, Panchen Back and Stark Effect; Classical theory of normal Zeeman effect.

Many electron atoms: Pauli's Exclusion Principle, Periodic table, Fine structure, Spin orbit coupling, Spectral Notations for Atomic States, Total Angular Momentum, Vector Model, L-S and J-J couplings, Hund's Rule, Term Symbols, Spectra of Alkali Atoms, Clebsch-Gordon coefficients

Molecular Spectra: Theory of the origin of pure rotational spectra of a diatomic molecule as a rigid rotator and as a non-rigid rotator, isotope effect, Raman Effect, Experimental study, Characteristics of Raman Lines, Classical and Quantum theory of Raman Effect

X. Solid State Physics

Crystal Structure:Amorphous and crystalline materials, crystal lattice, crystal planes and Miller indices, unit cells, typical crystal structure, coordination number, packing fraction, Diffraction of X-ray by crystal lattice, Brag's law, Laue's formulation of X-raydiffraction,reciprocal lattice, Brillouin zones, Laue spots, rotating crystalandDebyeScherrer methods, geometrical structure factor, atomic form factor, calculation for bcc,fcc and diamond structure, Metallic structure, close packed structure, quasicrystal.

Defects in solids: Lattice defects, vacancies, Schottky and Frenkel pairs, edge and screw dislocations, experimental methods to observed defects, neutron and electron diffraction methods.

Band Theory of solids: The Bloch theorem, Bloch functions, The Kroning-penney model,

Number of wave functions in the band. Velocity and effective mass of the electron.

Bonding in solids: Lennard jones potential, concepts of cohesive energy, covalent bonding and its origin, ionic bonding, energy of bonding, transition between covalent and ionic bonding, metallic bonding, Van-der Waals bonding, hydrogen bond.

Lattice vibrations: Vibrational modes of continuous media, phonon, linear monoatomic and diatomic chains, acoustical and optical phonons, qualitative description of phonon spectra in solids.

Specific heat of solids: Einstein and Debye theories of specific heat of solids, density of states, T3 law, Normal and Umklapp process.

PH.D. IN
GEOINFORMATICS

Syllabus for Entrance examination for Ph.D. in Geoinformatics

Electromagnetic Radiation (EMR): Wavelength regions and their applications Atmospheric windows, Interaction of EMR with atmosphere & Earth's Surface, Spectral response pattern, Geostationary & Sun Synchronous Satellites, Resolutions- Spectral, Spatial, Temporal and Radiometric, Earth Resource Satellite Sensors, Advances in remote sensing technologies: Thermal, RADAR, Microwave, Hyperspectral, Lidar *etc.*

Introduction to cartography, Map and Scale, Important Map Projections, Generalization- Elements , Control & Classification (Semantic & Geometric), Introduction to Global Positioning System, GPS Segments, GPS Positioning Types- Absolute, Differential, Geopositioning, GNSS: GAGAN, NAVSTAR, GLONASS, GALILEO *etc.*

Basic concepts about spatial information, Spatial vs. non-spatial data, Components of GIS, Spatial data models – Raster and Vector, Data base design - editing and topology creation in GIS, Linkage between spatial and non-spatial data, Integration of Raster & Vector Data, Feature Based Topological functions, Interactive Data Exploration, Vector Data Query, Attribute Data Query.

Remote sensing systems, remote sensing sensors, Electromagnetic Radiation, Interaction of EMR with atmosphere & Earth's Surface, Spectral properties of major elements, Photographic System, Cameras, Filters & Films, Resolutions, Earth Resource Satellite, Satellite missions (Indian and Foreign), Major Remote Sensing Agencies, Fundamental of Digital Image Processing, Geographic Information System (GIS)& its components, Application of Geoinformatics. Remote Sensing (RS) Applications in Agriculture, Forestry, Land cover/ Land use, Water resources, cryosphere, disaster management- floods, landslide, cyclone, forest fire, drought & Environmental Impact Assessment (EIA).

Components of Earth System, Internal Structure of Earth, Lithosphere, Biosphere, Hydrosphere ity, rock types and structures, weathering and erosion, landforms of fluvial, [illegible] Marine origin. Water resources, Hydrological Cycle, Watershed and Watershed management, Groundwater, Aquifers, Agro-climatic regions, Forestry and ecology. Environment, Sustainable development, Global warming, Climate change, GHGs, Disaster Management, Recent disaster events, Major disaster management agencies.

Operating System, Databases, Internet and Web technologies, HTML, XML, Data formats, helper applications, Java, databases and the Web, Internet Map Servers, Web GIS Architectures, C++, JAVA, PYTHON, Machine Learning, Google Earth Engine.

PH.D. IN
ENVIRONMENTAL SCIENCES

EVS

Department of Environmental Sciences

Ph.D. Syllabus Environmental Sciences (CUJRET-2023)

Fundamentals of Environmental Sciences

Definition, Principles and Scope of Environmental Science, Structure and composition of Environmental components, Meteorological parameters, Wind roses, Environmental education and awareness, Environmental ethics.

Environmental Chemistry

Fundamentals of Environmental Chemistry, Composition of air, Chemical processes in the formation of inorganic and organic particulate matters, thermochemical and photochemical reactions in the atmosphere, Oxygen and Ozone chemistry, Hydrological cycl. Concept of DO, BOD and COD, etc.

Environmental Ecology and Ecosystem

Ecology as an inter-disciplinary science. Origin of life and speciation. Human Ecology and Settlement. Ecosystem Structure and functions: Structures - Biotic and Abiotic components. Functions - Energy flow in ecosystems, energy flow models, food chains and food webs. Biogeochemical cycles, Ecological succession. Species diversity, Concept of ecotone, edge effects, ecological habitats and niche. Ecosystem stability and factors affecting stability. Ecosystem services. Basis of Ecosystem classification. Types of Ecosystem: Desert (hot and cold), forest, rangeland, wetlands, lotic, lentic, estuarine (mangrove), Oceanic. Biomes: Concept, classification and distribution. Characteristics of different biomes: Tundra, Taiga, Grassland, Deciduous forest biome, Highland Icy Alpine Biome, Chapparal, Savanna, Tropical Rain forest. Population ecology: Characteristics of population, concept of carrying capacity, population growth and regulations. Population fluctuations, dispersion and metapopulation. Concept of 'r' and 'k' species. Keystone species. 4 Community ecology: Definition, community concept, types and interaction - predation, herbivory, parasitism and allelopathy.

Environmental Biology

Biological invasions. Biodiversity and its conservation: Definition, types, importance of biodiversity and threats to biodiversity. Concept and basis of identification of 'Hotspots': hotspots in India. Measures of biodiversity. Strategies for biodiversity conservation: in situ, ex situ and in vitro conservation. National parks, Sanctuaries, Protected areas and Sacred groves in India. Concepts of gene pool, biopiracy and bio-prospecting. Concept of restoration ecology. Extinct, Rare, Endangered and Threatened flora and fauna of India. Concept of Industrial Ecology. Toxicology and Microbiology. Absorption, distribution and

excretion of toxic agents, acute and chronic toxicity, concept of bioassay, threshold limit value, margin of safety, therapeutic index, biotransformation. Major water borne diseases and air borne microbes. Environmental Biotechnology: Bioremediation – definition, types and role of plants and microbes for in situ and ex situ remediation. Bioindicators, Biofertilizers, Biofuels and Biosensors.

Environmental Geosciences

Origin of earth. Concept of minerals and rocks. Formation of igneous and metamorphic rocks. Controls on formation of landforms - tectonic including plate tectonic and climatic. Energy budget of the earth, Earth's thermal environment and seasons, Climates of India, western disturbances, Indian monsoon, droughts, *El Nino*, *La Nina*, Weathering of rocks and sediments, Soil forming minerals and process of soil formation, Distribution of water in earth, hydrology and hydrogeology, major basinsand groundwater provinces of India, Darcy's law and its validity, groundwater fluctuations, Pollution of groundwater resources, Natural resources and its management, Natural Hazards: Catastrophic geological hazards - floods, landslides, earthquakes, volcanism, avalanche, tsunami and cloud bursts, Prediction of hazards and mitigation of their impacts.

Energy and Environment

Solar radiation and its spectral characteristics, Fossil fuels: classification, composition, physico-chemical characteristics and energy content of coal, petroleum and natural gas. Principles of generation of hydro-power, tidal energy, ocean thermal energy conversion, wind power, geothermal energy, solar energy, Nuclear energy - fission and fusion, Nuclear fuel, Bioenergy, Environmental implications of energy use, energy use pattern in India and the world, radiative forcing and global warming.

Environmental Pollution and Control

Air Pollution:
Noise Pollution:
Water Pollution:
Soil poullution:
Types and sources of air , noise, soil and water pollution.

Solid and Hazardous Waste Management

Solid Waste - types and sources, Solid waste characteristics, generation rates, solid waste components, proximate and ultimate analyses of solid wastes, Solid waste processing and recovery Recycling, recovery of materials for recycling and direct manufacture of solid waste products, composting and vermicomposting, biomethanation of solid waste.

Environmental Assessment, Management and Legislation

Aims and objectives of Environmental Impact Assessment (EIA). Environmental Impact

Statement (EIS) and Environmental Management Plan (EMP), EIA Guidelines. Impact Assessment Methodologies, Guidelines for Environmental Audit. Environmental Management System Standards (ISO14000 series), EIA Notifications. Eco-labeling schemes. Environmental Laws and legislation in India. International Environmental Conventions and Agreements.

Statistical Approaches and Modelling in EnvironmentalSciences

Attributes and Variables: types of variables, scales of measurement, measurement of Central tendency and Dispersion, Standard error. Moments measure of Skewness and Kurtosis. Basic concept of probability theory. Sampling theory, Distributions

Contemporary Environmental Issues

Global Environmental Issues – Biodiversity loss, Climate change, Ozone layer depletion. Greenhouse effect, Global Warming, International efforts for environmental protection. National Action Plan on Climate Change, Current Environmental Issues in India. Rain water harvesting and ground water recharge, National river conservation plan – Namami Gange and Yamuna Action Plan, Eutrophication and restoration of lakes. Conservation of wetlands. Ramsar sites in India, Soil erosion, reclamation of degraded land. desertification and its control, Climate change - adaptability, energy security. food security and sustainability, Forest Conservation, Carbon sequestration and carbon credits.

PH.D. IN
LIFE SCIENCE

life sciences

Ph.D. LIFE SCIENCE
ENTRANCE EXAM SYLLABUS
DEPARTMENT OF LIFE SCIENCES
CENTRAL UNIVERSITY OF JHARKHAND

Ph.D. LIFE SCIENCE

ENTRANCE EXAM SYLLABUS

MOLECULES AND THEIR INTERACTION RELAVENT TO BIOLOGY

Structure of atoms, molecules and chemical bonds. Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins). Stabilizing interactions (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.). Principles of biophysical chemistry. Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, group transfer; biological energy. Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes Conformation of proteins (Ramachandran plot, secondary structure, domains, motif and folds). Conformation of nucleic acids (helix (A, B, Z), t-RNA, micro-RNA) Stability of proteins and nucleic acids. Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.

CELLULAR ORGANIZATION

Membrane structure and function Structural organization and function of intracellular organelles. Organization of genes and chromosomes, transposons. Cell division and cell cycle Microbial Physiology

FUNDAMENTAL PROCESSES

DNA replication, repair and recombination, RNA synthesis and processing, Protein synthesis and processing, Post- translational modification of proteins) Control of gene expression at transcription and translation level.

CELL COMMUNICATION AND CELL SIGNALING

Host parasite interaction, Cell signaling, Cellular communication Cancer-Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth. **Innate and adaptive immune system** Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity, antigen-antibody interactions, MHC molecules, antigen processing and presentation, activation and differentiation of B and T cells, B and T cell receptors, cell-mediated effector functions, inflammation, hypersensitivity and autoimmunity, immune response during bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections, congenital and acquired immunodeficiencies, vaccines

DEVELOPMENTAL BIOLOGY

Basic concepts of development : Potency, commitment, specification, induction, competence, determination and differentiation, morphogenetic gradients, cell fate and cell lineages; stem cells, genomic equivalence and the cytoplasmic determinants; imprinting, mutants and transgenics in analysis of development. **Gametogenesis, fertilization and early development:** Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination. **Morphogenesis and organogenesis in animals :** Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis – vulva formation in *Caenorhabditis elegans*, eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development- larval formation, metamorphosis; environmental regulation of normal development; sex determination. **Morphogenesis and organogenesis in plants:** Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum*. **Programmed cell death, aging and senescence**

Cancer Biology

The cell cycle; primary causes of cancer; hallmarks of cancer cells; Mutations and cancer; Ames' test for mutagenicity as a sign of carcinogenicity; RO at the centre stage; DNA repair and cancer; P53, apoptosis and cancer; Changes associated with progression of cancer; epithelial to mesenchymal transition, extracellular matrix; Extracellular and intracellular markers for targeted delivery and targeted therapy; Oncogenes and Tumour suppressor genes. Cancer and diet; Chemoprevention by dietary supplements; drugs targeting active DNA replication, telomerase, growth factors and growth factor receptors; Chemo- and radiation therapy; Cancer genetics; genes associated with cancer propensity, cancer cell genome; Cancer stem cells; Cancer immunology and therapeutic vaccines.

SYSTEM PHYSIOLOGY – PLANT

Photosynthesis - Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO_2 fixation-C_3, C_4 and CAM pathways. Respiration and photorespiration – Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway. Nitrogen metabolism - Nitrate and ammonium assimilation; amino acid biosynthesis. Plant hormones – Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action. Sensory photobiology - Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins; stomatal movement; photoperiodism and biological clock. Solute transport and photoassimilate translocation – uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates. Secondary metabolites - Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles. Stress physiology – Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses.

SYSTEM PHYSIOLOGY - ANIMAL

Blood and circulation - Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, immunity, haemostasis. **Cardiovascular System:** Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above. **Respiratory system** - Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration. **Nervous system** - Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture. **Sense organs** - Vision, hearing and tactile response. **Excretory system** - Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance. **Thermoregulation** - Stress and adaptation. **Digestive system** - Digestion, absorption, energy balance, BMR. **Endocrinology and reproduction** - Endocrine glands, basic mechanism of hormone action, hormones and diseases; reproductive processes, gametogenesis, ovulation, neuroendocrine regulation

INHERITANCE BIOLOGY

Mendelian principles : Dominance, segregation, independent assortment. **Concept of gene :** Allele, multiple alleles, pseudoallele, complementation tests **Extensions of Mendelian principles :** Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters. **Gene mapping methods :** Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants. **Extra chromosomal inheritance :** Inheritance of Mitochondrial and chloroplast genes, maternal inheritance **Microbial genetics :** Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes **Human genetics :** Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders **Quantitative genetics :** Polygenic inheritance, heritability and its measurements, QTL mapping. **Mutation :** Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis. **Structural and numerical alterations of chromosomes :** Deletion, duplication, inversion, translocation, ploidy and their genetic implications **Recombination :** Homologous and non-homologous recombination including transposition.

DIVERSITY OF LIFE FORMS:

Principles & methods of taxonomy: Concepts of species and hierarchical taxa, biological nomenclature, classical & quantititative methods of taxonomy of plants, animals and microorganisms. Levels of structural organization: Unicellular, colonial and multicellular forms. Levels of organization of tissues, organs & systems. Comparative anatomy, adaptive radiation, adaptive modifications.

Outline classification of plants, animals & microorganisms. Important criteria used for classification in each taxon. Classification of plants, animals and microorganisms. Evolutionary relationships among taxa. Natural history of Indian subcontinent: Major habitat types of the subcontinent, geographic origins and migrations of species, Common Indian mammals, birds. Seasonality and phenology of the subcontinent. Organisms of health & agricultural importance. Common parasites and pathogens of humans, domestic

animals and crops. Organisms of conservation concern. Rare, endangered species. Conservation strategies.

APPLIED BIOLOGY:

Microbial fermentation and production of small and macro molecules. Application of immunological principles, vaccines, diagnostics. Tissue and cell culture methods for plants and animals. Transgenic animals and plants, molecular approaches to diagnosis and strain identification. Genomics and its application to health and agriculture including gene therapy. Bioresource and uses of biodiversity. Breeding in plants and animals, including marker assisted selection Bioremediation and phytoremediation Biosensors

METHODS IN BIOLOGY

Molecular Biology and Recombinant DNA methods: Isolation and purification of RNA, DNA (genomic and plasmid) and proteins, different separation methods. Analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis. Isoelectric focusing gels. Molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems. Expression of recombinant proteins using bacterial, animal and plant vectors. Isolation of specific nucleic acid sequences Generation of genomic and cDNA libraries in plasmid, phage, cosmid, BAC and YAC vectors. In vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms.

Protein sequencing methods, detection of post translation modification of proteins. DNA sequencing methods, strategies for genome sequencing. Methods for analysis of gene expression at RNA and protein level, large scale expression, such as micro array based techniques Isolation, separation and analysis of carbohydrate and lipid molecules RFLP, RAPD and AFLP techniques Histochemical and Immuno techniques Antibody generation Detection of molecules using ELISA, RIA, western blot, immunoprecipitation, fluocytometry and immunofluorescence microscopy, detection of molecules in living cells, in situ localization by techniques such as FISH and GISH.

Radiolabeling techniques: Detection and measurement of different types of radioisotopes normally used in biology, incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guidelines

Microscopic techniques. Visulization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etch and freeze- fracture methods for EM, image processing methods in microscopy.

PH.D. IN
THEATRE ARTS

Syllabus for the Ph.D. Entrance Examination in Theatre Arts

1. Classical Indian Theatre and Natyasastra
2. Classical Greek Theatre and Poetics
3. Traditional and folk theatre forms of India
4. Southeast Asian Theatre
5. Modern Indian Theatre
6. Western theatre practise from the mediaeval to the postmodern era
7. Acting theories
8. Theatre in the digital age
9. Technical and design aspects of theatre (Costume and make-up, Stagecraft, design, lighting, and direction)
10. Research methods specific to the performing arts
11. Significant western theories and practises of theatre and performance

PH.D. IN
ENGLISH STUDIES

Department of English Studies

Ph.D. Course Work Syllabus, DES

Sr. No.	Name of the Paper	Credit
1.	Contemporary Literary Theory I	4
2.	Contemporary Literary Theory II	4
3.	Research and Publication Ethics (RPE)	2
4.	Review of Literature and Seminar Presentation	2

Paper II Contemporary Literary Theory – I

The course intends to acquaint students with early modern and postmodern approaches to the study of literature and their practical application in the explication of literary texts. The objective of the course is to prepare students to select the framework of their research project based on one or a couple of the contemporary critical theories.

Structuralism and Post-structuralism

Vladimir Propp, selections from *Morphology of the Folktale*

Jacques Derrida, selections from *Of Grammatology*

Psychoanalysis

Jacques Lacan, "The Instance of the Letter in the Unconscious"

Bessel A. van der Kolk and Alexander C. McFarlane, "The Black Hole of Trauma"

Postmodernism

Jean Baudrillard, Selections from *Simulacra and Simulations*

Gilles Deleuze and Felix Guattari, Selections from *A Thousand Plateaus*

New Historicism and Reader Response

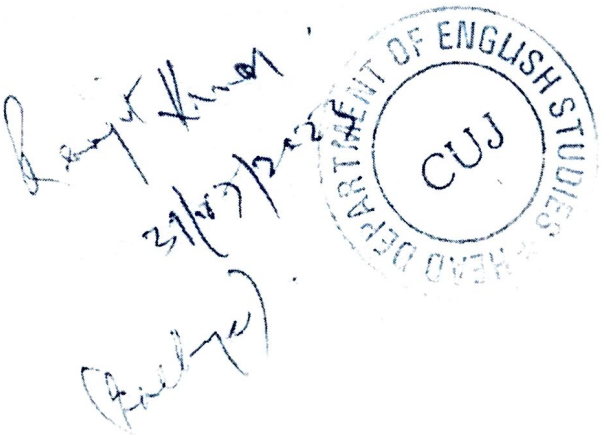
Louis Montrose, "Professing the Renaissance: The Poetics and Politics of Culture"

Roland Barthes, "The Death of the Author"

Gender and Sexuality

Luce Irigaray, "The Power of Discourse and the Subordination of the Feminine"

Eve Kosofsky Sedgwick, Selections from *Epistemology of the Closet*



Audre Lorde, "Age, Race, Class, and Sex: Women Redefining Difference"

Selections are from

Lodge, David. *Modern Criticism and Theory: A Reader,* London: Longman, 1988.

Rivkin, Julie, and Michael Ryan. *Literary Theory: An Anthology.* Malden, MA: Blackwell, 1998.

Suggested Readings

Bertens, Johannes Willem. *Literary Theory: The Basics.* London: Routledge, 2001.

Castle, Gregory. *The Blackwell Guide to Literary Theory,* Malden, MA: Blackwell, 2007.

Connors, Clare. *Literary Theory: A Beginner's Guide.* Oxford: One world, 2010.

Culler, Jonathan D. *Literary Theory.* New York: Sterling, 2009.

Eagleton, Terry. *Literary Theory: An Introduction.* Minneapolis: U of Minneapolis, 1983.

Paper- III Contemporary Theory- II

The course indents to acquaint students with the late modern cultural turn in theory to expose students to current discourses on postoloniality, ethnicity, nationhood, multiculturalism, Indian aesthetic theory, and cultural studies

Postcolonial Theory

- Ngugi wa Thiong.s. Selections from Decolonizing the Mind
- Anne McClintock, "The angel of the Progress: Pitfalls of the Term "Post-colonialism"",

Culture Studies

- Marx Hockheimer and Theodor Adorno, "The Cultur e Industry as Mass Deception"
- Laura Mulvey, "Visual Pleasure and Narrative Cinema"

Nation, ethnicity and multiculturalism

- Partha Chatterjee, "Nationalism as a Problem

- Werner Sollors, "Who is Ethic"
- Homi K. Bhabha, "Cultural Diversity and Cultural Differences"

Ecocriticism

- Rachel Carson, Selecions from *Silent Spring*
- Vandana Shiva, Selections from *Staying Alive: Women, Ecology and Development*

Indian Aesthetic Theories

- Rasa, Dhvani, Auchitya

Selections are from

Ashcrofts, Bill, Gareth Griffiths, and Helen Tiffin. The Post-colonial Reader, London, Routledge. Print

- Carson , Rachel. Silent Spring. N.p.:Econo-clad, 1999. Print
- Rivkin, Julie, and Michael Ryan. Literary Theory: An Anthoogy. Malden, MA: Blackwell, 1998.Print
- Shiva. Vandana. Staying Alive: Women, Ecology and Development. Lendon: Zed, 1998.Print

Suggested Readings

Bhabah. Homi k. Nation and Narration: Routledge, 1990. Print

Devy. G.N. Indian Literary Criticism: Theory and Interpretation. Hyderabad: Orient Longman, 2002. Print

Gerard, Gerd. Ecocriticissm. London: Routledge, 2004. Print

Grossberg, awrence. Culture Studies. Routledge: n.p., 1992. Print

Mongia, Padmini. Contemporary Postcolonial Theories: A Reader. London, Eng.: Arnold, 1997.Print

Naiper, WIston. Postcolonial Theory. Providence, RI: Dept. of English, Rhode Island College, 2002. Print

Paper IV: Research and Publication Ethics (RPE)

PAPER IV: RESEARCH AND PUBLICATION ETHICS (RPE) 5

PHILOSOPHY AND ETHICS

Introduction to philosophy: definition, nature and scope, concept, branches. Ethics: definition, moral philosophy, nature of moral judgments and reactions.

Unit I

SCIENTIFIC CONDUCT

Ethics with respect to science and research.
Intellectual honesty and research integrity. 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP). 4. Redundant publications: duplicate and overlapping publications, salami slicing. 5. Selective reporting and misrepresentation of data

Unit II

PUBLICATION ETHICS

1. Publication ethics: definition, introduction and importance
2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
5. Violation of publication ethics, authorship and contributor ship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals PRACTICE

Unit III

OPEN ACCESS PUBLISHING

1. Open access publications and initiatives.
2. SHERPA/ROMEO online resource to check publisher copyright & selfarchiving policies.
3. Software tool to identify predatory publications developed by SPPU .
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

Unit IV

PUBLICATION MISCONDUCT

A. Group Discussions
   Subject specific ethical issues, FFP, authorship 2. Conflicts of interest 3. Complaints and appeals: examples and fraud from India and abroad.
B. Software tools Use of plagiarism software like Turnitin, Urkund and other open source software tools

Unit V

DATABASES AND RESEARCH METRICS

A. Databases

1. Indexing databases

2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score.

2. Metrics: h-index, g index, i10 index, altmetrics.

Suggested Readings • The Ethics of Teaching and Scientific Research By Miro Todorovich; Paul Kurtz; Sidney Hook. • Research Ethics: A Psychological Approach By Barbara H. Stanley; Joan E. Sieber; Gary B. Melton • Research Methods in Applied Settings: An Integrated Approach to Design and Analysis By Jeffrey A. Gliner; George A. Morgan Lawrence Erlbaum Associates, 2000 • Ethics and Values in Industrial-Organizational Psychology By Joel LefkowitzLawrence Erlbaum Associates, 2003. Note: Latest references will be added by the teaching faculty during the class.

Paper V- Review of Literature and Seminar Presentation

This course shall require the student to write a comprehensive Review of Literature consisting of about 5000 words on any subject in his/her chosen field of research, which shall consist of 60 marks, followed by a seminar presentation on the same comprising 40 marks.

PH.D. IN
ANTHROPOLOGY AND TRIBAL STUDIES

Central University of Jharkhand

Department of Anthropology and Tribal Studies

School for the Study of Culture

Syllabus

For Ph.D Admission Test 2023

1. Social and Cultural Anthropology: Social Units; Social Institutions; Social Structuralism; Functionalism; Structural- Functionalism; Post Structuralism; Post Modernism; Social Sanction; Customary Law; : Ethnography and ethnographic approaches; Cultural relativism; Culture Pattern and Configuration; Cultural Ecology; unilinear and multi-linear evolutionism; Ethnicity and Ethnic Identity; Qualitative Approach; Importance of Field Studies; Micro Studies

Or.

Physical and Prehistoric Archaeology: Human Evolution; Bipedalism; Human Skeleton; Dentition; comparative Anatomy; Primates- Characteristic features; Living Apes; Human Genetics: Sex linked and Autosomal Chromosomes; Genetic Diseases; Human Nutrition and Growth; Epidemiology; Medical Anthropology-Theories and Concepts; Population Studies; Human Adaptation; Lithic Tools and Typology; Palaeolithic- Lower, Middle, Upper, Mesolithic and Neolithic, Micro-lithic and Chalcolithic Traditions in India; Bio-cultural approach; ethno archaeological approach;

Or.

Folklore: Origin and Development of Folklore Studies; Theories of Folklore: Migration Theory; Polygenesis; Monogenesis; Structuralism; Functionalism; Folkloristic; Narratology; Gender and Culture; Media and Culture; Performance Studies; Tourism and Culture

2. Tribal Studies: Indigenous; First Nation; Aboriginal; Adivasi; Tribal; Peasant; Subsistence Economy; Tribal Movements; Tribal Social Transformation; Tribal Ethnicity and Autonomy; Tribal Freedom Fighters in India; Indigenous and Traditional Knowledge Systems; Traditional Ecological Knowledge; Tribal Cultural Heritage; Tribal Languages; Tribal Development; Sacred Forest; Tribal religion.

Issued by Head, DATS &

Dean SSC, CUJ

PH.D. IN
TIBETAN LANGUAGE & CULTURE

झारखण्ड केन्द्रीय विश्वविद्यालय
Central University of Jharkhand
(Established by an Act of Parliament of India,2009)
DEPARTMENT OF FAR EAST LANGUAGES
བོད་ཡིག་སྐད་ཚན། དབུས་གཞུང་རྒྱུད་ལྡན་གསུག་ལག་སློབ་གཉེར་ཁང་། རྒྱ་ཅི།
SCHOOL OF LANGUAGES

Syllabus for CUJRET-2023 Entrance
Ph.D. in Tibetan Language & Culture

Outline syllabus and sample question

Part A consist of 50 multiple choice questions (MCQs) on research methodology.

Part B consist of 50 multiple choice questions (MCQs) comprising of subject knowledge (i.e. Tibetan language, Tibetan Linguistics, Tibetan Literature and Culture, Tibetan Buddhism) Questions and general information related to Tibet and Indian Himalayan regions.

Sample question

Q1. The Tibetan Grammar "Sumcu-pa" deals with the description about:
A) Letters B) Genders C) Particles D) Prefixes

Q2. . The recently coined terminology "Bhoti" in the context of Indian Himalayan region refers to:
A) Ladakhi B) Classical Tibetan C) Bhutia D) Monpa

Q3. Who is the first religious king of Tibet?
A) Songtsen Gampo B) Trisong Detsen C) Tri Ralpachen D) Lang Darma

PH.D. IN

POLITICAL SCIENCE AND PUBLIC ADMINISTRATION

Syllabus for PhD Admission Test in Political Science
Department of Political Science and Public Administration

Governance, good governance and democratic governance, role of state, civil society and individuals.

Accountability and control: Institutional mechanism for checks and balances, legislative control over executive, administrative and budgetary control, control through parliamentary committees, judicial control over legislature and executive, administrative culture, corruption and administrative reforms

Institutional mechanisms for good governance: Right to Information, Consumer Protection Act, Citizen Charter; Grievance redress system: Ombudsman, Lokpal, Lokayukta

Grassroots Governance: Panchayati Raj Institutions and their functioning Planning and Development

Decentralized planning, planning for development, sustainable development, participatory development, e-governance; NITI Aayog.
Public policy as an instrument of socio-economic development: public policies with special reference to housing, health, drinking water, food security, MNREGA, NHRM, RTE

Monitoring and evaluation of public policy; mechanisms of making governance process accountable: jansunwai, social audit.

Political participation of women – Political Socialization- Women leaders in politics, Women in Local Governance- Reservation policies- Women's Political Rights

Feminist Thinkers and Activists in Contemporary India: Raja Ram Mohan Roy, Easwar Chandra Vidya Sagar, Sarojini Naidu, Durga Bai Deshmukh, Pandita Ramabai, Mahatma Gandhi, Jawaharlal Nehru, B.R. Ambedkar.

Submitted by:

Alok Kumar Gupta
HoD DPSPA
August 10, 2023

PH.D. IN
INTERNATIONAL RELATIONS

DEPARTMENT OF INTERNATIONAL RELATIONS
SCHOOL OF HUMANITIES AND SOCIAL SCIENCES
CENTRAL UNIVERSITY OF JHARKHAND
CHERI-MANATU, RANCHI, JHARKHAND

Syllabus of Ph.D Entrance Test-2023

1. Theories of International Relations (Liberal and Neo-Liberal Approaches, Marxist theories of Development-Dependency and World System, Realism, Classical, Behavioral and Post Behavioral Approaches)
2. India's Foreign Policy
3. Comparative Politics
4. Western Political Thought: Plato: Justice and Philosopher King/ Aristotle: Politics / Hobbes: Social contract and Human Nature / Karl Marx: Socialism
5. Indian Political Thought
6. Global problems (like war and peace, development, human rights, environment) with reference to the role of the United Nations
7. Society and social issues in South Asia
8. Role of the United Nations and other multilateral organizations
9. Contemporary international politics
10. Politics and political system in South Asian countries.
11. Environmental issues
12. Research methods in Social Sciences.
13. Geopolitics and Word Order

29/7/23

Head
Department of International Relations
Central University of Jharkhand

PH.D. IN
MANAGEMENT

Subject : Management

Unit – I

- Management – Concept, Process, Theories and Approaches, Management Rolesand Skills
- Functions – Planning, Organizing, Staffing, Coordinating and Controlling. Communication – Types, Process and Barriers.
- Decision Making – Concept, Process, Techniques and Tools
- Organisation Structure and Design – Types, Authority, Responsibility, Centralisation, Decentralisation and Span of Control
- Managerial Economics – Concept & Importance
- Demand analysis – Utility Analysis, Indifference Curve, Elasticity & Forecasting.
- Market Structures – Market Classification & Price Determination.
- National Income – Concept, Types and Measurement .
- Inflation – Concept, Types and Measurement.
- Business Ethics & CSR
- Ethical Issues & Dilemma
- Corporate Governance
- Value Based Organisation

Unit – II

- Organizational Behaviour – Significance & Theories
- Individual Behaviour – Personality, Perception, Values, Attitude, Learning and Motivation
- Group Behaviour – Team Building, Leadership, Group Dynamics
- Interpersonal Behaviour & Transactional Analysis
- Organizational Culture & Climate
- Work Force Diversity & Cross Culture Organisational Behaviour
- Emotions and Stress Management
- Organizational Justice and Whistle Blowing
- Human Resource Management – Concept, Perspectives, Influences and Recent Trends
- Human Resource Planning, Recruitment and Selection, Induction, Training and Development
- Job Analysis, Job Evaluation and Compensation Management

Unit – III

- Strategic Role of Human Resource Management
- Competency Mapping & Balanced Scoreboard
- Career Planning and Development
- Performance Management and Appraisal
- Organization Development, Change & OD Interventions
- Talent Management & Skill Development
- Employee Engagement & Work Life Balance

- Industrial Relations: Disputes & Grievance Management, Labour Welfare and Social Security
- Trade Union & Collective Bargaining
- International Human Resource Management – HR Challenge of International Business
- Green HRM

Unit– IV

- Accounting Principles and Standards, Preparation of Financial Statements
- Financial Statement Analysis – Ratio Analysis, Funds Flow and Cash Flow Analysis, DuPont Analysis
- Preparation of Cost Sheet, Marginal Costing, Cost Volume Profit Analysis
- Standard Costing & Variance Analysis
- Financial Management, Concept & Functions
- Capital Structure – Theories, Cost of Capital, Sources and Finance
- Budgeting and Budgetary Control, Types and Process, Zero base Budgeting
- Leverages – Operating, Financial and Combined Leverages, EBIT–EPS Analysis, Financial Breakeven Point & Indifference Level.

Unit –V

- Value & Returns – Time Preference for Money, Valuation of Bonds and Shares, Risk and Returns;
- Capital Budgeting – Nature of Investment, Evaluation, Comparison of Methods; Risk and Uncertainly Analysis
- Dividend – Theories and Determination
- Mergers and Acquisition – Corporate Restructuring, Value Creation, Merger Negotiations, Leveraged Buyouts, Takeover
- Portfolio Management – CAPM, APT

- Derivatives – Options, Option Payoffs, Option Pricing, Forward Contracts & Future Contracts

- Working Capital Management – Determinants, Cash, Inventory, Receivables and Payables Management, Factoring

- International Financial Management, Foreign exchange market

Unit - VI

- Strategic Management – Concept, Process, Decision & Types

- Strategic Analysis – External Analysis, PEST, Porter's Approach to industry analysis, Internal Analysis – Resource Based Approach, Value Chain Analysis

- Strategy Formulation – SWOT Analysis, Corporate Strategy – Growth, Stability, Retrenchment, Integration and Diversification, Business Portfolio Analysis - BCG, GE Business Model, Ansoff's Product Market Growth Matrix

- Strategy Implementation – Challenges of Change, Developing Programs Mckinsey 7s Framework

- Marketing – Concept, Orientation, Trends and Tasks, Customer Value and Satisfaction

- Market Segmentation, Positioning and Targeting

- Product and Pricing Decision – Product Mix, Product Life Cycle, New Product development, Pricing – Types and Strategies

- Place and promotion decision – Marketing channels and value networks, VMS, IMC, Advertising and Sales promotion

Unit –VII

- Consumer and Industrial Buying Behaviour: Theories and Models of Consumer Behaviour

- **Brand Management** – Role of Brands, Brand Equity, Equity Models, **Developing a Branding Strategy**; Brand Name Decisions, Brand Extensions

and Loyalty

- Logistics and Supply Chain Management, Drivers, Value creation, Supply Chain Design, Designing and Managing Sales Force, Personal Selling
- Service Marketing – Managing Service Quality and Brands, Marketing Strategies of Service Firms
- Customer Relationship Marketing – Relationship Building, Strategies, Values and Process
- Retail Marketing – Recent Trends in India, Types of Retail Outlets.
- Emerging Trends in Marketing – Concept of e-Marketing, Direct Marketing, Digital Marketing and Green Marketing
- International Marketing – Entry Mode Decisions, Planning Marketing Mix for International Markets

Unit –VIII

- Statistics for Management: Concept, Measures Of Central Tendency and Dispersion, Probability Distribution – Binominal, Poison, Normal and Exponential
- Data Collection & Questionnaire Design
- Sampling – Concept, Process and Techniques
- Hypothesis Testing – Procedure; T, Z, F, Chi-square tests
- Correlation and Regression Analysis
- Operations Management – Role and Scope
- Facility Location and Layout – Site Selection and Analysis, Layout – Design and Process
- Enterprise Resource Planning – ERP Modules, ERP implementation
- Scheduling; Loading, Sequencing and Monitoring
- Quality Management and Statistical Quality Control, Quality Circles, Total Quality

Management – KAIZEN, Benchmarking, Six Sigma; ISO 9000 Series Standards

- Operation Research – Transportation, Queuing Decision Theory, PERT / CPM

Unit –IX

- International Business – Managing Business in Globalization Era; Theories of International Trade; Balance of payment
- Foreign Direct Investment – Benefits and Costs
- Multilateral regulation of Trade and Investment under WTO
- International Trade Procedures and Documentation; EXIM Policies
- Role of International Financial Institutions – IMF and World Bank
- Information Technology – Use of Computers in Management Applications; MIS, DSS
- Artificial Intelligence and Big Data
- Data Warehousing, Data Mining and Knowledge Management – Concepts
- Managing Technological Change

Unit – X

- Entrepreneurship Development – Concept, Types, Theories and Process, Developing Entrepreneurial Competencies
- Intrapreneurship – Concept and Process
- Women Entrepreneurship and Rural Entrepreneurship
- Innovations in Business – Types of Innovations, Creating and Identifying Opportunities, Screening of Business Ideas
- Business Plan and Feasibility Analysis – Concept and Process of Technical, Market and Financial Analysis
- Micro and Small Scale Industries in India; Role of Government in Promoting SSI
- Sickness in Small Industries – Reasons and Rehabilitation
- Institutional Finance to Small Industries – Financial Institutions, Commercial Banks, Cooperative Banks, Micro Finance.

PH.D. IN
MASS COMMUNICATION

Syllabus

Entrance Test for Admission in Ph.D. Mass Communication
Session – 2023-24

Department of Mass Communication
School of Mass Communication and Media Technologies
Central University of Jharkhand, Ranchi

- Communication – Basic concepts, nature, process and types
- Various communication theories and models
- Asian perspectives of communication, Indian communication thoughts,
- Development communication – Key concepts, processes, theories, plannings
- International communication – leading media houses, global communication flow
- History of Media – Newspaper, magazine, cinema, radio, television, digital media
- Structure and functioning of media – print, radio, television, digital media
- Journalism – Basic principles, types, key concepts and terminologies,
- Reporting and editing – News structure, writing, language editing
- Media literacy – meaning and importance, mis/dis-information
- Writing for various media, various formats and their usage
- Digital media – key concepts, social media, artificial intelligence
- Media, society and culture, media and democracy,
- Advertising – Meaning, growth, types, process of branding, media planning,
- Public relations – Meaning, publicity, propaganda, corporate communication
- Communication technologies related to different media
- Cinema studies – key concepts, theories, genre, structure of film industry,
- Photography – basic concepts, tools and techniques of photography
- Media production – print, radio, television and digital production
- Radio production – sound, microphones, recorder, production team, studio,
- Television production – camera, sound, lighting, editing, team, program formats
- Media regulations and media ethics – key media laws and codes of ethics
- Media economics and management – industry, structure, revenue, media houses,

PH.D. IN COMMERCE

SYLLABUS OF CUJRET

COMMERCE - SYLLABUS

1. BUSINESS ENVIRONMENT AND INTERNATIONAL BUSINESS

- Concepts and elements of business environment: Economic environment- Economic systems, Economic policies(Monetary and fiscal policies); Political environment Role of government in business; Legal environment- Consumer Protection Act, FEMA; Socio-cultural factors and their influence on business; Corporate Social Responsibility (CSR)
- Scope and importance of international business; Globalization and its drivers; Modes of entry into international business
- Theories of international trade; Government intervention in international trade; Tariff and non-tariff barriers; India's foreign trade policy
- Foreign direct investment (FDI) and Foreign portfolio investment (FPI); Types of FDI, Costs and benefits of FDI to home and host countries; Trends in FDI; India's FDI policy
- Balance of payments (BOP): Importance and components of BOP
- Regional Economic Integration: Levels of Regional Economic Integration; Trade creation and diversion effects; Regional Trade Agreements: European Union (EU), ASEAN, SAARC, NAFTA
- International Economic institutions: IMF, World Bank, UNCTAD
- World Trade Organisation (WTO): Functions and objectives of WTO; Agriculture Agreement; GATS; TRIPS; TRIMS

2. ACCOUNTING AND AUDITING

- Basic accounting principles; concepts and postulates
- Partnership Accounts: Admission, Retirement, Death, Dissolution and Insolvency of partnership firms
- Corporate Accounting: Issue, forfeiture and reissue of shares; Liquidation of companies; Acquisition, merger, amalgamation and reconstruction of companies
- Holding company accounts
- Cost and Management Accounting: Marginal costing and Break-even analysis; Standard costing; Budgetary control; Process costing; Activity Based Costing (ABC); Costing for decision-making; Life cycle costing, Target costing, Kaizen costing and JIT
- Financial Statements Analysis: Ratio analysis; Funds flow Analysis; Cash flow analysis
- Human Resources Accounting; Inflation Accounting; Environmental Accounting
- Indian Accounting Standards and IFRS
- Auditing: Independent financial audit; Vouching; Verification ad valuation of assets and liabilities; Audit of financial statements and audit report, Cost audit

- Recent Trends in Auditing: Management audit; Energy audit; Environment audit; Systems audit; Safety audit

3. BUSINESS ECONOMICS

- Meaning and scope of business economics
- Objectives of business firms
- Demand analysis: Law of demand; Elasticity of demand and its measurement; Relationship between AR and MR
- Consumer behavior: Utility analysis; Indifference curve analysis
- Law of Variable Proportions: Law of Returns to Scale
- Theory of cost: Short-run and long-run cost curves
- Price determination under different market forms: Perfect competition; Monopolistic competition; Oligopoly- Price leadership model; Monopoly; Price discrimination
- Pricing strategies: Price skimming; Price penetration; Peak load pricing

4. BUSINESS FINANCE

- Scope and sources of finance; Lease financing
- Cost of capital and time value of money
- Capital structure
- Capital budgeting decisions: Conventional and scientific techniques of capital budgeting analysis
- Working capital management; Dividend decision: Theories and policies
- Risk and return analysis; Asset securitization
- International monetary system
- Foreign exchange market; Exchange rate risk and hedging techniques
- International financial markets and instruments: Euro currency; GDRs; ADRs
- International arbitrage; Multinational capital budgeting.

5. BUSINESS STATISTICS

Measures of central tendency

- Measures of dispersion
- Measures of skewness
- Correlation and regression of two variables
- Probability: Approaches to probability; Bayes' theorem

- Probability distributions: Binomial, Poisson and normal distributions

6. BUSINESS MANAGEMENT AND HUMAN RESOURCE MANAGEMENT

- Principles and functions of management
- Organization structure: Formal and informal organizations; Span of control
- Responsibility and authority: Delegation of authority and decentralization
- Motivation and leadership: Concept and theories
- Corporate governance and business ethics
- Human resource management: Concept, role and functions of HRM; Human resource planning; Recruitment and selection; Training and development; Succession planning
- Compensation management: Job evaluation; Incentives and fringe benefits
- Performance appraisal including 360 degree performance appraisal

7. BANKING AND FINANCIAL INSTITUTIONS

- Overview of Indian financial system
- Types of banks: Commercial banks; Regional Rural Banks (RRBs); Foreign banks; Cooperative banks • Reserve Bank of India: Functions; Role and monetary policy management
- Banking sector reforms in India: Basel norms; Risk management; NPA management
- Financial markets: Money market; Capital market; Government securities market
- Financial Institutions: Development Finance Institutions (DFIs); Non-Banking Financial Companies (NBFCs); Mutual Funds; Pension Funds
- Financial Regulators in India
- Financial sector reforms including financial inclusion
- Digitisation of banking and other financial services: Internet banking; mobile banking; Digital payments systems
- Insurance: Types of insurance- Life and Non-life insurance; Risk classification and management; Factors limiting the insurability of risk; Re-insurance; Regulatory framework of insurance- IRDA and its role

8. MARKETING MANAGEMENT

- Marketing: Concept and approaches; Marketing channels; Marketing mix; Strategic marketing planning; Market segmentation, targeting and positioning
- Product decisions: Concept; Product line; Product mix decisions; Product life cycle; New product development
- Pricing decisions: Factors affecting price determination; Pricing policies and strategies

- Promotion decisions: Role of promotion in marketing; Promotion methods - Advertising; Personal selling; Publicity; Sales promotion tools and techniques; Promotion mix
- Distribution decisions: Channels of distribution; Channel management
- Consumer Behaviour: Consumer buying process; factors influencing consumer buying decisions
- Service marketing
- Trends in marketing: Social marketing; online marketing; Green marketing; direct marketing; rural marketing; CRM

9. LEGAL ASPECTS OF BUSINESS

- Indian Contract Act, 1872: Elements of a valid contract; Capacity of parties; Free consent; Discharge of a contract; Breach of contract and remedies against breach; Quasi contracts;
- Special contracts: Contracts of indemnity and guarantee; contracts of bailment and pledge; Contracts of agency
- Sale of Goods Act, 1930: Sale and agreement to sell; Doctrine of Caveat Emptor; Rights of unpaid seller and rights of buyer
- Negotiable Instruments Act, 1881: Types of negotiable instruments; Negotiation and assignment; Dishonour and discharge of negotiable instruments
- The Companies Act, 2013: Nature and kinds of companies; Company formation; Management, meetings and winding up of a joint stock company
- Limited Liability Partnership: Structure and procedure of formation of LLP in India
- The Competition Act, 2002: Objectives and main provisions
- The Information Technology Act, 2000: Objectives and main provisions; Cybercrimes and penalties
- The RTI Act, 2005: Objectives and main provisions
- Intellectual Property Rights (IPRs): Patents, trademarks and copyrights; Emerging issues in intellectual property
- Goods and Services Tax (GST): Objectives and main provisions; Benefits of GST; Implementation mechanism; Working of dual GST

Income-tax and Corporate Tax Planning

- Income-tax: Basic concepts; Residential status and tax incidence; Exempted incomes; Agricultural income; Computation of taxable income under various heads; Deductions from Gross total income; Assessment of Individuals; Clubbing of incomes
- International Taxation: Double taxation and its avoidance mechanism; Transfer pricing
- Corporate Tax Planning: Concepts and significance of corporate tax planning; Tax avoidance versus tax evasion; Techniques of corporate tax planning; Tax considerations in specific business situations: Make or buy decisions; Own or lease an asset; Retain; Renewal or replacement of asset; Shut down or continue operation;
- Deduction and collection of tax at source; Advance payment of tax; E-filing of income-tax returns

PH.D. IN EDUCATION

CENTRAL UNIVERSITY OF JHARKHAND

(Established by an Act of Parliament of India in 2009)

Subject Syllabus for Central University of Jharkhand Research Entrance Test 2023 - (CUJRET-2023)

Subject: EDUCATION

SYLLABUS

Unit 1: Educational Studies

a) Contribution of Indian Schools of philosophy (Sankhya Yoga, Vedanta Buddhism, Jainism) with special reference to Vidya, Dayanand Darshan; and Islamic traditions towards educational aims and methods of acquiring valid knowledge

b) Contribution of Western schools of thoughts (Idealism, Realism Naturalism, Pragmatism, Marxism, Existentialism) and their contribution to Education with special reference to information, knowledge and wisdom

c) Approaches to Sociology of Education (symbolic Interaction, Structural Functionalism and Conflict Theory). Concept and types of social Institutions and their functions (family, school and society). Concept of Social Movements, Theories of Social Movements (Relative Deprivation, Resource Mobilization, Political Process Theory and New Social Movement Theory)

d) Socialization and education- education and culture, Contribution of thinkers (Swami Vivekananda, Rabindranath Tagore, Mahatma Gandhi, Aurobindo, J.Krishnamurthy, Paulo Freire, Wollstonecraft, Nel Noddings and Savitribai Phule) to the development of educational thought for social change, National Values as enshrined in the Indian Constitution - Socialism, Secularism, justice, liberty, democracy, equality, freedom with special reference to education

Unit 2: History, Politics and Economics of Education

a) Committees and Commissions' Contribution to Teacher Education Secondary Education Commission (1953), Kothari Education Commission (1964-66), National Policy of Education (1986,1992), National Commission on Teachers (1999), National Curriculum Framework 2005, National Knowledge Commission (2007), Yashpal Committee Report (2009), National Curriculum Framework for Teacher Education (2009), Justice Verma Committee Report (2012)

b) Relationship between Policies and Education, Linkage between Educational Policy and National Development, Determinants of Educational Policy and Process of Policy formulation: Analysis of the existing situation, generation of policy options, evaluation of policy options, making the policy decision, planning of policy implementation, policy impact assessment and subsequent policy cycles.

c) Concept of Economics of Education: Cost Benefit Analysis Vs Cost Effective Analysis in Education, Economic returns to Higher Education Signaling Theory Vs Human Capital Theory, Concept of Educational Finance; Educational finance at Micro and Macro Levels, Concept of Budgeting

d) Relationship Between Politics and Education, Perspectives of Politics of Education Liberal, Conservative and Critical, Approaches to understanding Politics (Behaviouralism, Theory of Systems Analysis and Theory of Rational Choice), Education for Political Development and Political Socialization

Unit 3: Learner and Learning Process

a) Growth and Development: Concept and principles ,Cognitive Processes and stages of Cognitive Development , Personality: Definitions and theories (Freud, Carl Rogers, Gordon Allport, Max Wertheimer, Kurt Koffka) , Mental health and Mental hygiene

b) Approaches to Intelligence from Unitary to Multiple: Concepts of Social intelligence, multiple intelligence, emotional intelligence Theories of Intelligence by Sternberg, Gardner, Assessment of Intelligence, Concepts of Problem Solving, Critical thinking, Metacognition and Creativity

c) Principles and Theories of learning: Behaviouristic, Cognitive and Social theories of learning, Factors affecting social learning, social competence, Concept of social cognition, understanding social relationship and socialization goals

d) Guidance and Counselling: Nature, Principles and Need, Types of guidance (educational, vocational, personal, health and social & Directive, Non-directive and Eclectic), Approaches to counselling – Cognitive-Behavioural (Albert Ellis – REBT) & Humanistic, Person-centred Counselling (Carl Rogers) - Theories of Counselling (Behaviouristic, Rational, Emotive and Reality)

Unit 4: Teacher Education

a) Meaning, Nature and Scope of Teacher Education; Types of Teacher Education Programs, The Structure of Teacher Education Curriculum and its Vision in Curriculum Documents of NCERT and NCTE at Elementary, Secondary and Higher Secondary Levels , Organization of Components of Pre-service Teacher Education Transactional Approaches (for foundation courses) Expository, Collaborative and Experiential learning

b) Understanding Knowledge base of Teacher Education from the view point of Schulman, Deng and Luke & Habermas, Meaning of Reflective Teaching and Strategies for Promoting Reflective Teaching, Models of Teacher Education - Behaviouristic, Competency-based and Inquiry Oriented Teacher Education Models

c) Concept, Need, Purpose and Scope of In-service Teacher Education, Organization and Modes of In-service Teacher Education, Agencies and Institutions of In-service Teacher Education at District, State and National Levels (SSA, RMSA, SCERT, NCERT, NCTE and UGC), Preliminary Consideration in Planning in-service teacher education programme (Purpose, Duration, Resources and Budget)

d) Concept of Profession and Professionalism, Teaching as a Profession, Professional Ethics of Teachers, Personal and Contextual factors affecting Teacher Development, ICT Integration, Quality Enhancement for Professionalization of Teacher Education, Innovation in Teacher Education

Unit 5: Curriculum Studies

a) Concept and Principles of Curriculum, Strategies of Curriculum Development, Stages in the Process of Curriculum development, Foundations of Curriculum Planning - Philosophical Bases (National, democratic), Sociological basis (socio cultural reconstruction), Psychological Bases (learner's needs and interests),Bench marking and Role of National level Statutory Bodies - UGC, NCTE and University in Curriculum Development

b) Models of Curriculum Design: Traditional and Contemporary Models (Academic / Discipline Based Model, Competency Based Model, Social Functions / Activities Model [social reconstruction], Individual Needs & Interests Model, Outcome Based Integrative Model , Intervention Model, C I P P Model (Context, Input, Process, Product Model)

c) Instructional System, Instructional Media, Instructional Techniques and Material in enhancing curriculum Transaction, Approaches to Evaluation of Curriculum : Approaches to Curriculum and Instruction (Academic and Competency Based Approaches), Models of Curriculum Evaluation: Tyler's Model, Stakes' Model, Scriven's Model, Kirkpatrick's Model

d) Meaning and types of Curriculum change, Factors affecting curriculum change, Approaches to curriculum change, Role of students, teachers and educational administrators in curriculum change and improvement, Scope of curriculum research and Types of Research in Curriculum Studies

Unit 6: Research in Education

a) Meaning and Scope of Educational Research, Meaning and steps of Scientific Method, Characteristics of Scientific Method (Replicability, Precision, Falsifiability and Parsimony), Types of Scientific Method (Exploratory, Explanatory and Descriptive), Aims of research as a scientific activity: Problem-solving, Theory Building and Prediction, Types of research (Fundamental, Applied and Action), Approaches to educational research (Quantitative and Qualitative), Designs in educational research (Descriptive, Experimental and Historical)

b) Variables: Meaning of Concepts, Constructs and Variables, Types of Variables (Independent, Dependent, Extraneous, Intervening and Moderator), Hypotheses - Concept, Sources, Types (Research,

Directional, Non-directional, Null), Formulating Hypothesis, Characteristics of a good hypothesis, Steps of Writing a Research Proposal, Concept of Universe and Sample, Characteristics of a good Sample, Techniques of Sampling (Probability and Non-probability Sampling), Tools of Research - Validity, Reliability and Standardisation of a Tool, Types of Tools (Rating scale, Attitude scale, Questionnaire, Aptitude test and Achievement Test, Inventory), Techniques of Research (Observation, Interview and Projective Techniques)

c) Types of Measurement Scale (Nominal, Ordinal, Interval and Ratio), Quantitative Data Analysis - Descriptive data analysis (Measures of central tendency, variability, fiduciary limits and graphical presentation of data), Testing of Hypothesis (Type I and Type II Errors), Levels of Significance, Power of a statistical test and effect size, Parametric Techniques, Non- Parametric Techniques , Conditions to be satisfied for using parametric techniques, Inferential data analysis, Use and Interpretation of statistical techniques: Correlation, t-test, z-test, ANOVA, chi-square (Equal Probability and Normal Probability Hypothesis). Qualitative Data Analysis - Data Reduction and Classification, Analytical Induction and Constant Comparison, Concept of Triangulation

d) Qualitative Research Designs: Grounded Theory Designs (Types characteristics, designs, Steps in conducting a GT research, Strengths and Weakness of GT) - Narrative Research Designs (Meaning and key Characteristics, Steps in conducting NR design), Case Study (Meaning, Characteristics, Components of a CS design, Types of CS design, Steps of conducting a CS research, Strengths and weaknesses) Ethnography (Meaning, Characteristics, Underlying assumptions, Steps of conducting ethnographic research, Writing ethnographic account, Strengths and weaknesses), Mixed Method Designs: Characteristics, Types of MM designs (Triangulation, explanatory and exploratory designs), Steps in conducting a MM designs, Strengths and weakness of MM research.

Unit 7: Pedagogy, Andragogy and Assessment

a) Pedagogy, Pedagogical Analysis - Concept and Stages, Critical Pedagogy- Meaning, Need and its implications in Teacher Education, Organizing Teaching: Memory Level (Herbartian Model), Understanding Level (Morrison teaching Model), Reflective Level (Bigge and Hunt teaching Model), Concept of Andragogy in Education:

Meaning, Principles, Competencies of Self-directed Learning, Theory of Andragogy (Malcolm Knowles), The Dynamic Model of Learner Autonomy

b) Assessment – Meaning, nature, perspectives (assessment for Learning, assessment of learning and Assessment of Learning) - Types of Assessment (Placement, formative, diagnostic, summative) Relations between objectives and outcomes , Assessment of Cognitive (Anderson and Krathwohl), Affective (Krathwohl) and psychomotor domains (R.H. Dave) of learning

c) Assessment in Pedagogy of Education: Feedback Devices: Meaning, Types, Criteria, Guidance as a Feedback Devices: Assessment of Portfolios, Reflective Journal, Field Engagement using Rubrics. Competency Based Evaluation, Assessment of Teacher Prepared ICT Resources

d) Assessment in Andragogy of Education - Interaction Analysis: Flanders' Interaction analysis, Galloway's system of interaction analysis (Recording of Classroom Events, Construction and Interpretation of Interaction Matrix), Criteria for teacher evaluation (Product, Process and Presage criteria, Rubrics for Self and Peer evaluation (Meaning, steps of construction).

Unit 8: Technology in/ for Education

a) Concept of Educational Technology (ET) as a Discipline: (Information Technology, Communication Technology & Information and Communication Technology (ICT) and Instructional Technology. Applications of Educational Technology in formal, non formal (Open and Distance Learning), informal and inclusive education systems. Overview of Behaviourist, Cognitive and Constructivist Theories and their implications to Instructional Design (Skinner, Piaget, Ausubel, Bruner, Vygotsky), Relationship between Learning Theories and Instructional Strategies (for large and small groups, formal and non formal groups)

b) Systems Approach to Instructional Design, Models of Development of Instructional Design (ADDIE, ASSURE, Dick and Carey Model Mason's), Gagne's Nine Events of Instruction and Five E's of Constructivism, Nine Elements of Constructivist Instructional Design, Application of Computers in Education: CAI, CAL, CBT, CML, Concept, Process of preparing ODLM, Concept of e learning, Approaches to e

learning (Offline, Online, Synchronous, Asynchronous, Blended learning, mobile learning)

c) Emerging Trends in e learning. Social learning (concept, use of web 2.0 tools for learning, social networking sites, blogs, chats, video conferencing, discussion forum). Open Education Resources (Creative Common, Massive Open Online Courses; Concept and application). E Inclusion - Concept of E Inclusion, Application of Assistive technology in E learning . Quality of E Learning – Measuring quality of system, Information, System, Service, User Satisfaction and Net Benefits (D&M IS Success Model, 2003). Ethical Issues for E Learner and E Teacher - Teaching, Learning and Research

d) Use of ICT in Evaluation, Administration and Research. E portfolios. ICT for Research - Online Repositories and Online Libraries. Online and Offline assessment tools (Online survey tools or test generators) – Concept and Development.

Unit 9: Educational Management, Administration and Leadership

a) Educational Management and Administration – Meaning, Principles, Functions and importance, Institutional building, POSDCORB, CPM, PERT, Management as a system, SWOT analysis, Taylorism, Administration as a process, Administration as a bureaucracy, Human relations approach to Administration, Organisational compliance, Organinsational development, Organisational climate

b) Leadership in Educational Administration: Meaning and Nature. Approaches to leadership: Trait, Transformational, Transactional, Value based, Cultural, Psychodynamic and Charismatic Models of Leadership (Blake and Mouton's Managerial Grid, Fiedler's Contingency Model, Tri-dimensional Model, Hersey and Blanchard's Model, Leader-Member Exchange Theory)

c) Concept of Quality and Quality in Education: Indian and International perspective, Evolution of Quality: Inspection, Quality Control, Quality Assurance, Total Quality Management (TQM), Six sigma, Quality Gurus: Walter Shewart, Edward Deming, C.K Prathad

d) Change Management: Meaning, Need for Planned change, Three-Step-Model of Change (Unfreezing, Moving, Refreezing), The Japanese Models of Change: Just-in-Time, Poka yoke, Cost of Quality: Appraisal Costs, Failure costs and Preventable costs, Cost Benefit

Analysis, Cost Effective Analysis, Indian and International Quality Assurance Agencies: Objectives, Functions, Roles and Initiatives (National Assessment Accreditation Council [NAAC], Performance Indicators, Quality Council of India [QCI] , International Network for Quality Assurance Agencies in Higher Education [INQAAHE].

Unit 10: Inclusive Education

a) Inclusive Education: Concept, Principles, Scope and Target Groups (Diverse learners; Including Marginalized group and Learners with Disabilities), Evolution of the Philosophy of Inclusive Education: Special, Integrated, Inclusive Education, Legal Provisions: Policies and Legislations (National Policy of Education (1986), Programme of Action of Action (1992), Persons with Disabilities Act (1995), National Policy of Disabilities (2006), National Curriculum Framework (2005), Concession and Facilities to Diverse Learners (Academic and Financial), Rehabilitation Council of India Act (1992), Inclusive Education under Sarva Shiksha Abhiyan (SSA), Features of UNCRPD (United Nations Convention on the Rights of Persons with Disabilities) and its Implication

b) Concept of Impairment, Disability and Handicap, Classification of Disabilities based on ICF Model, Readiness of School and Models of Inclusion, Prevalence, Types, Characteristics and Educational Needs of Diverse learners' Intellectual, Physical and Multiple Disabilities, Causes and prevention of disabilities, Identification of Diverse Learners for Inclusion, Educational Evaluation Methods, Techniques and Tools

c) Planning and Management of Inclusive Classrooms: Infrastructure, Human Resource and Instructional Practices, Curriculum and Curricular Adaptations for Diverse Learners, Assistive and Adaptive Technology for Diverse learners: Product (Aids and Appliances) and Process (Individualized Education Plan, Remedial Teaching), Parent-Professional Partnership: Role of Parents, Peers, Professionals, Teachers, School

d) Barriers and Facilitators in Inclusive Education: Attitude, Social and Educational, Current Status and Ethical Issues of inclusive education in India, Research Trends of Inclusive Education in India

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PH.D. IN

HINDI

Hindi

पाठयक्रम

हिन्दी भाषा और उसका विकास

- हिन्दी के ऐतिहासिक पृष्ठभूमि : प्राचीन, मध्यकालीन और आधुनिक भारतीय आर्य भाषाएँ
- हिन्दी की उपभाषाएँ और उनकी बोलियाँ तथा भौगोलिक विस्तार
- हिन्दी के विविध स्वरूप : हिन्दी, उर्दू, दक्खिनी, हिन्दुस्तानी
- हिन्दी का भाषिक स्वरूप : हिन्दी की स्वनिम व्यवस्था, ध्वनियों का वर्गीकरण, हिन्दी शब्द रचना (उपसर्ग, प्रत्यय और समास) हिन्दी की रूप रचना – लिंग, वचन और कारक व्यवस्था
- हिन्दी भाषा प्रयोग के विविध रूप: बोली, मानक भाषा, राष्ट्रभाषा, राजभाषा, संपर्क भाषा
- हिन्दी की संवैधानिक स्थिति
- देवनागरी लिपि: विशेषताएँ और मानकीकरण

हिन्दी साहित्य का इतिहास

- हिन्दी साहित्येतिहास दर्शन
- साहित्य इतिहास के लेखन की पद्धतियां, काल विभाजन और नामकरण
- आदिकाल की विशेषताएँ और प्रवृत्तियाँ
- भक्तिकाल के उदय के सामाजिक सांस्कृतिक पृष्ठभूमि, विशेषताएँ और प्रवृत्तियाँ
- भक्तिकाल की दार्शनिक पृष्ठभूमि
- रीतिकाल : सामाजिक सांस्कृति पृष्ठभूमि प्रवृत्तियाँ और विशेषताएँ
- आधुनिक काल : पृष्ठभूमि, प्रवृत्तियाँ और विशेषताएँ
- हिन्दी गद्य का उद्भाव और विकास
- पुर्नजागरण काल द्विवेदी युग स्वछंदतावाद, छायावाद, प्रगतिवाद, प्रयोगवाद, नई कविता. समकालीन कविता की अवधारणा और विशेषताएँ

हिन्दी साहित्य की गद्य विधाएँ

- हिन्दी उपन्यास : उद्भाव और विकास
- हिन्दी कहानी : उद्भाव और विकास, प्रमुख कहानी आंदोलन और कहानीकार
- हिन्दी नाटक : विकास के चरण, नाटक और रंगमंच, हिन्दी एकांकी, प्रमुख नाटककार एवं नाट्य कृत्तियां
- हिन्दी निबंध : उद्भाव और विकास
- हिन्दी आलोचना : उद्भाव और विकास
- हिन्दी की अन्य गद्य विधाएँ : रेखा चित्र, संस्मरण, यात्रा साहित्य, आत्मकथा, जीवनी, रिपोर्ताज, डायरी।

भारतीय एवं पाश्चत्य साहित्यशास्त्र

- काव्य के लक्षण, काव्य प्रयोजन और काव्य हेतु।
- प्रमुख संप्रदाय और सिद्धांत : रस, अंलकार, रीति, ध्वनि, वक्रोक्ति और औचित्य।
- रस निष्पति, साधानिककरण, शब्दशक्ति , काव्यगुण, काव्य दोष।
- प्लेटो, अरस्तू, वर्ड्सवर्थ, कॉलरिज, इलिएट और आइ ए रिचर्ड्स के काव्य संबंधी सिद्धांत।
- नई समीक्षा, मिथक, फन्तासी, कल्पना, बिम्ब, प्रतीक।

वैचारिक पृष्ठभूमि

- भारतीय नवजागरण और स्वाधीनता आंदोलन की वैचारिक पृष्ठभूमि।
- गांधीवादी दर्शन, अंबेडकर दर्शन, लोहिया दर्शन
- मार्क्सवाद, मनोविश्लेषणवाद, अस्तित्ववाद, उत्तर आधुनिकतावाद
- अस्मितामूलक विमर्श : दलित, स्त्री, आदिवासी एवं अल्पसंख्यक।