

# LINGAYA'S UNIVERSITY

## SYLLABUS FOR ENTRANCE TEST FOR PH.D.

DEPTT. – EC, EE, EL

- 1. DIGITAL SIGNAL PROCESSING:** Discrete-Time Signals, Discrete-Time Systems, Sampling Of Time Signals, Digital Filters, Multirate Digital Signal Processing, ADSP 2100, DSP processors, Applications of DSP in: Communications, speech processing, image processing, Biomedical and Radars.
- 2. MICROPROCESSOR:** Introduction to microprocessor, 8085/8086 microprocessor: Architecture & Block Diagram; Instruction Set of 8085/8086 microprocessor: data transfer instructions, arithmetic instructions, branch instructions, looping instructions; The 8255 PPI Chip Architecture; the 8259 Programmable Interrupt Controller, The 8237 DMA controller.
- 3. WIRELESS COMMUNICATION:** Various generation wireless networks; cellular concepts; interface and system capacity; trunking and grade of service improving coverage and capacity in cellular system.
- 4. GSM SERVICES AND FEATURES:** Architecture; frame structure; GSM channel; signal processing in GSM; Design Parameters of mobile unit, Design Parameter at base and mobile unit; Antenna configurations; Noise, power and field stren.
- 5. OPTICAL FIBRE COMMUNICATION SYSTEM:** Optical wave guide, optical sources and transmitters, optical detectors and receivers.
- 6. POWER ELECTRONICS - THYRISTOR COMMUTATION CIRCUITS:** Turn off characteristics; natural commutation; forced commutation methods; commutation by resonating load; self commutation by an L-C circuit; charged capacitor switched by a load carrying SCR; charged capacitor turned on by an auxiliary switching SCR; an external source of pulse for commutation; AC line commutation; performance of SCR with different loads.
- 7. A.C. CONTROLLERS – INVERTERS :** Applications and types of inverters; single phase bridge inverter; single phase center tapped inverter; series inverter; three phase bridge inverter; impulse commutation inverters; MC Murray inverters; modified MC Murray inverter; design of MC Murray inverter circuit; MC Murray-bed ford inverter; voltage source inverter.

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# LINGAYA'S UNIVERSITY

## SYLLABUS FOR ENTRANCE TEST FOR Ph.D. DEGREE PROGRAMME

### DEPARTMENTS – CSE / IT / Comp. Applications

- 1. COMPUTER ARCHITECTURE & ORGANIZATION:** Combinational Circuit: adder, subtractor, decoder, MUX etc. Sequential Circuit: Flip-flops, Registers, Counters, Machine Instructions and Addressing Modes, ALU & Data path, Memory interface, I/O Interface, Instruction pipeline, Main and secondary storage.
- 2. COMPUTER NETWORKS:** ISO/OSI stack, LAN technologies, Flow and error control techniques, IPV4,IPV6, TCP/UDP, Routing algorithms , Congestion control, Application layer protocols, Basic concepts of Switches, Bridges, Gateway & Routers, Basic concepts of Network security : Public and private key cryptography, Firewall, Digital signature etc.
- 3. BASIC AND DISCRETE MATHEMATICS:** Propositional logic, First order logic, Probability, Conditional probability, Sets, Relations and Functions, Permutations and Combinations.
- 4. DATA STRUCTURES:** Overview of Programming in C/C++, Searching & Sorting Techniques, Stacks, Queues, Lists and their Applications, Trees: Binary Tree, Properties & Representation, ADT Binary Tree, Binary search Trees, AVL Trees & Applications, Graphs: Representations & Properties, Directed and Undirected graphs, Graph search methods, Path finding Algorithms, Dijkstra's algorithm & their Application
- 5. THEORY OF COMPUTATIONS:** Grammar, Finite Automata, NFA, DFA, Pumping Lemma, CFG, Chomsky and Greibach Normal Forms, PDA, Correspondence between PDA and CFG, Turing Machines, Universal Turing Machines, Multi-tape and Multi-head Turing Machines, Rice's Theorem, Primitive Recursive Function, Post Correspondence Problem, Complexity Theory, Time Complexity of Turing Machines.
- 6. DATABASE MANAGEMENT SYSTEM:** Data Models, DBMS, File organization, Indexing, Hashing, Generalization, ER Model, Normalization, Security in DBMS, OODBMS, ORDBMS, Query Processing, Disaster Recovery, OLTP, Concurrency, Locking Schemes, Optimistic Scheduling, Deadlocks, DDL, DML, SQL, Distributed Databases, Issues.
- 7. DIGITAL ELECTRONICS:** Logic Gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR; Boolean algebra, Error detection and correction codes, Karnaugh map, Multiplexers and Demultiplexers, BCD arithmetic circuits, Encoders and Decoders, Flip Flops : S-R, J-K, T, D, master-slave, edge triggered; Switching mode operation of p-n junction, D/A and A/D converters.

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# LINGAYA'S UNIVERSITY

## SYLLABUS FOR ENTRANCE TEST FOR PH.D.

### DEPTT. - MECHANICAL ENGINEERING

#### (A) APPLIED MECHANICS AND DESIGN:

1. **ENGINEERING MECHANICS:** Free body diagrams and equilibrium; kinematics and dynamics of particles and of rigid bodies in plane motion; impact.
2. **MECHANICS OF SOLIDS:** Stress and strain, force and bending moment diagrams; bending and shear stress; deflection of beams; torsion of circular shafts; springs; thin walled sections; Euler's theory of columns; strain energy methods; thermal stresses; mechanical properties; material testing.
3. **THEORY OF MACHINES:** Kinematics and dynamics of plane mechanisms; dynamic analysis of slider-crank mechanism; gear trains; flywheels; bearings; governors; static and dynamic balancing of rotors.
4. **VIBRATIONS:** Free and forced vibration of single degree of freedom systems; effect of damping; vibration isolation; resonance; critical speeds of shafts.
5. **DESIGN:** Design for static and dynamic loading; failure theories; principles of the design of machine elements such as shafts, spur gears, rolling and sliding contact bearings, breaks, clutches and various joints.

#### (B) PRODUCTION AND INDUSTRIAL ENGINEERING:

1. **PRODUCTION ENGINEERING:** Unconventional Machining Processes, Computer controlled machines, CAD/CAM, CNC, Mechanics of Metal Cutting, tool wear and machinability, economics of metal cutting, metal forming, casting processes, powder metallurgy, joining processes, finishing operations and super finishing processes, measurement.
2. **INDUSTRIAL ENGINEERING :** Production systems, systems approach, productivity, product design and development, production planning and control, statistical quality control, operations scheduling, Linear optimization models, assignment and transportation models, waiting line models, capacity planning, plant and facility layout, plant location, production and assembly line balancing, time and motion study, work sampling, predetermined time systems, principles of motion economy, industrial safety, cost concepts and break even analysis, interest and money time relationship, demand and supply relationship, market types and competition, principles of management, motivation, organization, forecasting.

#### (C) THERMAL ENGINEERING:

1. **THERMODYNAMICS:** Basic laws of thermodynamics, availability, irreversibility, concept of Exergy, thermodynamic cycles related to energy conversion.
2. **TEAT TRANSFER:** Basic models of heat transfer, heat exchangers.
3. **I.C. ENGINES:** Air standard cycles, normal and abnormal combustion in S.I. engines and C.I. engines, engine performance, alternative fuels for I.C. Engines.
4. **FLUID MECHANICS AND MACHINES:** Fluid properties, Bernoulli's equation, flow through pipes, hydraulic machines, fans, compressors and pumps.
5. **REFRIGERATION AND AIR CONDITIONING:** Refrigeration systems, vapor compression cycles. Vapor absorption system, refrigerants, expansion advices, condenser and evaporator, psychometric process.
6. **GAS DYNAMICS:** Basic equations for fluid flow, wave propagation, Rayleigh line, fanno line, shock waves.
7. **ENERGY CONVERSION SYSTEMS:** Energy sources, basic cycles related to energy conversion system, environmental evaluation.

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# LINGAYA'S UNIVERSITY

## SYLLABUS FOR ENTRANCE TEST FOR PH.D.

### DEPTT.- CIVIL ENGINEERING

1. **ENGINEERING MECHANICS:** System of coplanar forces, centroids and moment of inertia, friction, kinematics of a particle, kinematics of rigid bodies, kinetics of particles and kinetics of rigid bodies, momentum and energy principles, belt friction.
2. **STRENGTH OF MATERIALS:** Shear force and bending moment, simple stresses and strains, shear stresses in beams, principal stresses and strains, direct and bending stresses, columns and struts, thin cylinders.
3. **FLUID MECHANICS:** Fluid statics, pressure measurement, buoyancy & floatation, fluid kinematics, fluid dynamics, flow measurement, orifices , mouth pieces, notches , weirs , flow through pipes , dimensional analysis and models, laminar flow, turbulent flow in pipes, boundary layer theory, flow through channels, rapidly varied flow.
4. **SURVEYING:** Measurement of horizontal distances, chain surveying, measurement of angles, measurement of elevations, theodolite surveying, tacheometric surveying, curves, hydrographic surveying,
5. **THEORY OF STRUCTURES:** Fixed beams, continuous beams, moving load, influence lines, strain energy, columns, three hinged arches, three hinged suspension bridges.
6. **CONCRETE TECHNOLOGY:** Cement, aggregates, water, admixtures, fresh concrete, properties of hardened concrete, concrete mix design.
7. **GEOTECHNICAL ENGINEERING:** Structure of soil, the three phase system, index properties of soils, classification of soils, soil water and effective stress principal, permeability of soils, compressibility, compaction , shear strength , exploration and in situ soil measurements.
8. **WATER RESOURCES ENGINEERING:** Hydrology, precipitation, infiltration, evaporation and evapotranspiration, run-off, hydrographs, floods, ground water hydrology, irrigation.
9. **ENVIRONMENTAL ENGINEERING:**
  - a. **WATER SUPPLY ENGINEERING:** Introduction to Water Supply, Quality of Water, Sources of Water, Raw Water Conveyance, Treatment of Water, Distribution of Water,
  - b. **SANITARY ENGINEERING:** Sewage and Sewerage, Sewer Design, Sewer Appurtenances, Sewer Pumping, Waste Water Characteristics, Sewage Treatment, Effluent Disposal,

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# LINGAYA'S UNIVERSITY

## SYLLABUS FOR ENTRANCE TEST FOR PH.D.

### DEPTT. – BUSINESS ADMINISTRATION

- 1. MANAGERIAL ECONOMICS:** Managerial Economics- Demand Analysis, Production Function, Costoutput Relations, Market Structures, Pricing Theories , Advertising, Macro-economics, National Income Concepts, Infrastructure- Management and Policy, Business Environment, Capital Budgeting.
- 2. ORGANIZATIONAL BEHAVIOR:** The concept and significance of organizational behavior- Skills and roles in an organization- classical, Neo-classical and modern theories of organizational structure-Organizational design- Understanding and Managing individual behavior personality- Perception-Values-Attitudes-Learning-Motivation, Understanding and managing group behavior, process-Inter-personal and group dynamicscommunication- leadership-managing change-managing conflicts, Organizational development.
- 3. HUMAN RESOURCE MANAGEMENT:** Concepts and perspectives in HRM; HRM in changing environment, Human resource planning- Objectives, process and techniques, Job analysis- job description, Selecting human resources, Induction, training and development, Exit policy and implications, Performance appraisal and evaluation, Potential assessment, Job evaluation, Wage determination, Industrial relations and Trade unions, Dispute resolution and grievance management, Labour welfare and social security measures.
- 4. FINANCIAL MANAGEMENT:** Financial management- nature and scope, Valuation concepts and valuation of securities, Capital budgeting decisions- risk analysis, Capital structure and cost of capital, Dividend policy- determinant, Long-term and short-term financing instruments, Mergers and Acquisitions.
- 5. MARKETING MANAGEMENT:** Marketing Environment and Environment scanning; Marketing information systems and marketing research; understanding consumer and industrial markets; demand measurement and forecasting; market segmentation- targeting and positioning; product decisions, product mix, product life cycle; new product development; branding and packaging; pricing methods and strategies.
- 6. PROMOTION DECISIONS:** Promotion mix; advertising; Personal selling; channel management; vertical marketing systems; Evaluation and control of marketing effort; Marketing of services; Customer relation management, Uses of internet as a marketing medium-other related issues like branding, market development, advertising and retailing on the net.
- 7. PRODUCTION MANAGEMENT:** Role and scope of production management; Faculty location; Layout planning and analysis; Production Planning and control- production process analysis; Demand forecasting for operations; Determinations of product mix; Production scheduling; Work measurement; Time and motion study; Statistical Quality Control; Role and scope of operations research; linear programming; sensitivity analysis; duality; transportation model; inventory control; Queueing Theory; decision theory; Markov Analysis; PERT/CPM.
- 8. ENTREPRENEURSHIP:** Concepts- types, characteristics; motivation; competencies and its development; innovation and entrepreneurship; small business- concepts government policy for promotion of small and tiny enterprises; process of business opportunity identification; detailed business plan preparation; managing small enterprises; planning for growth; sickness in small enterprises; rehabilitation of sick enterprises; Intrapreneurship (organizational entrepreneurship).
- 9. ETHICS AND MANAGEMENT:** Ethics and management system; ethical issues and analysis in management; Value based organizations; Personal framework for ethical choices; Ethical pressure on individual in organizations; Gender issues; Ecological consciousness; Environmental ethics; Social responsibilities of business; Corporate governance and ethics.

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# LINGAYA'S UNIVERSITY

## SYLLABUS FOR ENTRANCE TEST FOR PH.D.

### DEPTT. – APPLIED SCIENCE (PHYSICS)

#### SECTION- A

General information on science and its interface with society to test the candidate's awareness of science, aptitude of scientific and quantitative reasoning, common elementary computer science, history of development of computers, Mainframe, Mini, Micro's and Super Computer Systems. General awareness of computer Hardware i.e. CPU and other peripheral devices (input / output and auxiliary storage devices); Basic knowledge of computer systems, software and programming languages i.e. Machine language, Assembly language and higher level language. General awareness of popular commercial software packages other scientific application packages.

#### SECTION – B

- 1. BASIC MATHEMATICAL METHODS:** Calculus, Vector algebra and vector calculus, Linear algebra, matrices, Linear differential equations, Fourier - series, Elementary complex analysis.
- 2. CLASSICAL DYNAMICS:** Basic principles of classical dynamics. Lagrangian and Hamiltonian formalisms. Symmetries and conservation laws. Motion in the central field of force. Collisions and scattering. Mechanics of a system of particles. Small oscillations and normal modes. Wave motion - wave equation, phase velocity, group velocity, dispersion, Special theory of relativity - Lorentz transformations, addition of velocities, mass - energy equivalence.
- 3. ELECTROMAGNETICS:** Electrostatics - Laplace and Poisson equations, boundary value problems. Magnetostatics - Ampere's theorem, Biot - Savart Law, electromagnetic induction. Maxwell's equations in free space and in linear isotropic media. Boundary conditions on the fields at interfaces. Scalar and vector potentials. Gauge invariance. Electromagnetic waves – reflection and refraction, dispersion, interference, coherence, diffraction, polarization. Electrodynamics of a charged particle in electric and magnetic fields. Radiation from moving charges, radiation from a dipole. Retarded potential.
- 4. QUANTUM PHYSICS AND APPLICATIONS:** Wave - particle duality. Heisenberg's uncertainty Principle. The Schrodinger equation Particle in a box, Harmonic Oscillator, Tunnelling through a barrier. Motion in a central potential, Orbital angular momentum. Angular momentum algebra, spin. Addition of angular momenta. Time - independent perturbation theory. Fermi's Golden Rule. Elementary theory of scattering in a central potential. Phase shifts, partial wave analysis, Born approximation, identical particles, spin - statistics connection.
- 5. THERMODYNAMIC AND STATISTICAL PHYSICS:** Laws of thermodynamics and their consequences, Thermodynamic potentials and Maxwell's relations. Chemical potential, phase equilibria. Phase space, microstates and macrostates. Partition function. Free Energy and connection with thermodynamic quantities. Classical and quantum statistics, Degenerate electron gas. Blackbody radiation and Planck's distribution law, Bose-Einstein condensation. Einstein and Debye models for lattice specific heat.
- 6. EXPERIMENTAL DESIGN:** Measurement of fundamental constants:  $e$ ,  $h$ ,  $c$ . Measurement of High & Low Resistances,  $L$  and  $C$ ; Detection of X - rays, Gamma rays, charged particles, neutrons etc: Ionization chamber, proportional counter, GM counter, Scintillation detectors, Solid State detectors. Emission and Absorption Spectroscopy. Measurement of Magnetic field, Hall effect, magnetoresistance. X-ray and neutron Diffraction. Vacuum Techniques: basic idea of conductance, pumping speed etc. Pumps; Mechanical Pump, Diffusion pump; Gauges; Thermocouple, Panning, Pirani, Hot Cathode. Low Temperature: Cooling a sample over a range upto 4 K and measurement of temperature; Measurement of Energy and Time using electronic signals from the detectors and associated instrumentation : Signal processing, A/D conversion &

multichannel analyzers, Time-of-flight technique ; Coincidence Measurements ; true to chance ratio, correlation studies.

- 7. ELECTRONICS:** Physics of p n junction. Diode as a circuit element; clipping, clamping; Rectification, Zener regulated power supply; Transistor as a circuit element: CC, CB and CE configuration. Transistor as a switch, OR, AND, NOT gates. Feed back in Amplifiers. Operational amplifier and its applications: inverting, non " inverting amplifier, adder, integrator, differentiator, wave form generator, comparator & Schmidt trigger. Digital integrated circuits NAND & NOR gates as building blocks, X OR Gate, simple combinational circuits, Half & Full adder, Flip-flop, shift register, counters. Basic principles of A/D & D/A converters; Simple applications of A/D & D/A converters.
  
- 8. ATOMIC & MOLECULAR PHYSICS:** Quantum states of an electron in an atom. Hydrogen atom spectrum. Electron spin. Stern-Gerlach experiment. Spin-orbit coupling, fine structure, relativistic correction, spectroscopic terms and selection rules, hyperline structure. Exchange symmetry of wave functions. Pauli's exclusion principle, periodic table alkali type spectra, LS & JJ coupling, Zeeman, Paschen Back and Stark effects. X-Rays and Auger transitions, Compton effect. Principles of ESR, NMR. Covalent, ionic and Van der Waals interaction. Rotation Vibration spectra. Raman Spectra, selection rules, nuclear spin and intensity alternation, isotope effects, electronic states of diatomic molecules, Frank Condon principle. Lasers spontaneous and stimulated emission, optical pumping, population inversion, coherence (temporal and spatial) simple description of Ammonia maser, CO<sub>2</sub> and He-Ne Lasers.
  
- 9. CONDENSED MATTER PHYSICS:** Crystal classes and systems, 2d & 3d lattices, Bonding of common crystal structures, reciprocal lattice, diffraction and structure factor, elementary ideas about point defects and dislocations. Lattice vibrations, Phonons, specific heat of solids, free electron theory Fermi statistics; heat capacity. Electron motion in periodic potential, energy bands in metals, insulators and semi-conductors; tight binding approximation; impurity levels in depend semi-conductors. Electronic transport from classical kinetic theory, electrical and thermal conductivity, Hall effect and thermoelectric power transport in semiconductors. Dielectric Polarization mechanisms, Clausius equation, Piezo, Pyro and ferroelectricity. Dia and Para magnetism; exchange interactions, magnetic order, ferro, anti ferro and ferrimagnetism. Super conductivity basic phenomenology; Meissner effect, Type 1 and Type 2 Super conduction, JCS, Pairing mechanism.

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# LINGAYA'S UNIVERSITY

## SYLLABUS FOR ENTRANCE TEST FOR PH.D.

### DEPTT. – APPLIED SCIENCE (MATHEMATICS)

- 1. LINEAR ALGEBRA:** Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations. Algebra of matrices, rank and determinant of matrices, linear equations. Eigenvalues and eigenvectors, Cayley-Hamilton theorem. Matrix representation of linear transformations. Change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms. Inner product spaces, orthonormal basis. Quadratic forms, reduction and classification of quadratic forms.
- 2. COMPLEX ANALYSIS:** Algebra of complex numbers, the complex plane, polynomials, Power series, transcendental functions such as exponential, trigonometric and hyperbolic functions. Analytic functions, Cauchy-Riemann equations. Contour integral, Cauchy's theorem, Cauchy's integral formula, Liouville's theorem, Maximum modulus principle, Schwarz lemma, Open mapping theorem. Taylor series, Laurent series, calculus of residues. Conformal mappings, Mobius transformations.
- 3. ORDINARY DIFFERENTIAL EQUATIONS (ODES):** Existence and Uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs. General theory of homogenous and non-homogeneous linear ODEs, variation of parameters, Sturm-Liouville boundary value problem, Green's function.
- 4. PARTIAL DIFFERENTIAL EQUATIONS (PDES):** Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs. Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations.
- 5. NUMERICAL ANALYSIS:** Numerical solutions of algebraic equations, Method of iteration and Newton-Raphson method, Rate of convergence, Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, Finite differences, Lagrange, Hermite and spline interpolation, Numerical differentiation and integration, Numerical solutions of ODEs using Picard, Euler, modified Euler and Runge-Kutta methods.
- 6. LINEAR PROGRAMMING PROBLEM:** Simplex methods, duality. Elementary queuing and inventory models. Steady-state solutions of Markovian queuing models: M/M/1, M/M/1 with limited waiting space, M/M/C, M/M/C with limited waiting space, M/G/1.
- 7. CALCULUS OF VARIATIONS:** Variation of a functional, Euler-Lagrange equation, Necessary and sufficient conditions for extrema. Variational methods for boundary value problems in ordinary and partial differential equations.
- 8. LINEAR INTEGRAL EQUATIONS:** Linear integral equation of the first and second kind of Fredholm and Volterra type, Solutions with separable kernels. Characteristic numbers and eigenfunctions, resolvent kernel.
- 9. CLASSICAL MECHANICS:** Generalized coordinates, Lagrange's equations, Hamilton's canonical equations, Hamilton's principle and principle of least action, Two-dimensional motion of rigid bodies, Euler's dynamical equations for the motion of a rigid body about an axis, theory of small oscillations.

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**LINGAYA'S UNIVERSITY**  
**SYLLABUS FOR ENTRANCE TEST FOR PH.D.**  
**DEPTT. – EDUCATION**

1. **PHILOSOPHY OF EDUCATION:** Meaning of philosophy, scope of Philosophical inquiry, meaning of education with reference to individual growth and development, origin and purpose of human existence as the common denominator between Philosophy and Education, need for philosophy of education.
2. **SOCIOLOGY OF EDUCATION:** Development and scope, difference with Educational ociology, sociological approach, researches in the area of Sociology of Education.
3. **LEARNING:** Concept, Levels of learning, Gagne's types of learning. Theories of Learning- Thorndike's Connectionism, Pavlov's Classical Conditioning, Skinner's Operant Conditioning, Learning by Insight, Hull's Needs Reduction Theory, Tolman's Sign-Gestalt Theory, Kurt-Lewin's Field Theory and their Educational implications. Factor influencing Leaning.
4. **PERSONALITY:** Concept, development, structure and dynamics of personality. Theories of Personality: Allport, Eysenck; Psychoanalytic approach of Freud, Erickson; Behavioural approach – Miller and Dollard and Bandura and Walter; Humanistic approach – Roger, Maslow; Indian Theories: Vedic, Rabindernath Tagore Mahatma Gandhi, and Sri Aurobindo.
5. **METHODS OF EDUCATIONAL RESEARCH:** Experimental; Normative Survey; Historical; Case Study; Developmental; Fundamental, Applied , Evaluative and Action Research; Qualitative Research: Phenomenological, Ethnomethodical and Naturalistic Enquiry.
6. **DEVELOPING A RESEARCH PROPOSAL:** Problem and its sources; Selection and definition of problem; Objectives – Primary, secondary and concomitant; Hypothesis: Nature, definition, types, sources; Characteristics of a good hypothesis; Directional and non-directional hypothesis.
7. **COMPARATIVE EDUCATION:** Scope and major concepts of Comparative Education, Methods in Comparative Education, Role of UNO in improving educational opportunities among the member countries, various organs of the UNO and their educational activities, Primary Education: U.S.A, U.K., Japan and India, Secondary Education: U.S.A., U.K. Japan and India, Erosion of Moral values and Ethics.

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**LINGAYA'S UNIVERSITY**  
**SYLLABUS FOR ENTRANCE TEST FOR PH.D.**  
**DEPTT. – APPLIED SCIENCE (CHEMISTRY)**

**INORGANIC CHEMISTRY:**

1. **CO-ORDINATION COMPOUNDS OF METALS:** Step wise and overall formation constants and their interaction, trends in stepwise constants, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand, chelate effect and its thermodynamic origin, determination of binary formation constants by pH metry and spectrophotometry.
2. **BORON COMPOUNDS:** Higher boranes, carboranes and metalloboranes, compounds with, etalmetal multiple bonds, metal carbonyls and halide clusters.

**MATERIALS CHEMISTRY:**

1. **MULTIPHASE MATERIALS:** Two component phase equilibria, eutectic phase formation (Pb-Sn), Solid solution, Cu-Ni, peritectic phase formation: Fe-Ni, Fe-C phase diagram, phase transformation in Fe-C alloys, Solid solutions and intermetallic compound.
2. **HIGH TC MATERIALS:** Defect pervoskites, high Tc superconductivity in cuprates, preparation and characterization of 1, 2, 3, and 2, 1, 4, materials, normal state properties, anisotropy, temperature dependence of electrical resistance, optical photon modes, superconductivity state, heat capaci ty, coherence length, elastic constants, position life times, microwave absorpction pairing and multigap structure in high Tc materials, applications of high Tc materials.
3. **CORROSION:** Definition, Classification, Units and rate of corrosion, Electrochemical corrosion eaction, Rusting, Polarization, Activation Polarization, Concentration Polarization, Passivity, Inhibitors, Electrochemical series of metals, Galvanic series of metals and Alloys, Galvanic corrosion, Ceramic corrosion, Pitting corrosion, Intergranular corrosion, Stress corrosion.
4. **POLYMER CHEMISTRY:** General characteristics of chain growth polymerization, alkene polymerization by free radical, anionic and cationic initiators, ring opening polymerization of ethers, lactones and lactams.  
General characteristics of step growth polymerization, synthesis of polymers by step polymerization, polyesters, polycarbonates, polyamides, polyphenylene oxide, polysulphones, polysiloxanes  
Zeigler-Natta co-ordination polymerization  
Copolymerisation, general characteristics, copolymer equation and its application, monomer reactivity ratio and copolymer structure, block copolymer and graft copolymer.

**ORGANIC CHEMISTRY:**

1. **NAME REACTIONS AND THEIR MECHANISMS:** Formations and stabilities of carbonium ions, carbanions, carbenes, nitrenes, radicals and arynes, Reactive intermediates, Nucleophilic, Electrophilic, Radical substitution, Addition and Elimination reactions. Barton, Baeyer-villigier, Birch, Chichibabin, Clemmensen Diels-alder, Friedel crafts, Hoffmann, Hofmann-Loffler-Freytag, Hydroboration, Lossen, Mannich, Michael addition, Meerwein-Ponndorf-Verley, Perkin, Grignard, Reimer-Tiemann, Reformatsky, Stork enamine, Wittig, Wolff-Kishner. Oppenaur oxidations, Robinson annulations, Routine functional group transformations and inter-conversions of simple functionalities, Aldol, Clasién, Stobbe and Dieckmann, Schmidt, Condensations, Beckmann and Fries, Favorski, Curtius Rearrangements.
2. **STEREOCHEMISTRY AND CONFORMATIONAL ANALYSIS:** Concept of chirality, Asymmetric synthesis (including enzymatic and catalytic nexus) enantio and diastereo-selective synthesis, racemization, resolution, Walden inversion. Effects of conformation on reactivity in acyclic compounds and cyclohexanes, Conformational analysis of cyclohexane.

**PHYSICAL CHEMISTRY:**

1. **SPECTROSCOPY:** Theoretical treatment of rotational, vibrational and electronic spectroscopy. Principles of NMR, EPR, Mössbauer and photoelectron speetroscopy.
2. **CHEMICAL EQUILIBRIUM:** Free energy and entropy of mixing, partial molar quantities, Gibbs-Duhem equation. Equilibrium constant, temperature-dependence of equilibrium constant, phase diagram of one-and two-component systems, phase rule.

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# LINGAYA'S UNIVERSITY

## SYLLABUS FOR ENTRANCE TEST FOR PH.D.

### DEPTT. - ENGLISH

The Syllabus of entrance test will comprise the following portions of the historical periods of English literature to judge the following aptitudes:-

**A.** Different periods of literary history:

14<sup>th</sup> Century

16<sup>th</sup> Century

17<sup>th</sup> Century

Restorative Period

Romantic Period

Modern Period

**B.** To judge Research Aptitude, one question (Compulsory) will be asked on the topic, intent and purpose of the subject of research on which the candidate wishes to register for Ph.D.

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