CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI

Ph.D. Entrance Examination Scheme, 2015

Maximum Marks – 100 **Duration of Examination – 3 hrs**

Section – I

Consisting of 40 objective type questions from relevant discipline of the syllabus.

Section – II

Consisting of 60 objective type questions from any of the specialization of the relevant discipline of the syllabus.
The weightage for section I shall be 40% & section II shall be 60%.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Biotechnology

Section – I

Microbiology: Prokaryotic and eukaryotic cell structure; Microbial nutrition, growth and control; Microbial metabolism (aerobic and anaerobic respiration, photosynthesis); Nitrogen fixation; Chemical basis of mutations and mutagens; Microbial genetics (plasmids, transformation, transduction, conjugation); Microbial diversity and characteristic features; Viruses.

Biochemistry: Biomolecules and their conformation; Ramachandran map; Weak inter-molecular interactions in biomacromolecules; Chemical and functional nature of enzymes; Kinetics of single substrate and bi-substrate enzyme catalyzed reactions; Bioenergetics; Metabolism (Glycolysis, TCA and Oxidative phosphorylation); Membrane transport and pumps; Cell cycle and cell growth control; Cell signaling and signal transduction; Biochemical and biophysical techniques for macromolecular analysis.

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

Process Biotechnology: Bioprocess technology for the production of cell biomass and primary/secondary metabolites, such as baker's yeast, ethanol, citric acid, amino acids, exo-polysacharides, antibiotics and pigments etc.; Microbial production, purification and bioprocess application(s) of industrial enzymes; Production and purification of recombinant proteins on a large scale; Chromatographic and membrane based bioseparation methods; Immobilization of enzymes and cells and their application for bioconversion processes. Aerobic and anaerobic biological processes for stabilization of solid / liquid wastes; Bioremediation.

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

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

Characteristics of animal cells: Metabolism, regulation and nutritional requirements for mass cultivation of animal cell cultures; Kinetics of cell growth and product formation and effect of shear force; Product and substrate transport; Micro & macro-carrier culture; Hybridoma technology; Live stock improvement; Cloning in animals; Genetic engineering in animal cell culture; Animal cell preservation.

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

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

Bioinformatics: Major bioinformatics resources (NCBI, EBI, ExPASy); Sequence and structure databases; Sequence analysis (biomolecular sequence file formats, scoring matrices, sequence alignment, phylogeny); Genomics and Proteomics (Large scale genome sequencing strategies; Comparative genomics; Understanding DNA microarrays and protein arrays); Molecular modeling and simulations (basic concepts including concept of force fields).

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline : Civil Engineering

Section - I

STRUCTURAL ENGINEERING

Mechanics: Bending moment and shear force in statically determinate beams. Simple stress and strain relationship: Stress and strain in two dimensions, principal stresses, stress transformation, Mohr's circle. Simple bending theory, flexural and shear stresses, unsymmetrical bending, shear centre. Thin walled pressure vessels, uniform torsion, buckling of column, combined and direct bending stresses.

Structural Analysis: Analysis of statically determinate trusses, arches, beams, cables and frames, displacements in statically determinate structures and analysis of statically indeterminate structures by force/energy methods, analysis by displacement methods (slope deflection and moment distribution methods), influence lines for determinate structures.

Concrete Structures: Concrete Technology - properties of concrete, basics of mix design, Concrete design – basic working stress and limit state design concepts, analysis of ultimate load capacity and design of members subjected to flexure, shear, compression and torsion by limit state methods.

Steel Structures: Analysis and design of tension and compression members, beam and beam – columns, column bases. Connections simple and eccentric, beam-column connections, Plastic analysis of beams and frames.

GEOTECHNICAL ENGINEERING

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

Foundation Engineering: Sub – surface investigations – scope, drilling bore holes, sampling, penetration tests, plate load test, Earth pressure theories, effect of water table, layered soils, Stability of slopes-infinite slopes, finite slopes. Foundation types – foundation design requirements. Shallow foundations – bearing capacity, effect of shape, water table and other factors, stress distribution, settlement analysis in sands & clays. Deep foundations – pile types, dynamic & static formulae, load capacity of piles in sands & clays, negative skin friction.

WATER RESOURCES ENGINEERING

Fluid Mechanics and Hydraulics: Properties of fluids, principle of conservation of mass, momentum energy and corresponding equations, potential flow, applications of momentum and Bernoulli's equation, laminar and turbulent flow, flow in pipes. Concept of boundary layer and its growth. Uniform flow, critical flow and gradually varied flow in channels, specific energy concept, hydraulic jump. Forces on immersed bodies, flow measurements in channels, tanks and pipes. Dimensional analysis and hydraulic modeling. Kinematics of flow, velocity triangles and specific speed of pumps and turbines.

Hydrology: Hydrologic cycle, rainfall, evaporation, infiltration, stage discharge relationships, unit hydrographs, flood estimation, reservoir capacity, reservoir and channel routing. Well hydraulics.

Irrigation: Duty, delta, estimation of evapo-transpiration. Crop water requirements. Design of lined and unlined canals, waterways, head works, gravity dams and spillways, Design of weirs on permeable foundation. Types of irrigation system, irrigation methods, Water logging and drainage, sodic soils.

ENVIRONMENTAL ENGINEERING

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

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

Municipal Solid Wastes: Characteristics, generation, collection and transportation of solid wastes, engineered systems, for solid waste management (reuse/recycle, energy recovery, treatment and disposal).

TRANSPORTATION ENGINEERING

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

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

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline : Computer Sciences (for CSE, IT, MCA)

Section - I

Computer Architecture: Architectural classification schemes, Memory models, Pipelining, RISC CISC, VLIW architectures, data dependency, and interconnection network.

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

Programming Methodology: Scope, binding, parameter passing, recursion, procedure oriented programming – data types and declarations, assignment and control flow statements, 1-d and 2-d arrays, functions, pointers; Concepts of object-oriented programming - classes, objects, inheritance, polymorphism, operator overloading.

Operating Systems: Classical concepts (concurrency, synchronization, deadlock), Distributed Operating System, multithreading, inter-process communication, CPU scheduling, memory management, file systems, I/O systems, protection and security, shell programming.

Information Systems and Software Engineering: SDLC, planning and managing the

Project, design, coding, testing, implementation, maintenance.

Databases: E-R diagrams, object and relational model, database design, integrity constraints, normal forms, query languages (SQL), file structures (sequential, indexed), b- trees, transaction and concurrency control.

Data Communication and Computer Networks: ISO/OSI and TCP/IP stacks, transmission media, data encoding, multiplexing, flow and error control, LAN technologies (Ethernet, token ring), network devices – switches, gateways, routers, network security – cryptography, digital signature, firewalls, routing concepts, ATM, Queuing theory – M/M/1 queues, poisson and other distributions.

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Electrical Engineering

(Common for Electrical Engg. and Electrical & Electronics Engineering)

Section - I

Electric Circuits and Fields: Network graph, KCL, KVL, node and mesh analysis, transient response of dc and ac networks; sinusoidal steady-state analysis, resonance, basic filter concepts; ideal current and voltage sources, Thevenin's, Norton's and Superposition and Maximum Power Transfer theorems, two-port networks, three phase circuits; Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions; Ampere's and Biot-Savart's laws; inductance; dielectrics; capacitance.

Signals and Systems: Representation of continuous and discrete-time signals; shifting and scaling operations; linear, time-invariant and causal systems; Fourier series representation of continuous periodic signals; sampling theorem; Fourier, Laplace and Z transforms.

Electrical Machines: Single phase transformer - equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers - connections, parallel operation; autotransformer; energy conversion principles; DC machines - types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors; three phase induction motors - principles, types, performance characteristics, starting and speed control; single phase induction motors; synchronous machines - performance, regulation and parallel operation of generators, motor starting, characteristics and applications; servo and stepper motors, special machines.

Power Systems: Basic power generation concepts; transmission line models and performance; cable performance, insulation; corona and radio interference; distribution systems; per-unit quantities; bus impedance and admittance matrices; load flow; voltage control; power factor correction; economic operation; symmetrical components; fault analysis; principles of overcurrent, differential and distance protection; solid state relays and digital protection; circuit breakers; system stability concepts, swing curves and equal area criterion; HVDC transmission and FACTS.

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

Electrical and Electronic Measurements: Bridges and potentiometers; PMMC, moving iron, dynamometer and induction type instruments; measurement of voltage, current, power,

energy and power factor; instrument transformers; digital voltmeters and multimeters; phase, time and frequency measurement; Q-meters; oscilloscopes; potentiometric recorders; error analysis.

Analog and Digital Electronics: Characteristics of diodes, BJT, FET; amplifiers - biasing, equivalent circuit and frequency response; oscillators and feedback amplifiers; operational amplifiers - characteristics and applications; simple active filters; VCOs and timers; combinational and sequential logic circuits; multiplexer; Schmitt trigger; multi- vibrators; sample and hold circuits; A/D and D/A converters; 16 & 8-bit microprocessor basics, architecture, programming and interfacing.

Power Electronics and Drives: Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs - static characteristics and principles of operation; triggering circuits; phase control rectifiers; bridge converters - fully controlled and half controlled; principles of choppers and inverters; basis concepts of adjustable speed dc and ac drives.

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

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Electronics and Instrumentation Engineering

Section - I

Basics of Circuits and Measurement Systems: Kirchoff's laws, mesh and nodal Analysis. Circuit theorems. One-port and two-port Network Functions. Static and dynamic characteristics of Measurement Systems. Error and uncertainty analysis. Statistical analysis of data and curve fitting.

Transducers, Mechanical Measurement and Industrial Instrumentation: Resistive, Capacitive, Inductive and piezoelectric transducers and their signal conditioning. Measurement of displacement, velocity and acceleration (translational and rotational), force, torque, vibration and shock. Measurement of pressure, flow, temperature and liquid level. Measurement of pH, conductivity, viscosity and humidity.

Analog Electronics: Characteristics of diode, BJT, JFET and MOSFET. Diode circuits. Transistors at low and high frequencies, Amplifiers, single and multi-stage. Feedback amplifiers. Operational amplifiers, characteristics and circuit configurations. Instrumentation amplifier. Precision rectifier. V-to-I and I-to-V converter. Op-Amp based active filters. Oscillators and signal generators.

Digital Electronics: Combinational logic circuits, minimization of Boolean functions. IC families, TTL, MOS and CMOS. Arithmetic circuits. Comparators, Schmitt trigger, timers and mono-stable multi-vibrator. Sequential circuits, flip-flops, counters, shift registers. Multiplexer, S/H circuit. Analog-to-Digital and Digital-to-Analog converters. Basics of number system. Microprocessor applications, memory and input-output interfacing. Microcontrollers.

Signals, Systems and Communications: Periodic and aperiodic signals. Impulse response, transfer function and frequency response of first- and second order systems. Convolution, correlation and characteristics of linear time invariant systems. Discrete time system, impulse and frequency response. Pulse transfer function. IIR and FIR filters. Amplitude and frequency modulation and demodulation. Sampling theorem, pulse code modulation. Frequency and time division multiplexing. Amplitude shift keying, frequency shift keying and pulse shift keying for digital modulation.

Electrical and Electronic Measurements: Bridges and potentiometers, measurement of R, L and C. Measurements of voltage, current, power, power factor and energy. A.C & D.C current probes. Extension of instrument ranges. Q-meter and waveform analyzer. Digital voltmeter and multi-meter. Time, phase and frequency measurements. Cathode ray oscilloscope. Serial and parallel communication. Shielding and grounding.

Control Systems and Process Control: Feedback principles. Signal flow graphs. Transient Response, steady-state-errors. Routh and Nyquist criteria. Bode plot, root loci. Time delay systems. Phase and gain margin. State space representation of systems. Mechanical, hydraulic and pneumatic system

components. Synchro pair, servo and step motors. On-off, cascade, P, P-I, P-I-D, feed forward and derivative controller, Fuzzy controllers.

Analytical, Optical and Biomedical Instrumentation: Mass spectrometry. UV, visible and IR spectrometry. X-ray and nuclear radiation measurements. Optical sources and detectors, LED, laser, Photo-diode, photo-resistor and their characteristics. Interferometers, applications in metrology. Basics of fiber optics. Biomedical instruments, EEG, ECG and EMG. Clinical measurements. Ultrasonic transducers and Ultrasonography. Principles of Computer Assisted Tomography.

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Electronics & Telecommunication Engineering

Section - I

Electronic Devices and Circuits: Energy bands in silicon, intrinsic and extrinsic silicon. Carrier transport in silicon: diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. p-n junction diode, BJT, JFET, MOS capacitor, MOSFET, Special diodes, Device technology: integrated circuits fabrication process,
Oxidation, diffusion, ion implantation, photolithography, n-tub, p-tub and twintub CMOS
Process, Diodes and Transistor Circuits.

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

Advanced Digital circuits: Logic gates; digital IC families (DTL, TTL, ECL, MOS, and CMOS). Combinatorial circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift- registers. Semiconductor memories. Microprocessors & Microcontroller (8085, 8086, 8051): architecture, programming, memory and I/O interfacing.

Signals and Systems: Definitions and properties of Laplace transform and discrete transform, DFT and FFT, z-transform. LTI Systems, convolution, poles and zeros,
realization and analysis of Digital Filters. Architecture of DSP Processors, Digital image Processing techniques.

Control Systems: Basic control system components; block diagrammatic description, reduction of block diagrams. Open loop and closed loop (feedback) systems and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems; transient and steady state analysis of LTI control systems and frequency response. Tools and techniques for LTI control system analysis: root loci, Routh-Hurwitz criterion, Bode and Nyquist plots. Control system compensators: elements of lead and lag compensation, elements of Proportional-Integral- Derivative (PID) control. State variable representation and solution of state equation of LTI control systems.

Communications Techniques: Random signals and noise: probability, random variables, probability density function, autocorrelation, power spectral density. Analog communication systems, SNR calculations for AM and FM for low noise conditions. Digital communication systems: PCM, DPCM, ASK, PSK, FSK, matched filter receivers, bandwidth consideration and probability of error calculations for these schemes. Optical Communication,

Satellite Communication, Basics of TDMA, FDMA and CDMA and GSM.
Information Theory & coding, Secure Communication, Mobile Communication Techniques.

Microwave Communication Engineering: Elements of vector calculus: divergence and curl; Maxwell's equations, wave equation, Waveguides : modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Basics of Antennas and Wave propagation: Dipole antennas; radiation pattern; antenna gain.

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Mechanical Engineering

Section - I

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

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

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

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

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

Thermodynamics: Zero, First and Second laws of thermodynamics; thermodynamic system and processes; Carnot cycle, irreversibility and availability; behavior of ideal and real gases, properties of pure substances, calculation of work and heat in ideal processes; analysis of thermodynamic cycles related to energy conversion.

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

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

I.C. Engines: Air-standard cycles, pre-ignition, detonation & diesel-knock, ignition system, cooling & lubrication system, emission & control, fuel injection & carburetion, supercharging,

measurement of calorific values, engine performance & heat balance sheet.

Heat Transfer: Modes of heat transfer; one dimensional heat conduction, resistance concept, electrical analogy, unsteady heat conduction, fins; dimensionless parameters in free and forced convective heat transfer, various correlations for heat transfer in flow over flat plates and through pipes; thermal boundary layer; effect of turbulence; radiative heat transfer, black and grey surfaces, shape factors, network analysis; heat exchanger performance, LMTD and NTU methods.

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

Turbo-machinery: Pelton-wheel, flow of stream through nozzles & diffuses, Francis and Kalpan turbines-impulse and reaction principles, velocity diagrams, various types of gas turbines, reciprocating, centrifugal and axial flow compressors, multi-stage compression.

Engineering Materials: Structure and properties of Engineering materials, heat treatment, stress-strain diagrams for engineering materials. Common applications of various materials.
Metal Casting: Design of patterns, moulds and cores; solidification and cooling; riser and gating design, design considerations, types of casting processes.

Forming: Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy.

Joining: Physics of welding, brazing and soldering; adhesive bonding; design consideration in welding.

Machining and Machine Tool Operations: Mechanics of machining, single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, principles of design of jigs and fixtures.

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

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

Computer Integrated Manufacturing: Basic concepts of CAD/CAM and their integration tools, Robotic, Robotic Kinematics.

Inventory Control: Deterministic and probabilistic models; safety stock inventory control systems.
Operation Research: Linear programming, Graphical & Simplex method transportation, assignment, network flow models, simple queuing models, PERT and CPM, Game Theory.

Value Engineering: Value analysis for cost/value.

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

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Chemical Engg.

Section – I

1. Process Calculations and Thermodynamics: Laws of conservation of mass and energy; use of tie components; recycle, bypass and purge calculations; degree of freedom analysis. First and Second laws of thermodynamics. First law application to close and open systems. Second law and Entropy Thermodynamic properties of pure substances: equation of state and departure function, properties of mixtures: partial molar properties, fugacity, excess properties and activity coefficients; phase equilibria: predicting VLE of systems; chemical reaction equilibria.

2. Fluid Mechanics and Mechanical Operations: Fluid statics, Newtonian and nonNewtonian fluids, Bernoulli equation, Macroscopic friction factors, energy balance, dimensional analysis, shell balances, flow through pipeline systems, flow meters, pumps and compressors, packed and fluidized beds, elementary boundary layer theory, size reduction and size separation; free and hindered settling; centrifuge and cyclones; thickening and classification, filtration, mixing and agitation; conveying of solids.

3. Heat and Mass Transfer: Conduction, convection and radiation, heat transfer coefficients, steady and unsteady heat conduction, boiling, condensation and evaporation; types of heat exchangers and evaporators and their design. Fick's laws, molecular diffusion in fluids, mass transfer coefficients, film, penetration and surface renewal theories; momentum, heat and mass transfer analogies; stage wise and continuous contacting and stage efficiencies; HTU & NTU concepts design and operation of equipment for distillation, absorption, leaching, liquid-liquid extraction, drying, humidification, dehumidification and adsorption.

4. Chemical Reaction Engineering: Theories of reaction rates; kinetics of homogeneous reactions, interpretation of kinetic data, single and multiple reactions in ideal reactors, non-ideal reactors; residence time distribution, single parameter model; non-isothermal reactors; kinetics of heterogeneous catalytic reactions; diffusion effects in catalysis.

5. Instrumentation and Process Control: Measurement of process variables; sensors, transducers and their dynamics, transfer functions and dynamic responses of simple systems, process reaction curve, controller modes (P, PI, and PID); control valves; analysis of closed loop systems including stability, frequency response and controller tuning, cascade, feed forward control.

6. Plant Design and Economics: Process design and sizing of chemical engineering equipment such as compressors, heat exchangers, multistage contactors; principles of process economics and cost estimation including total annualized cost, cost indexes, rate of return, payback period, discounted cash flow, optimization in design.

7. Chemical Technology: Inorganic chemical industries; sulfuric acid, NaOH, fertilizers (Ammonia, Urea, SSP and TSP); natural products industries (Pulp and Paper, Sugar, Oil, and Fats); petroleum refining and

petrochemicals; polymerization industries; polyethylene, polypropylene, PVC and polyester synthetic fibers.

8. Statistics & Research Aptitude Mean, median, mode, basic concepts of probability, coefficient of variance, standard error, standard deviation, and correlation and regression analysis. Student t-test, F-test, analysis of variance (ANOVA), data graphics and data interpretation. Principles and various models of statistical optimization techniques, optimization software's. National and international scenario of scientific research, literature reviewing, reference citation, scientific and research journals, impact valuation, research article and patent drafting, various scientific websites, abstracts.

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Management

Section – I

General Management

Overview: Functions and Principles of management; Management Thought and Concepts; Management Decision Making Processes and Types.

Managerial Economics

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

Behavioral Science

Overview of Organizational Behaviour; Understanding and managing Individual Behaviour-personality, Perception, Values, Attitudes, Learning and Motivation; Group Dynamics and Team Work. Overview of Organizational Development: Organizational structure; Organizational design; OD Interventions; Change Management.

Human Resource management

Overview of HRM: Concepts and Perspectives in HRM; HRM in Changing Environment, Overview of HR Planning: Objectives Process and Techniques; Job Analysis; Recruitment and Selection, Training and Development; Performance Appraisal; Exit Policy, Overview of Industrial Relations: Wage Policy and Determination; Trade Unions; Dispute Resolution and Grievance Management; Labour Welfare and Social Security Measures.

Finance

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

Marketing Management

Overview of Marketing: Marketing Mix, Market Segmentation, Targeting and Positioning; Overview of Product Management; Product Mix Decisions; Product Life Cycle, New Product Development, Branding; Pricing Methods and Strategies. Overview of Promotional

Management: Promotion Mix; Advertising; Personal selling; Channel Management; Evaluation and Control of Marketing Effort; Marketing of Services; Customer Relation management. Overview of E-Marketing: Uses of Internet as Marketing Medium; Issues in Branding, Market Development, advertising and Retailing on Internet.

Production Management

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

Quantitative Techniques

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

Information System

Overview of MIS: Application of Information Systems in management; MIS and Decision Making; System Analysis and Design. Overview of E-Commerce: e-commerce Business models; e-marketing; security issues in electronic commerce, legal issues in electronic commerce. Overview of ERP: Role of ERP in information integration; Evolution of ERP.

Strategic Management

Overview of Strategic Management: Concept of Corporate Strategy; BCG Model; Porter's Generic Strategies; Competitor Analysis. Overview of Strategy Formulation and Implementation: Strategy Formulation and implementation at Corporate and Business level.
Global Strategic Management: Transnationalization of World Economy; Managing Cultural Diversity; Global Entry Strategies; Managing International Business; Competitive
Advantage of Nations.

Entrepreneurship

Overview of Entrepreneurship: Theories of entrepreneurship; Innovation and Entrepreneurship. Small Business Concepts: Government policy for Promotion of Small and Medium Enterprises; Process of Business Opportunity Identification; Detailed Business Plan Preparation; Managing Small Enterprises; Planning for Growth; Sickness in Small Enterprises; Rehabilitation of Sick Enterprises; Entrepreneurship (Organizational Entrepreneurship).

Ethics in Business

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

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Applied Chemistry

Section - I

Physical Chemistry

Structure: Quantum theory : principles and techniques; applications to a particle in a box, harmonic oscillator, rigid rotor and hydrogen atom; valence bond and molecular orbital theories, Huckel approximation; approximate techniques: variation and perturbation; symmetry, point groups; rotational, vibrational, electronic, NMR, and ESR spectroscopy.

Equilibrium : Kinetic theory of gases; First law of thermodynamics, heat, energy, and work; second law of thermodynamics and entropy; third law and absolute entropy; free energy; partial molar quantities; ideal and non-ideal solutions; phase transformation: phase rule and phase diagrams –one, tow, and three component systems; activity, activity coefficient, fugacity, and fugacity coefficient; chemical equilibrium, response of chemical equilibrium to temperature and pressure; colligative properties; Debye-Huckel theory; thermodynamics of electrochemical cells; standard electrode potentials; applications – corrosion and energy conversion; molecular partition function (translational, rotational, vibrational, and electronic).

Kinetics : Rates of chemical reactions, temperature dependence of chemical reactions; elementary, consecutive, and parallel reactions; steady state approximation; theories of reaction rates – collision and transition state theory, relaxation kinetics, kinetics of photochemical reactions and free radical polymerization, homogeneous catalysis, adsorption isotherms and heterogeneous catalysis.

INORGANIC AND ANALYTICAL CHEMISTRY

Main group elements : General characteristics, allotropes, structure and reactions of simple and industrially important compounds: boranes, carboranes, silicones, silicates boron nitride, borazines and phosphazenes. Hydrides, oxides and oxoacids of pnictogens (N, P), chalcogens (S, Se & Te) and halogens, xenon compounds, pseudo halogens and interhalogen compounds. Shapes of molecules and hard – soft acid base concept. Structure and Bonding (VBT) of B, Al, Si, N, P, S, Cl compounds. Allotropes of carbon: graphite, diamond, C60. Synthesis and reactivity of inorganic polymers of Si and P.

Transition Elements : General characteristics of d and f block elements; coordination chemistry: structure and isomerism, stability, theories of metal – ligand bonding (CFT and LFT), mechanisms of substitution and electron transfer reactions of coordination complexes.

Electronic spectra and magnetic properties of transition metal complexes, lanthanides and actinides. Metal carbonyls, metal – metal bonds and metal atom clusters, metallocenses; transition metal complexes with bonds to hydrogen, alkyls, alkenes, and arenes; metal carbons; use of organometallic compounds as catalysts in organic synthesis. Bioinorganic chemistry of Na, K, Mg, Ca, Fe, Co, Zn, Cu and Mo.

Solids: Crystal systems and lattices, miller planes, crystal packing, crystal defects; Braggs Law, ionic crystals, band theory, metals and semiconductors, Different structures of AX, AX2, ABX3 compounds, spinels.

Instrumental methods of analysis : Atomic absorption and emission spectroscopy including ICP-AES, UV-visible spectrophotometry, NMR, mass, Mossbauer spectroscopy (Fe and Sn), ESR spectroscopy, chromoatography including GC and HPLC and electro- analytical methods (Coulometry, cyclic voltammetry, polarography, amperometry, and ion selective electrodes).

ORGANIC CHEMISTRY

Stereochemistry: Chirality of organic molecules with or without chiral centres. Specification of configuration in compounds having one or more stereogenic centres. Enantiotopic and diastereotopic atoms, groups and faces. Stereoselective and stereospecific sysnthesis. Conformational analysis of acyclic and cyclic compounds. Geometrical isomerism. Configurational and conformational effects on reactivity and selectivity/specificity.

Reaction mechanism : Methods of determining reaction mechanisms. Nucleophilic and electrophiclic substitutions and additions to multiple bonds. Elimination reactions. Reactive intermediates- carbocations, carbanions, carbenes, nitrenes, arynes, free radicals. Molecular rearrangements involving electron deficient atoms.

Organic synthesis : Synthesis, reactions, mechanisms and selectivity involving the following alkenes, alkynes, arenes, alcohols, phenols, aldehydes, ketones, carboxylic acids and their derivatives, halides, nitro compounds and amines. Use of compounds of Mg, Li, Cu, B and Si in organic synthesis. Concepts in multistep synthesis – retro synthetic analysis, disconnections, synthons, synthetic equivalents, reactivity umpolung, selectivity, protection and deprotection of functional groups. Pericyclic reactions: Electrocyclic, cycloaddition and sigmatropic reactions. Orbital correlation FMO and PMO treatments.

Photochemistry : Basic principles, Photochemistry of alkenes, carbonyl compounds, and arenes, Photo oxidation and photo reduction, Di-fi- methane rearrangement, Barton reaction. Heterocyclic compounds: Structure, preparation, properties and reactions of furan, pyrrole, thiophene, pyridine, indole and their derivatives.

Biomolecules : Structure, properties and reactions of mono and disaccharides, physicochemical properties of amino acids, chemical synthesis of peptides, structural features of proteins, nucleic acids, steroids, terpenoids, carotenoids, and alkaloids.

Spectroscopy: Principles and applications of UV-visible, IR, NMR and Mass

spectrometry in the determination of structures of organic molecules.

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Applied Mathematics

Section - I

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

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

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

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

Algebra: Normal subgroups and homomorphism theorems, automorphisms; Group actions, Sylow's theorems and their applications; Euclidean domains, Principle ideal domains and unique factorization domains. Prime ideals and maximal ideals in commutative rings; Fields, finite fields. Functional Analysis: Banach spaces, Hahn-Banach extension theorem, open mapping and closed graph theorems, principle of uniform boundedness; Hilbert spaces, orthonormal bases, Riesz representation theorem, bounded linear operators.

Numerical Analysis : Numerical solution of algebraic and transcendental equations; bisection, secant method, Newton-Raphson method, fixed point iteration; interpolation; error of

polynomial interpolation, Lagrange, Newton interpolations; numerical differentiation; numerical integration; Trapezoidal and Simpson rules, Gauss Legendra quadrature, method of undetermined parameters; least square polynomial approximation; numerical solution of systems of linear equations; direct methods (Gauss elimination, LU decomposition); iterative methods (Jacobi and Gauss-Seidel); matrix eigenvalue problems; power method, numerical solution of ordinary differential equations; initial value problems; Taylor series methods, Euler's methods, Runge-Kutta methods.

Partial Differential Equations: Linear and quasilinear first order partial differential equations, method of characteristics; second order linear equations in tow variables and their classification; Cauchy, Dirichlet and Neumann problems; solutions of Laplace, wave and diffusion equations in two variables; Fourier series and Fourier transform and Laplace transform methods of solutions for the above equations. Mechanics: Virtual work, Lagrange's equations for holonomic systems, Hamiltonian equations.

Topology : Basic concepts of topology, product topology, connectedness, compactness, countability and separation axioms, Urysohn's Lemma.

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

Linear programming: Linear programming problem and its formulation, convex sets and their properties, graphical method, basic feasible solution, simplex method, big-M and two phase methods; infeasible and unbounded LPP's, alternate optima; Dual problem and duality theorems, dual simplex method and its application in post optimality analysis; Balanced and unbalanced transportation problems, u- v method for solving transportation problems; Hungarian method for solving assignment problems.

Calculus of Variation and Integral Equations: Variation problems with fixed boundaries; sufficient conditions for extremum, linear integral equations of Fredholm and Volterra type, their iterative solutions.

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Applied Physics

Section - I

Mathematical Physics: Dimensional analysis; Vector algebra and vector calculus; Linear algebra, matrices; linear differential equations; Finite difference methods; Elementary probability theory, binomial, Poisson and normal distributions. Fourier series, Fourier and Laplace transforms; Elements of complex analysis.

Classical Mechanics: Newton's laws; central forces, Kepler problem and planetary motion; collisions and scattering in laboratory and centre of mass frames; mechanics of system of particles; rigid body dynamics; moment of inertia tensor; non inertial frames and pseudo forces; variational principle; Lagrange's and Hamilton's formalisms; equation of motion, cyclic coordinates, Poisson bracket; periodic motion, small oscillations, normal modes; special theory of relativity – Lorentz transformations, time dilation, length contraction, relativistic kinematics, variation of mass with velocity, mass- energy equivalence, relation between energy and momentum.

Electromagnetic Theory : Electrostatics : Gauss' Law and its applications; Laplace and Poisson equations, boundary value problems; Magneto statics: Biot-Savart law, Ampere's theorem,; dielectrics and conductors; dielectric polarization; Concept of internal field; electromagnetic induction Faraday's law; Maxwell's equations; scalar and vector potentials; Electromagnetic waves and their reflection, refraction, interference, diffraction and polarization. Poynting vector, energy and momentum of electromagnetic waves; radiation from a moving charge.

Quantum Mechanics: Physical basis of quantum mechanics; Wave – particle duality; De-Broglie hypothesis; electron and neutron diffraction experiment, wave packet and group velocity, wave function and probability interpretation, quantization of atomic energy, Heisenberg's uncertainty principle; Schrodinger equation (time-dependent and time-independent); Eigen value problems such as particle-in-a-box, harmonic oscillator, etc; Tunneling through a barrier; Orbital angular momentum.

Thermodynamics and Statistical Physics : Laws of thermodynamics and their consequences; macro states and microstates; phase space; probability ensembles; partition function, free energy, calculation of thermodynamic quantities; classical and quantum statistics;

degenerate Fermi gas; black body radiation and Planck's distribution law; Bose-Einstein condensation; first and second order phase transitions. Atomic and Molecular Physics : Quantum states of an electron in an atom; Electron spin; Spectra of one-and many-electron atoms; Relativistic corrections for energy levels of hydrogen; Hyperfine structure and isotopic shift; width of spectral lines; LS & JJ coupling; Zeeman, Paschen Back & Stark effect; X-ray spectroscopy; Electron spin resonance, Nuclear magnetic resonance, chemical shift; Rotational, vibration, electronic, and Raman spectra of diatomic molecules; Spontaneous and stimulated emission, Einstein A & B coefficients; Lasers, optical pumping, population inversion, rate equation; Modes of resonators and coherence length. Temporal and spatial coherence.

Solid State Physics: Atomic structure and bonding in materials. Crystal structure of Materials, unit cells and space lattices, determination of structures of simple crystals by x-ray diffraction, miller indices of planes and directions, Concept of amorphous, single and polycrystalline structures and their effect on properties of materials. Crystal growth techniques. Imperfections in crystalline solids and their role in influencing various properties; free electron theory; band theory of solids; metals, semiconductors and insulators; types of semiconductors & conduction mechanism, Hall effect; Diamagnetism, Para magnetism, and ferromagnetism; Electron motion in a periodic potential, Superconductivity, type-I and type-II superconductors, Joseph son junctions.

Nuclear and Particle Physics : Basic nuclear properties; size, shape, charge distribution, spin and parity; mass defect, Binding energy, semi-empirical mass formula; Liquid drop model; Nature of the nuclear force, nuclear shell model; Alpha decay, Beta-decay, gamma decay, Laws of radioactivity, Rutherford scattering, nuclear reactions, reaction mechanisms, compound nuclei and direct reactions; conservation laws; controlled and uncontrolled chain reaction critical mass, multiplication factor, fission and fusion; nuclear reactor, particle accelerators and detectors; mass spectrographs, elementary particles.

Electronics: Semiconductor device physics: including diodes, junctions, depletion region, barrier potential, Fermi level, biasing, transistors, Bipolar Junction Transistors, field effect Transistors, amplifier and oscillator circuits; operational amplifier, negative feedback circuits, rectifier circuits, regulated power supplies; logic gates & symbols, Boolean algebra, De-Morgan's Theorem, basic digital logic circuits, Optoelectronic devices, including solar cells, photo detectors, and LEDs; Digital techniques and
Applications (registers, counters, comparators and similar circuits); A/D and D/A converters.

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Pharmacy

Section – I

Pharmacognosy & Phytochemistry : Chemistry test, isolation and characterization of phytopharmaceuticals belonging to the group of Alkaloids, Glycosides, Terpenoids, Steroids, Purines, Guggual lipids, Pharmacognosy of crude drugs that contain the above constituents. Standardization of raw materials and herbal products. Biotechnological principles and techniques for plants development. Tissue culture.

Pharmacology & Toxicology: General pharmacological principle including Toxicology. Drug interaction, Pharmacology of drugs acting on Central nervous system, Cardiovascular system, Autonomic nervous system, Gastro intestinal system and Respiratory system. Pharmacology of Autocoids, Hormones, Hormone antagonists,
Chemotherapeutic agents including anticancer drugs. Bioassays, Immuno Pharmacology. Drugs acting on the blood & blood forming organs. Drugs acting on the renal system.

Medicinal Chemistry : Introduction to drug design, Structure, Classification, Synthesis, SAR and uses of the following category of drugs – Hypnotics and Sedatives, NSAIDS, Neuroleptics, Antidepressants, Anxiolytics, Anticonvulsants. Local Anesthetics, Cardio Vascular drugs – Antianginal agents, Vasodilators, adrenergic & Cholinergic drugs, Diuretics, Antihypertensive drugs, Hypoglycemic agents, Antilipedmic agents. Chemotherapeutic agents, Antibiotics, Sulphadrugs, Antitubercular, Preparation, storage and uses of official Radiopharmaceuticals.

Pharmaceutics & Pharmaceutical Jurisprudence: Development, manufacturing standards, Q.C. limits, labeling of Tablets, Capsules and Parenterals as per the pharmacopoeal requirements. Storage of different dosage forms and new drug delivery systems (Nanoparticle, Occular drug delivery system and Transdermal drug delivery systems). Bio-pharmaceutics and Pharmacokinetics and their importance in formulation. Formulation and preparation of cosmetics –lipstick, shampoo, creams, nail preparations and dentifrices. Pharmaceutical calculations. Drugs and cosmetic Act and rules with
respect to manufacture, sales and storage, Pharmacy Act.

Pharmaceutical Chemistry (Analysis): Principles, instrumentation and applications oaf the following: Absorption spectroscopy (UV & IR). Fluorimetry, Flame photometry, Potentiometry, Conductometry and Plarography, Principles of NMR, Mass Spectroscopy, X-ray

diffraction analysis and different chromatographic methods (TLC, HPLC, HPTLC and GC).

Biochemistry: Metabolism of Carbohydrate, lipids and proteins, Biochemical role of Vitamins, Enzymes, Nucleic acids. General principles of immunology. Methods of determine kidney & liver function.

Microbiology: Principles and methods of microbiological assays of the Pharmacopoeia. Methods of preparation of official sera and vaccines, Serological and diagnostics tests. Application of microorganisms in Pharmaceutical industry.

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Syllabus for Entrance Examination for Admission in Ph.D. programme, 2015

Discipline: Humanities

Section – I & II

I. Phonetics and Phonology of English & Modern English Grammar

General Phonetics and Phonology, Production of speech, Structural Phonology, Grammar & Various kinds of Grammar; Notions of Grammaticality and Acceptability; Traditional, Structural and Generative Models, Morphology & Morphophonemics and Syntax.

II. Applied Linguistics

Scope and Definition of Applied Linguistics, Traditional Approach to Linguistics Structural Approach to Linguistics and Cognitive Approach to Linguistics

III. Literature

Literary forms : Prose, poetry and drama.

British Literature: Chaucer, Shakespeare, Milton, Alexander Pope, John Keats, Byron, P B Shelly, William Wordsworth, Robert Browning, Arnold, John Dryden, S T Coleridge, G B Shaw, D H Lawrence, E M Foster, W B Yeats, George Orwell.

American Literature: T S Eliot, W H Auden, Eugene O'Neill, Emerson, Thoreau, Hawthorne, Thomas Hardy, Ernest Hemingway, Walt Whitman, Emily Dickenson, Robert Frost, Silvia Plath, Tennyson, Mark Twain, Ezra pound, Allen Tate, Virginia Woolf, Tennessee Williams.

Indo-Anglean Literature : Henry Derozio, Toru Dutt, Sarojini Naidu, Rabindranath Tagore, Aurobindo Ghosh, Girish Karnad, Raja Rao, Mulk Raj Anand, R K Narayan, Kamala Markandaya, Nissim Ezekiel, Kamala Das, Khushwant Singh, Salman Rushdie, Vikram Seth, V S Naipaul, Arundhati Roy, Anita Desai.

Critical Theories: Aristotle, Longinus, Eliot, William Wordsworth, Coleridge, Mathew Arnold, Eliene Showalter, Psycho-Analytic Criticism and Feminist Criticism.

IV. Research Methodology:

Basic Concepts of Research, Research methods, Strategies and Study Skills

V. Professional Communication:

Basic Concepts, Report Writing Presentation Skills, Interpersonal Skills, Organizational Behaviour and Communication.

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