Chhattisgarh Swami Vivekanand Technical University, Bhilai

North Park Avenue, Sector- 8, Bhilai-490009, Chhattisgarh, India
Phone : (0788) 2261311, Fax : (0788) 2261411
Website : www.csvtu.ac.in, E-mail : registrar@csvtu.ac.in

ADMISSION IN Ph.D. PROGRAMME

Adv. No. 48/ CSVTU/PhD/2015 Date: 09-12- 2015

Applications are invited in prescribed form for admission in Ph.D. Programme in the disciplines of Applied Chemistry, Applied Mathematics, Applied Physics, Bio-Technology, Chemical Engineering, Civil Engineering, Computer Applications, Computer Science & Engineering, Electrical Engineering, Electrical & Electronics Engineering, Electronics & Instrumentation, Electronics & Telecommunication, Humanities, Information Technology, Management, Mechanical Engineering and Pharmacy. Notification no. 3069/CSVTU/Ph.D./2015 Bhilai, Dated: 09-12-2015 for admission in Ph.D. programme. Detailed syllabus, vacant seat position, list of Research Center, application form and modified ordinance no. 10 and all relevant information are available on **www.csvtu.ac.in.**

- **Last date for submission of application at the approved Research Center is "26-12-2015"**

REGISTRAR
CSVTU, BHILAI

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
छत्तीसगढ़ स्वामी विवेकानंद तकनीकी विश्वविद्यालय

क्रमांक: 3069 / छस्वावितवि / पीएच. डी. / 2015 भिलाई, दिनांक: 09-12-2015

अधिसूचना

1. पीएच. डी. प्रवेश परीक्षा 2015–16 जनवरी 2016 के अंतिम सप्ताह में आयोजित की जाएगी। परीक्षा तिथि की घोषणा बाद में की जावेगी। पीएच. डी. में प्रवेश हेतु शोध केन्द्रों में आवेदन पत्र जमा करने की अंतिम तिथि 26 दिसंबर 2015 निर्धारित की जाती है।
2. पीएच. डी. प्रवेश परीक्षा आवेदन पत्र विश्वविद्यालय के वेबसाइट से डाउन लोड कर निर्धारित शुल्क के साथ स्वयं द्वारा चयनित शोध केन्द्रों में निर्धारित तिथि तक जमा किया जा सकता है।
3. शोध केन्द्रों की सूची, रिक्तियों की जानकारी एवं पाठ्यक्रम (Syllabus), परीक्षा पद्धति एवं अन्य संबंधित जानकारी www.csvtu.ac.in पर उपलब्ध है।
4. शोध केंद्र पीएच. डी. प्रवेश परीक्षा के आवेदन पत्र दिनांक 09 जनवरी 2016 तक विश्वविद्यालय में जमा करेंगे।
5. संशोधित अध्यादेश क्र. 10 की कण्डिका क्र. 3.4 के प्रावधान के अनुसार प्रवेश परीक्षा से छूट की पात्रता रखने वाले आवेदकों का भी निर्धारित अवधि में ही प्रवेश आवेदन पत्र संबंधित शोध केन्द्र में जमा करना होगा। आवेदन पत्रों की जाँच संबंधित DRC द्वारा करने के पश्चात् पात्र व अपात्र आवेदकों की सूची विश्वविद्यालय को उपलब्ध कराया जावेगा साथ ही आवेदक को सूचित किया जाएगा।
6. शोध केन्द्रों द्वारा आवेदन पत्र स्वीकार करते समय यह सुनिश्चित किया जावेगा कि आवेदक ने समस्त जानकारियों का उल्लेख आवेदन पत्र में किया है तथा समस्त आवश्यक दस्तावेज संलग्न किया है अथवा नहीं।
7. पीएच. डी. प्रवेश परीक्षा का परीक्षा केन्द्र व समय निर्धारित तिथि से 10 दिनों पूर्व घोषित कर दिया जावेगा साथ ही प्रवेश पत्र संबंधित शोध केन्द्र के विश्वविद्यालय की ओर से उपलब्ध करा दिया जावेगा।

क्रमशः

North Park Avenue, Sector - 8, Bhilai (C.G.) - 490 009
Ph. No. : 0788 - 2261311, Fax No. : 0788 - 2261411, Website : www.csvtu.ac.in, E-mail : registrar@csvtu.ac.in

8. विभागीय शोध समिति (DRC) द्वारा शोध निर्देशकों के अधीन शोधार्थियों के प्रवेश हेतु छत्तीसगढ़ शासन के आरक्षण नियमों का पालन सुनिश्चित करें।
9. शोध निर्देशकों के अधीन रिक्तियों की संख्या परिवर्तनीय है।
10. किसी भी स्थिति में विश्वविद्यालय का निर्णय अंतिम होगा।
11. आवेदन पत्र के साथ नियोक्ता का अनापत्ति प्रमाण पत्र संलग्न किया जाना आवश्यक है।

कुलसचिव
छस्वावितवि भिलाई

पृष्ठ क्रमांक: 3069/1 /छस्वावितवि/पीएच. डी./2015 भिलाई, दिनांक: 09-12-2015

प्रतिलिपिः–

1. प्राचार्य, समस्त शोध केन्द्र संबंद्ध छगस्वावितवि, भिलाई की ओर सूचनार्थ एवं कार्यवाही हेतु।
2. विशेष कर्त्तव्यस्थ अधिकारी (अका/परीक्षा/सूचना प्रकोष्ठ) को सूचनार्थ एवं आवश्यक कार्यवाही हेतु।
3. निज सहायक माननीय कुलपति।
4. मास्टर फाइल।
5. संपादक समस्त दैनिक समाचार पत्र भिलाई को सूचनार्थ कि इस समाचार को अपने दैनिक में छात्रहित में प्रकाशित करने का कष्ट करें।

कुलसचिव
छस्वावितवि भिलाई

Entrance Test		Test Exempted	

ROLL NO.: ……..

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Application form for appearing in the Entrance Examination/Personal Interview for Ph.D. Programme, 2015

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

Discipline: …… **Specialization:** ……

1. **Name** (In Block Capital Letters Only) ……

   (As per academic record) ……

Affix Recent Colour photograph

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

D	D	M	M	Y	Y	Y	Y

3. **Nationality** ……

   If foreign National, write name of the Country ……

4. **Sex**

M		F		Other	

5. **Father's Name** ……

   Mobile No. ……

6. **Mother's Name** ……

7. **Address for Correspondence** ……

   ……

   ……

   Email-ID ……

   Mobile No. ……

8. **Permanent Address** ……

   ……

   ……

9. **Category**

UR		OBC		SC		ST		Others	

10. **In case of physically challenged, write Yes or No**

Yes		No	

In case of physically challenged indicate type of disability

Ortho		Visual		Hearing	

11. Academic Record (from class 12th on wards)

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

UGC/CSIR (JRF)/NET/GATE/SLET, other Fellowship Examination Details

	Name of Examination	Examination Discipline	Year	Result
1				
2				
3				

12. Working/Research Experience/Teaching Experience

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

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

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

14. Are you pursuing any course currently, if yes gives details

Yes		**No**	

……

15. Whether any disciplinary action has been taken against you? If so, state reasons, the punishment awarded and reference of authority awarding the punishment

……

……

16. Details of Demand Draft / E-payment (Online)

a) Amount Rs. _____ DD. No. _____ Date _____

b) Issued by (Bank Name & Branch) _____

c) E-payment no. and Date _____

Note: The application fee of **Rs. 1000/-** must be paid through demand draft in favour of ***Registrar, Chhattisgarh Swami Vivekanand Technical University, Bhilai from any nationalized bank or online fee collection mode of CSVTU website.***

Declaration by the applicant

I do solemnly affirm that I have not been punished for any act of indiscipline nor I have adopted any unfair means in any examination nor involved myself in any other offense whatsoever.

I further solemnly affirm that information furnished by me in this application form are true; and that the certificates and the Photostat copies of the documents I have submitted, are genuine and that I have not concealed any relevant information.

I further affirm that if at any stage hereafter it is found that the information and the undertaking furnished by me were not true then:-

- My registration be immediately cancelled without any notice.
- That I shall be liable to refund the scholarship/any financial aid received from the University/any other source during my Ph.D. programme.
- That I shall be debarred from future admission in any academic course and employment at this University and if already employed I shall be dismissed without any notice.

Strike out the clause not applicable and put a tick mark in the appropriate box-

I have submitted the Transfer and Migration certificates. ☐

I have not submitted the Transfer and Migration certificates, but will submit the same within 3 months, if admitted. ☐

I also solemnly affirm that as per the CSVTU Modified Ordinances I shall not concurrently pursue any other full time academic course either at this or any other University. If found doing so I shall be liable to the aforesaid actions and punishment.

Place:..... **Signature**

Date:..... **Name:**

Scrutinization by Departmental Research Committee (DRC)

- The applicant is duly **recommended/not recommended** by DRC.
- The candidate is required/not required to appear in entrance test.
- Any other remarks.

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

Forwarded by Head of Institution

Signature

Seal

Principal/Chairman DRC
Seal

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI
Ph.D. Entrance Examination/Personal Interview Year 2015

ROLL NO.: .....

ADMISSION SLIP

Examination Centre: .....

Name of the Candidate: .....

Discipline: .....

Address:

.....

.....

Affix Recent Colour photograph

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

Specimen signature of the applicant

Date:

Signature of Issuing Officer
Seal

Note: Valid ID proof is must during examination

.....

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI
Ph.D. Entrance Examination/Personal Interview Year 2015

ROLL NO.:.....

ATTENDANCE SLIP

Examination Centre: .....

Name of the Candidate: .....

Discipline: .....

Address: .....

.....

.....

Affix Recent Colour photograph

is permitted to appear in the Entrance Examination/Personal Interview for Ph.D. 2015.

Specimen signature of the applicant

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

Date of Exam	Signature of the Examinee	Signature & Name of the Invigilator

Signature of Centre Supdt.
Seal

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

INSTRUCTIONS FOR FILLING THE FORM

- Either TYPE or PRINT the entries on the form neatly.
- All items require you to submit an self attested copy of a document.
- Documents to be enclosed are given in the checklist.
- The application fee of **Rs. 1000/-** must be paid through demand draft in favour of ***Registrar, Chhattisgarh Swami Vivekanand Technical University, Bhilai payable at Bhilai from any nationalized bank or online fee collection mode of CSVTU website.***
- The candidate should write his/her name at the back of Demand Draft.
- All photographs affixed must be the same.

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

1. Proof of Date of Birth (DOB).
2. Copy of SC/ST/OBC Certificate, if applicable.
3. Copy of UGC/CSIR (JRF)/NET/GATE/SLET score card.
4. Copies of mark/grade sheets of U.G. and P.G. programme completed.
5. List of Technical papers published, duly signed by the applicant.
6. No Objection/relieving Certificate from employer (for employed candidates).
7. The Demand draft for the application as applicable.
8. Two self addressed stamped (Rs. 40/- each) envelopes of 23 cm x10 cm in size.
9. Two self attested passport size photographs.
10. Experience certificate of regular/contract appointment where applicable as per the modified Ordinance no. 10 of CSVTU, Bhilai.

LIST OF DISCIPLINE IN WHICH CURRENTLY Ph.D. PROGRAMMES ARE BEING CARRIED OUT:

- Applied Chemistry
- Applied Mathematics
- Applied Physics
- Pharmaceutical Sciences
- Management & Humanities
- Civil Engineering
- Mechanical Engineering
- Electrical Engineering
- Electrical and Electronics Engineering
- Electronics & Telecommunication Engineering
- Electronics and Instrumentation Engineering
- Computer Sciences & Information Technology
- Biotechnology
- Chemical Engineering

THE COMPLETED APPLICATION FORM MUST REACH ON OR BEFORE "26-12-2015"

The application should be submitted to the Principal/Director of the designated Centre of Research

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Structure of Ph.D. Entrance Examination 2015

1. **Written Test**

   There would be one written paper in two sections of 100 marks for 3 hrs.

   Section – I 40 objective type questions from respective discipline. (40 Marks)

   Section – II 60 objective type questions from specialized area of respective discipline. (60 Marks)

   Note - (For Humanities will be one section of 100 marks)

2. **Personal Interview**

3. **Exemption from written test**

   As per modified Ordinance no. 10 clause 3.4 of CSVTU, Bhilai may be exempted/relaxed from written test for following category.

   (I) Candidate with valid score card of UGC/CSIR (JRF), NET, SLET or GATE.

   (II) Candidates possessing M.Phil degree through a regular programme from an University, or a deemed University or any other University in corporate by any law for the time being in force and recognized by the University.

   (III) Teacher fellowship holder and University/College teachers holding a regular position (regular appointment) and has completed two years of service as teacher in a department of the University/affiliated college/Institution.

   (IV) Scientist of any recognized National/International Institutions having two years of research experience.

   (V) Teachers holding contract appointments who have served as teacher for a total minimum period of four years in a department of the University/Affiliated college/Institution.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Ph.D. Programme fee

S.No	Particulars	Amount		Remarks
1	Ph.D. Entrance exam. fee	Rs.	1000.00	
2	Ph.D. Enrollment fee	Rs.	1000.00	up to specified date
3	Late fee for enrollment	Rs.	50.00	
4	Immigration fee	Rs.	500.00	
5	Coursce work exam fee	Rs.	525.00	
6	Ph.D. Registration fee	Rs.	10000.00	
7	Ph.D. Six monthly progress report fee	Rs.	2000.00	for each report
8	Ph.D. thesis submission fee	Rs.	20000.00	

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).

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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.

***

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 in Ph.D. Programme 2015

Discipline: Biotechnology

Section - II

Specialization

A: Microbiology

Diversity of Prokaryotic and Eukaryotic Microbes
Archaea, Bacteria, Fungal Systematics and diversity, Fungal endophytes of tropical plants and their applications, Mycorrhizal fungi, Agriculturally important toxigenic fungi, Secondary metabolites from fungi, Genomics and Biodiversity of yeast, Antagonistic interactions in yeasts, Biotechnological applications of yeasts, Algal diversity from morphology to molecules.

Microbial Physiology and Metabolism
Growth and cell division, Solute Transport, Central Metabolic Pathways and Regulation, Nitrogen metabolism, Metabolism of lipids and hydrocarbons, Metabolism of nucleotides, Physiological Adaptations and Intercellular signalling.

Virology

I - Animal Viruses: Classification , Morphology and Chemistry of Viruses, Working with viruses, Virus replication Strategies, Replication patterns of specific viruses, Subviral pathogens, Pathogenesis of viral infection, Anti-viral strategies –prevention and control of viral diseases.

II – Plant and microbial viruses: History and development of plant virology, cryptograms and classification of plant viruses and viroids, Propagation, Purification, characterization and identification and genomics of plant viruses, Symptoms of plant virus diseases, transmission of plant viruses, viral and viroid diseases and their control, Microbial viruses.

Immunology
Three fundamental concepts in immunology, Immune cell receptors, Genetic organization, Immune response and signaling, Tolerance and autoimmunity, Immunological disorders and hypersensitivity, Transplantation and tumour immunology.

Molecular Biology

The nature of Genetic material, DNA replication, Recombination and Repair of DNA, Transcription, Post-transcriptional processes , Translation, Post-translational Processes, Molecular basis of cell physiology.

Recombinant DNA Technology

Basics of DNA cloning, Methods of DNA protein analysis, Polymerase Chain Reaction, Construction of DNA and genomic DNA libraries, Genome sequencing, Transcriptional analysis of gene expression and transcriptomics, Overexpression of recombinant proteins, Analysis of protein-DNA and protein –protein interactions, protein engineering and proteome analysis, Pharmaceutical products of DNA technology, Transgenics and animal cloning.

Microbial Genetics

Genetic analysis of bacteria, Gene transfer and mapping by conjugation, Lytic bacteriophages, Gene transfer by transformation and transduction, Lysogenic phages, Transposons, Gene regulation.

Industrial and Food Microbiology

Introduction to industrial microbiology, Downstream processing of microbial products, fermentation economics, Production aspects, Microbiology of foods, Microbial spoilage of foods, Food preservation, Fermentation processes, Food-borne diseases.

Environmental Microbiology

Brief history and development of environmental microbiology, Culture dependent and culture-independent approaches for understanding microbial diversity in the environment, Microbial diversity in normal and extreme environments, Global warming, Lignin degradation, Liquid waste management, Solid waste management, Bioremediation of environmental pollutants, Microbes and mineral recovery.

Plant – Pathogen Interaction

Concepts and physiology of plant diseases, Biochemical basis of plant diseases, Some important plant diseases and their etiological studies, Genetical basis of plant diseases, Disease control, Molecular approach, Disease forecasting.

Microbial Pathogenicity

Classical view of microbial pathogenicity, Molecular microbial pathogenicity, Emeging and re-emerging pathogens, Molecular microbial epidemiology, Environmental change and infectious diseases, Antimicrobial resistance, Newer vaccines, Rapid diagnostic principles.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

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

Discipline: Biotechnology

Section - II

Specialization

B: Bioinformatics

Introduction and Bioinformatics Resources: Definition, role, scope different areas and limitations of Bioinformatics. Biological data & databases: Classification of biological database. Architecture and file formats of Nucleic acid sequence databases (GenBank, EMBL, and DDBJ), Protein sequence databases (SWISS-PROT, TrEMBL, PIR, and PDB), Small molecule database (PubChem, DrugBank, KEGG, ChemSpider), Gene and protein interaction databases (BioGrid, STRING, IntAct, HPRD).

Biological sequence analysis and Alignment: Prediction of physicochemical properties of genes and proteins based on sequence composition and sequence comparison, Algorithms for pairwise and multiple sequence alignment, concept of gaps, gap-penalties scoring matrices, Probabilistic methods including hidden markov models, pattern matching, entropy measures, evolutionary models, and phylogeny, Methods and advanced filtering options available with various sequence alignment programs such as ClustalW, BioEDIT and BLAST etc.

Structural Bioinformatics: Basic properties associated with nucleic acid and proteins structures, RNA folding, RNA loops, Experimental methods available for structural determination of nucleic acids and proteins, Computational methods for structure validation, protein fold prediction (from homology modeling to ab initio prediction), Algorithms and methods available for predicting and analyzing DNA-protein, protein-protein and protein-ligand interactions, Molecular dynamics simulation and Monte Carlo simulation, File format and structural analysis tools available at Protein Data bank (PDB), Nucleic Acid Data Bank (NDB), Molecular modeling Data Bank (MMDB), Structure classification Databases (SCOP, CATH, PDBSum) etc., Tools for predicting biological functions from structures, Molecular docking – concept and methods. Drug Discovery and drug Designing.

Statistical techniques commonly used in biological analysis: Neural Networks, Support Vector Machines, Supervised and unsupervised Learning, Kernel Methods, Normalization of

Gene Expression Data, Classification of Gene Expression Data, Statistical Analysis with the Gene Ontology, Classification of Protein Structures, Statistical methods associated with the analysis of microarray and next generation sequencing (NGS) data. Uni- and multivariate analysis (e.g. ANOVA, correlation, regression, clustering, and ordination), Basic idea of the open source statistical programming environment R.

Genome and Gene Expression: Genome organization: coding versus non-coding sequences, Composition and biochemistry of basic transcription machinery, Transcription initiation, elongation and termination, Regulatory sequences: promoters, enhancers, suppressors, Application of comparative genomics to identify cis-acting elements, Epigenetics: Chromatin structure and histone modifications; DNA methylation, Nuclear structure and long range DNA interactions, Transcription regulation and development, Regulatory networks: the regulation of regulators, Non-coding RNAs and control of gene expression, Intergenic and antisense transcription; RNA processing, including alternative splicing and its regulation, Nucleo-cytoplasmic RNA transport, RNA stability and degradation pathways, RNA interference (siRNAs), Translation regulation (microRNAs), Analysis of gene expression, Human transcriptome, Single-gene analyses and techniques, Deep sequencing and micro-arrays.

Molecular Phylogenetic: Principles of Molecular Evolution and Molecular Phylogenetics, Nomenclature, representation, and general concepts of tree structure. Phylogenetic Tree Construction Methods and Programs: Distance-Based Methods, Character-Based Methods, Phylogenetic Tree Evaluation, and Phylogenetic Programs. Phylogenetic analysis tools- Phylip, ClustalW etc.

Modeling of Biological systems: Basic idea of modeling of biological systems, properties of cell components (such as enzyme kinetics), mass and energy balances, stoichiometry and constraint-based modelling, kinetic modelling, Metabolic Control Analysis, General concepts associated with graph theory, topological properties, centrality measurements, robustness and sensitivity analysis of biological networks, Methods and tools for constructing gene regulatory network and protein interaction network, Prediction of network motifs, modules and subnetworks.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Civil Engg.

Section - II

Specialization

A: Structural Engineering

Advanced Reinforced Concrete Structures

Concrete Technology: Concrete as structural material, strength of concrete and its significance, Strength porosity relationship, Factors effecting compressive strength, Behavior of concrete under stress states, Durability of concrete and its significance, Sulphate attack, Alkali aggregate reaction, Corrosion of embedded steel in concrete and concrete deterioration due to corrosion of steel and its preventive measures.

Design of Slender Columns: Concentrically loaded slender columns, eccentrically loaded slender columns, Slender columns subjected to axial and transverse loads, Structural behaviour of columns in braced and unbraced frames, Codal procedure for design of slender columns.

Flat Slabs: Elements of flat slabs, Codal procedure for design of flat slabs, Behaviour of flat slab in shear, One way and two way shear, Opening in flat slabs, Effect of pattern loading in flat slabs.

Design of Beam Column Joints: Types of joints, Joints in maltistoreyed buildings, Forces acting on joints, Design of joints.

Dynamic of Structures

Single Degree of Freedom Systems: Fundamental, Mass spring damper system, Analysis of free vibrations, Response to harmonic loading, periodic loading, Impulsive loading and general dynamic loading. Generalised SDOF, Vibration analysis by Rayleigh method.

Multi Degree of Freedom Systems: Two degree of freedom system – undamped, free & forced. Multidegree of freedom system- undamped, Holter method, Stodola method, Orthogonality condition, Damped system. Dynamic analysis and Response- Modal Analysis, Response spectrum analysis, Rayleigh's-Rit z method.

Structures with Distributed Mass and Load: Axial, shear and transverse vibration due to bending of beams, Uniform shear beam, Beam in bending, Numerical techniques for shear beam, Bending of beams, Forced vibration, Plates or slabs subjected to normal loads.

Earthquake Motion and Response: Introduction, Strong motion earthquake, Numerical method for spectra, Elastic spectra, Ground velocity and displacement, Inelastic spectra, Equivalent linear system, Comparison of an elastic and inelastic system.

A seismic Design of Structures: Design data and philosophy of design, Seismic co-efficient, permissible increase in stress and load factor for multistoreyed buildings, Base shear, Fundamental time period of buildings, Distribution of forces along the height, Dynamic analysis using IS: 13912, Earthquake resistant construction of buildings, Ductility provision in reinforced concrete construction of structures, Design of water towers, Stack like structures.

Advanced Steel Structures

Concept of Plastic Design: Introduction, Theory of plastic bending, Assumptions, Bending of rectangular section, Plastic hinge, Redistribution of moments, Computation of plastic moment, Shape factor, Overload factor, Method of plastic analysis : Statical Method, Mechanism method, Upper bound, Lower bound and uniqueness theorem, Partial, Complete and over complete failure of indeterminate structures.

Plastic Analysis of Frames: Plastic analysis of portal frames subjected to transverse and lateral loads, Analysis of gable frames, Analysis of multibay multistoreyed frames, Moment balancing method.

Deflections: Assumption, Calculation of deflection at ultimate loads, Deflection at working loads, Rotation capacity.

Secondary Design Consideration: General, Influence of axial force on the plastic moment, Influence of shear force, Local buckling of flanges and webs, Lateral buckling.

Advanced Structural Analysis

Stiffness Method: Basis of stiffness method, Influence coefficients, Kinematic indeterminacy, Degree of freedom, Action displacement relationship, Direct stiffness approach, Transformation of axes system, Representing the imposed loads as nodal loads, Elastic supports, Support displacements, Application to various type of structures e.g. Continuous beams, Trusses, Frames and grids, Temperature effects.

Flexibility Method: Particular solution, Complimentary solution, Compatibility equations, Flexibility coefficients, Application of complimentary energy principles, Basis of the method, Numerical integration for flexibility coefficients, Application to various type of structures, Elastics supports, Supports displacement, Temperature shrinkage, Imperfect fit, Analysis of pin jointed trusses, Rigid frames.

Finite Element Method: Introduction, Basic steps in finite element method, Coordinate systems, Rotation of axes, Shape functions, Elements stiffness matrix and load vector, Triangular element in plane stress and strain, Numerical integration, Isoperametric elements,

Rectangular elements in plate flexure, Triangular element in plate flexure, Rectangular element in plane stress and bending combined, Computer programs for these elements.

B: Highway Engineering

Geometric Design

Geometric design standards of Highways: Controls and Criteria for geometric design, basic requirements, Design vehicle, Design of capacity, level of service, design of camber, design methods used in field, design of cross-section elements, design and analysis of different sight distances IRC specifications for design.

Design of Horizontal Alignment: Design and analysis of super elevation, methods for eliminating camber and buildings super elevation in the field, design of extra widening, methods for providing extra widening in the field, design of transition, design of combined curve, IRC specifications for design.

Design of Vertical Alignment: Design of gradients, basic criteria and methods for designing summit and & valley vertical curves, IRC specification for design.

Geometric Design of Inter-sections: Design elements of intersections, elaborate design of rotary intersection, grade separated intersections, median separators.

Pavement Analysis & Design

Importance and functions of various components of pavement structures, concept of wheel loads and tandem axles, ESWL, vehicle damage factors.

Design of Flexible pavements: CBR method of flexible pavement design. Old concepts to be recent concept by IRC-37-2001, Design by group index method, Design of low cost roads.

Design of rigid pavement: Factors affecting, Analysis of stresses, equivalent wheel load, Westergaard's analysis, IRC design guidelines, design of joints, tie bars, dowel bars, CRCP, FRC and pre-stressed concrete pavements.

Highway Materials Design & Construction

Bituminous materials and mixes: Terminology, classification, distillation, grades, asphalts and tars, testing methods and specifications, bitumen aggregate interactive mechanism, design of bituminous mixes.

Intermediate and high type bituminous pavements: Concept of macadam roads, Bituminous surface treatments, Road mix and bituminous plant mixes, bituminous bound macadam, asphalt and concrete, Bituminous concrete laying procedures, use of admixtures, construction methods and machinery.

Rigid pavements: Base course function, design of pavement grade mixes, Construction equipment, methods, quality control and procedures, pumping, joint filers and sealants, mix selection, compaction methods and construction procedures for reinforced and pre-stressed

pavements.

Advanced Traffic Engineering

Introduction: Traffic characteristics, PIEV theory, Traffic flow Characteristics, capacity and level of service concept

Traffic studies: Traffic Volume, spot speed, speed & delay, axle load surveys, Origin & Destination study, sampling techniques, presentation of traffic data, analysis and applications

Traffic facilities design: Design of parking facilities, Design of lighting and terminal facilities.

Traffic Operations and Control: Traffic regulation, Traffic control devices i.e. signs and markings, design of traffic signals.

Traffic Safety: Effect of road conditions on traffic safety, Accident study, presentation and analysis of traffic data, improvement measures

Intelligent Transport System: Highway communication, automatic vehicle detection, electronic toll collection system, advanced driver information system, simulation of traffic systems.

C: Environmental Engineering

Environmental Chemistry

Basic concepts of chemistry involved in water & wastewater analysis: Basic concepts of General chemistry, Physical chemistry, Equilibrium chemistry, Organic chemistry, Bio chemistry, Colloidal chemistry, Nuclear chemistry. Basic concepts of quantitative chemistry: Sampling Gravimetric analysis, Volumetric analysis, Colourimetry, Spectrophotometry. Industrial Methods of Analysis, Optical Methods; Electric Methods Chromatographic methods.

Chemistry of Turbidity, colour, pH, Acidity, Alkalinity Hardness, Residual chlorine, Chlorides, Dissolved oxygen, BOD, COD, Nitrogen, Oil and Grease.

Advanced Wastewater Treatment

Quality characteristics of wastewaters. Physical, chemical & Biological water quality parameters. Water quality requirement; Stream Standards, Potable water standards and waster water Influent standards, Physico- chemical processes involved in Waste water treatment;

Sedimentation, Coagulation & Flocculation, various types of setting, settling tank; principle and design, Grit chamber; principle, types and design aspects. Filtration: Theory, methods of filtration and their modified forms.

Disinfections: Objective and different methods. Organic impurities of waste water,

composition of waster water, biological treatment, aerobic and anaerobic processes. Microorganisms in biological treatment and their metabolic kinetics. Kinetics of plug flow and complete mix reactors.

ASP and its modifications, aeration, objective and methods, design of aeration devices.

Bio-filters: various types, Trickling filters and their design. Sludge handling and disposal; Sludge types and composition. Various methods of sludge treatment. Sludge digestion tanks. Disposal of sludge. Tertiary treatment of wastewater: objective and methods.

Air Pollution & Control

Introduction, Atmospheric composition, Origin of air pollution, Global implications of air pollution, Classification of air pollutants, Particulars, Hydrocarbons and Gaseous air pollutants. Sources of air pollutants and their health effects. Meteorological aspects of air pollution, Influence of Meteorological aspects on Air Quality: Lapse rate and Dispersions, Wind and Dispersions, Moisture and dispersion, modeling.

Air Pollution sampling: Ambient and stack sampling, Ambient Air Quality Monitoring, Engineered systems of air pollution Control: Atmospheric cleansing process, approaches to contaminant control. Control devices for particulate contaminant and gaseous contaminants.

Environmental Pollution & Management

Water Pollution: Components of water, hydrological cycle and water budget equation, Effects of Environmental Pollution on components of hydrological cycle.

Classification of water pollutants and their sources, Types of water pollution, Sources of water pollution and effect of polluted waters on environment and health. Consequences of polluted water disposal on land, rivers and lakes.

Self purification of river and impoundments. Do sag curve and self purification models. Eutrophication of lakes; Ground water pollution, Causes and consequences, Artificial recharging of ground waters.

Noise Pollution: Noise & Noise pollution definitions Physical parameters of Noise pollution, Sources and health effects of Noise pollution. Strategies for noise pollution control; Control at sources and control at path. Case studies of Noise Pollution and its control.

D: Geotechnical Engineering

Origin and Classification of soils, and Phase Relationships, Clay minerology, Diffuse double layer, Compaction Effective Stress Principle, Permeability, Seepage pressure, Quick sand condition, Pheratic lines, Flow nets, Compressibility, Terzaghi's Consolidation Theory, Shear Strength, Shear Strength Parameters – total stress and effective stress, Mohrs Circle, Failure

Envelope, Stress path

Site Exploration: Methods of soil exploration with relative merits and demerits, Depth and spacing of bore holes, Standard penetration tests, Plate load tests, Static cone penetration tests etc.

Bearing Capacity: Bearing capacity theories, corrections for size, shape, depth, eccentricity of loading, water table etc., Presumptive bearing capacities, Codal provisions

Lateral earth Pressure: Rankine's and Coloumb's theories, Earth pressure computation in different soils and surcharge load, Rebhnann's and Culmann's construction. Design considerations of earth retaining structures.

Foundations: Shallow Foundations, Pile Foundations (including under-reamed piles), Cassion and Well foundations; Design considerations, Codal provisions, Layered soils. Choice of shear strength parameters, Total and differential settlement. Stress distribution, Consolidation settlement in clays (with correction factors), Immediate settlement, Settlement in sands

Slope Stability: Finite and infinite slopes, Critical failure surface, factor of safety, Causes of failure in earthen dams and remedial measures.

Ground Improvement: Mechanical soil stabilization, Mixing additives, Compaction piles, compaction by dynamic loads, Pre-loading using sand drain, Reinforced soil

Soil Dynamics: Engineering problems involving soil dynamics; Dynamic loading, Role of inertia; Theory of Vibrations, Types of machine foundations, Design criteria for machine foundations, Codal provisions.

E: Water Resources / Irrigation Engineering

Advanced Hydrology: Introduction Precipitation, Water Losses, Runoff, Estimation of average monthly and annual runoff, rainfall - runoff relationships. Analysis of data , Supplementing missing data, consistency of record, hyetograph, mass curve analysis, depth areas duration analysis. Rainfall frequency analysis, estimation of evaporation and evapotranspiration, Synthetic unit hydrograph, S- curve, Unit hydrograph of varied durations, Instantaneous unit hydrograph, conceptual models, Design Flood, Flood Forecasting Hydrologic Models.

Fluid Mechanics: Equations of motion in general orthogoral coordinate system, Kinematics of Flow, Hydrodynamics, Boundary Layer Theory, Laminar boundary layer, turbulent boundary layer; stability analysis of the boundary layer, Laminar Flow, Turbulent Flow, Dimensional analysis, similitude and model testing.

Open Channel Flow: Fluid Flow Concepts, Classification of channels basic equation; Uniform flow in rigid boundary channels, Shear stress and its distribution, conveyance of a channel, relation with depth; Gradually varied flow-types and governing equation, non-Prismatic channels; Hydraulic Jumps, Forced hydraulic Jump, Jump in rectangular and nonrectangular channels; Channel Controls, Transitions, Unsteady flow, Waves, Celerity of a wave, Surge, Method of characteristics, Flood Routing,

Water Resources & Planning: Project Planning, Resources Planning, System Engg. Earth and Concrete dam, Types of dams:- Rigid dams, Gravity dams, Arch and buttress dams, Basic principles of design and details of construction, Project Economic. Operation of reservoirs. Water management Policy during droughts

Irrigation & Drainage design: Soil & Soil Fertility, Water Requirement of crops, Irrigation methods, Management of Irrigation systems, Irrigation works, Water Logging, Drainage, Design of Drainage system. Salinity of soil. Salinity control. Quality of irrigation water

Ground Water Engineering: Ground water in Hydrologic cycle, Ground Water-Inventory, Flow into Well, Construction of Wells, Shallow Well, Replenishment of Ground Water, Investigation of Ground Water, Ground Water Management, Techniques of artificial recharge, Sea water intrusion into coastal aquifers, multiple well systems ground water development and management.

Water Power Engineering: Development of water power, Estimation of Hydropower potential, Comparison of Hydro, thermal and nuclear power, Flow duration curve, firm power, secondary power, Load and Load duration curves, Load factor, Classification of hydropower plants, Penstocks:- Alignment, types of penstocks, economic diameter of penstocks.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Computer Science and Engineering

Section-II

Specialization to CSE

A) Artificial Intelligence and Soft-computing: Natural Language Processing, AI v/s ANN, Neural Networks, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow& Hebb's learning rule, Delta rule, Associative Memory, Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, crisp logic, fuzzy logic, introduction & features of membership functions, fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic, GAencoding, fitness function, reproduction, Particle Swarm Optimization, Ant Colony Optimization.

B) Data Mining and Big Data: Basic Data Mining Tasks, Data Mining Issues, Data Mining Metrics, Data Mining from a Database Perspective, Clustering, Classification and prediction models, Pattern mining and association rules, Apriori principle, Mining high-frequency patterns and high-confidence rules, Interestingness measures for patterns and rules, Big data and social sensing, Big data acquisition, Web scraping, crawling, crowdsourcing, crowd-sensing, Big data technologies and platforms, basic concept of cloud computing, virtualization.

C) Digital Image Processing and Computer Vision: Image Processing and Computer Vision Background, Image Processing and Computer Vision Applications, Human Perception of Pictures, Digital Image Processing Hardware, Image Model, Amplitude digitization, Intensity Quantization, Spatial co-ordinate digitization, Image Sampling, Image Quality, Image Pixel Relationships, Linear Operators, 2-D Transforms, Spatial Domain Methods, Frequency Domain Methods, Inverse Filtering, Image Compression, Redundancy Types, Lossless and Lossy Compression, Image Compression Standards, Object Detection Methods, Edge Liking and Boundary Detection, Thresholding Methods, Region Oriented Methods. Object Representation and Description, Representation schemes, Description, Pattern Recognition, Decision Theoretic Methods for Recognition.

D) Advanced Computer Network and Security: Routing algorithms, Congestion control algorithms, Internetworking, Services and elements of Transport protocols, MANET, Introduction to Network Security, Symmetric Encryption and Message Confidentiality, Public key Cryptography and Message Authentication, Authentication Application, Electronic Mail Security, IP Security, Web Security, Network Management Security, Intruders, Malicious Software Firewalls.

E) Simulation and Modeling: Mathematical Model, types of Mathematical models and properties, Procedure of modeling, Graphical method: Barterning model, Basic optimization, Monte-Carlo simulation, Approaches to differential equation: Heun method, Local stability theory: Bernoulli Trials, Classical and continuous models, Case studies in problems of engineering and biological sciences. General techniques for simulating continuous random variables, simulation from Normal and Gamma distributions, simulation from discrete probability distributions, simulating a non – homogeneous Poisson Process and queuing system.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Information Technology

Section - II

Specialization to IT

A) Information Security and Coding: Security Models and Policies, Program Security, Malicious Software, Operating system security, Privacy and Privacy Enhancement Tools, Steganography, Social Engineering, Security threats on Social networks, digital signature schemes, Interactive Proofs, two-party secure computation, multiparty secure computation, and chosen-ciphertext security, Quantum Cryptography, entropy, relative entropy, mutual information, chain rules, data processing inequality, the asymptotic equipartition property, entropy rates for stochastic processes, arithmetic coding, discrete channels, random coding bound and converse, Gaussian channels, linear block codes and their properties, hard-decision decoding, cyclic codes, Homomorphic encryption

B) Mobile and Pervasive Computing: Cellular Wireless Networks, GSM, Architecture, Protocols, Connection Establishment Frequency Allocation, Routing, Mobility Management, Security, GPRS, Wireless LANs and PANs IEEE 802.11 Standard Architecture Services Network HyperLAN Blue Tooth WiFi WiMAX, Pervasive computing infrastructureapplications Device Technology Hardware, Humanmachine Interfaces, Biometrics, and Operating systems Device Connectivity Protocols, Security, and Device Management Pervasive Web Application architectureAccess from PCs and PDAs Access via WAP.

C) Data Science for Internet of Things: Hardware, SoC, sensors, device drivers, IoT standards, Cloud computing for IoT, Bluetooth, Bluetooth Low Energy, beacons, Introduction to Data Science, Goals of statistical graphics and data visualization, Graphs of Data, Graphs of Fitted

Models, Graphs to Check Fitted Models, Principles of graphics, Bayesian inference: combining models and data in a forecasting problem, Bayesian hierarchical modeling for studying public opinion, Bayesian modeling for Big Data, IoT datasets and APIs by application: Healthcare, Manufacturing, wearables, Energy.

D) Pattern Recognition, Image Processing and Data Mining: Pattern Recognition: Basic Concept of Pattern Recognition, Fundamental Problems in PatternRecognition Systems, Design Concepts and Methodologies, Linear Decision Functions, PatternClassification by Distance Functions, Pattern Classification by Likelihood Functions, Trainable PatternClassifiers - The Deterministic Approach.Image Processing: Digital Image Fundamentals, Image enhancement in the Spatial and Frequency, Domain, Image Segmentation, Morphological Image Processing.Data Mining and Soft Computing: Introduction to Data Mining and soft computing, what is softcomputing? Role of Fuzzy sets, neural networks, Rough Sets, Genetic Algorithm, Wavelets and theirHybridization in Data Mining, Classification and clustering in Data Mining, Multimedia Data Mining.

E) Semantic Web and Linked data: Introduction: History of Web, World Wide Web, Internet, Working Mechanism of Web, Importanceof Document on the Web, URL, IRI, Namespace, Domain.Semantic Web: What is Semantic? What is Semantic Web? Semantic Web Road Map, Comparisonbetween Semantic Web and Traditional Web, Semantic Web Layer Cake and Their Significance,Vision of Semantic Web, Short Introduction to Ontology.Preliminary Knowledge on XML, RDF, RDFa, Microdata.RDF (Resource Description Framework) & RDF Schema: Introduction to RDF, Different Features andComponents of RDF, Detail Study of RDF Class, Property, Instances, Restriction, Domain and Range ofProperties and their Use with Examples, Different Notations of RDF: RDF/XML, N3, NTRIPLES, Turtle.Ontology: What is Ontology? Different Types of Ontology (Upper Ontology, Domain Ontology etc.),Reusability of Ontology, Heterogeneity Problem among Ontologies, Discussion about the Problemand its Solution, Different Building Blocks of an Ontology (Domain Ontology).Linked Data Web and Semantic Web: Introduction to Linked Data, Relation between Linked Data andSemantic Web, Linked Data Principles and Design Consideration, Publishing Linked Data, ConsumingLinked Data, Discussion on Traditional Web of Documents and Web of Data.Introduction to Current Research and Development Work going on Semantic Web: Introduction toDifferent Stages to Develop a Complete Semantic Web Application and Linked Data, Introduction toDifferent

Available Tools.

F) Remote Sensing and GIS: Introduction – Perspectives and concept of remote sensing, special applications. GeophysicalRemote Sensing – external fields, magnetic, geophysical remote sensing: Gravity, crust dynamicsseismology. Electromagnetic spectrum; The photon, Distribution of Radiant energies, Sensortechnology, Spectral signatures- Interpretation and classification. Signatures and Sensors, ImageProcessing & Interpretation, Fundamentals of image processing, image representation, Spatialdomain and transformation domain image processing, Enhancement techniques using softcomputing tools in spatial as well as spectral domain, optimization based image processing. Featuresand classification techniques, GIS Applications, latest trends of GIS applications.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Master of Computer Application

Section - II

Specialization to Computer Application

A) Artificial Intelligence & Soft Computing: Heuristic search techniques - Generate and test, Hill climbing, Best first search, Problem reduction, Constraint satisfaction, Means-Ends Analysis. Game Playing - Minimax search procedure, adding alpha-beta cutoffs, additional refinements, Iterative deepening. Knowledge Structures - Semantic Networks, Frames, Conceptual Dependency diagrams, Scripts. Genetic Algorithms - Significance of Genetic operators, termination parameters, Evolving Neural nets, Ant Algorithms. Fuzzy Set Theory - Classical & Fuzzy set theory, Interval Arithmetic's, Operations on Fuzzy sets. Natural Language Processing - Steps in NLP, Syntactic processing, Semantic analysis, Discourse and Pragmatic processing, Statistical NLP, Spell checking.

B) Discrete Structures: Sets, Relations, Functions, Pigeonhole Principle, Inclusion-Exclusion Principle, Equivalence and partial Orderings, Elementary Counting Techniques, Probability. Models of computation – Finite Automata, Pushdown Automata, Non-determinism and NFA, DPDA and PDAs and Languages accepted by these structures. Grammars, Languages, Non-Computability and Examples of Non-computable problems. Graph- Definitions, paths, connected graphs, regular and bipartite graphs, cycles and circuits, Tree and rooted tree, Spanning tree, Hamiltonian and Eulerian graph, planar graphs.

C) Data Mining and Knowledge Discovery: Types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity. Overview, K-means, Agglomerative Hierarchical clustering, DBSCAN, Classification-Alternative techniques- Nearest Neighborhood classifier, Bayesian Classifier, Support Vector Machines: Linear SVM, Separable and Non Separable case. Cluster Evaluation- Overview, Un- supervised Cluster evaluation using cohesion and separation, using the proximity matrix, Scalable clustering algorithms. Web Data mining- Web terminology and characteristics, web content mining, web usage mining, web structure mining, Search Engines: Characteristics, Functionality, Architecture, Ranking of web pages, Enterprise search.

D) Software Engineering: System Development Life Cycle (SDLC) – Steps, Water fall model, Prototypes, Spiral Model. Software Metrics, Software Project Management. Software Design – System design, detailed design, and function oriented design, object oriented design, user interface design, design level metrics. Coding and Testing – Testing level metrics, Software quality and reliability, clean room approach. Software re-engineering.

E) Semantic Web and Linked data: Introduction: History of Web, World Wide Web, Internet, Working Mechanism of Web, Importance of Document on the Web, URL, IRI, Namespace, Domain. Semantic Web: What is Semantic? What is Semantic Web? Semantic Web Road Map, Comparison between Semantic Web and Traditional Web, Semantic Web Layer Cake and Their Significance, Vision of Semantic Web, Short Introduction to Ontology. Preliminary Knowledge on XML, RDF, RDFa, Microdata. RDF (Resource Description Framework) & RDF Schema: Introduction to RDF, Different Features and Components of RDF, Detail Study of RDF Class, Property, Instances, Restriction, Domain and Range of Properties and their Use with Examples, Different Notations of RDF: RDF/XML, N3, NTRIPLES, Turtle. Ontology: What is Ontology? Different Types of Ontology (Upper Ontology, Domain Ontology etc.), Reusability of Ontology, Heterogeneity Problem among Ontologies, Discussion about the Problem and its Solution, Different Building Blocks of an Ontology (Domain Ontology). Linked Data Web and Semantic Web: Introduction to Linked Data, Relation between Linked Data and Semantic Web, Linked Data Principles and Design Consideration, Publishing Linked Data, Consuming Linked Data, Discussion on Traditional Web of Documents and Web of Data. Introduction to Current Research and Development Work going on Semantic Web: Introduction to Different Stages to Develop a Complete Semantic Web Application and Linked Data, Introduction to Different Available Tools.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Electrical Engineering, Electrical and Electronics Engineering

Section - II

Specialization

A) Power Systems:

Modern power system operation and control, static and dynamic modeling, Load flow studies, transient stability and small signal stability of large power systems, Voltage stability: P-V and Q-V curves, static analysis, sensitivity and continuation power flow method. Introduction to optimization techniques, economic load dispatch of thermal and hydro-thermal plants, loss formula, real and reactive power optimization, optimal power flow, unit commitment, power system security constrained optimization, load-frequency control, energy control centers and power system state estimation.

Bus impedance and admittance matrices; load flow; voltage control; power factor correction; economic operation; symmetrical components; fault analysis; principles of over-current, differential and distance protection; solid state relays and digital protection; circuit breakers; system stability concepts, swing curves and equal area criterion; HVDC transmission.

B) Electrical Machines:

Single phase transformer - equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers- connections, parallel operation; auto-transformer; 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.

C) Control Systems & Instrumentation:

Transient and steady state analysis of LTI control systems and frequency response. Tools and techniques for LTI control system analysis and design: Routh Hurwitz criterion, Root loci, Bode plots. Elements of Proportional Integral Derivative (PID) control. State variable representation and solution of state equation of LTI control systems. Controllability and observability. Pole placement by state feedback.

Static and dynamic characteristics of measurement systems, first order and second order systems, error analysis; electromechanical indicating instruments: AC/DC current and voltage meters, loading effect, extension of instrument ranges, measurement of power and energy; instrument transformers. AC & DC bridges; resistive, capacitive, inductive transducers, and their signal conditioning; digital voltmeter and multimeter, oscilloscope, frequency counter; analog-to-digital and digital-to-analog converters.

D) Power Electronics & Electric Drive:

Operating characteristics of power semi-conductor devices, principle of operation of single and three phase ac-dc line commutated converters, introduction to unity power factor converters. Principle of operation dc-dc (buck, boost, buck-boost, fly-back and forward) converters. Principle of operation single phase and three phase dc-ac converters, PWM techniques, basis concepts of adjustable speed dc and ac drives.

E) Soft Computing:

Artificial Neural Networks (ANN): Artificial Neural Networks, Building Blocks of ANN. ANN Terminologies: Architecture, Setting of Weights, Activation Functions, Mcculloch- Pitts Neuron Model, Hebbian Learning Rule, Perception Learning Rule, Delta Learning Rule. Fuzzy Systems: Fuzzy System: Fuzzy Sets, Properties and Operations - Fuzzy Relations, Cardinality, Operations and Properties of Fuzzy Relations, Fuzzy Composition; Fuzzy Variables, Types of Membership Functions. Genetic Algorithm (GA): Biological Terminology, Elements of GA: Encoding, Types of Selection, Types of Crossover, Mutation, Reinsertion, Theoretical Foundation: Schema, Fundamental Theorems of GA.

F) Advanced Signal Processing and Applications (Exclusively for Electrical and Electronics Engineering):

Discrete time signals and systems, Convolution and frequency response. Discrete time Fourier and z-transforms. Properties, analysis of discrete time systems. The DFT, definition and properties, circular convolution calculation, FFT transform. Relationship between continuous and discrete time systems: sampling time and frequency normalization, discrete time processing of continuous time signals. Difference equation for digital filters definition and properties. FIR filters, IIR filters, Digital filter design techniques: impulse invariance, Bilinear transformation, finite difference, window design methods, introduction to multirate DSP, decimation and interpolation, polyphase decomposition. Adaptive signal processing: time adaptive systems, LMS algorithm. Recursive least squares (RLS) algorithms, least square lattice (LSL) algorithm.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Electronics and Instrumentation Engineering

Section - II

Specialization

A) Process Instrumentation and Process Control:

Process characteristics: Incentives for process control, Process Variables types and selection criteria, Process degree of freedom, The period of Oscillation and Damping, Characteristics of physical System: Resistance, Capacitive and Combination of both. Elements of Process Dynamics, Types of processes- Dead time, self-Regulating /non self regulating, Linear/non linear, and Selection of control action. Study of Liquid Processes, Gas Processes, Flow Processes, Thermal Processes.

Analysis of Control Loop: Steady state gain, Process gain, Valve gain, Process time constant, Variable time Constant, Transmitter gain. Analysis of Flow Control, Pressure Control, Liquid level Control, Temperature control, SLPC-features, faceplate, functions, MLPC- features, faceplate, functions, SLPC and MLPC comparison.

Review of Systems: Review of first and higher order systems, closed and open loop response. Response to step, impulse and sinusoidal disturbances. Transient response. Block diagrams. Stability Analysis: Frequency response, design of control system, controller tuning and process identification. Bode and Nyquist stability criterion. Special Control Techniques: Advanced control techniques, cascade, ratio, feed forward, adaptive control, Smith predictor, internal model control. Multivariable Control Analysis: Introduction to state-space methods, Control degrees of freedom analysis and analysis, Interaction, Bristol arrays, Niederlinski index - design of controllers, Tuning of multivariable controllers.

B) Industrial Instrumentation and Automation:

Introduction to Industrial Automation, Role of automation in industries, Introduction to the types of manufacturing industries, Introduction to type of automation system, Benefits of automation. Introduction to Automation pyramid, Introduction to automation tools like PAC, PLC, SCADA, DCS, Hybrid DCS with reference to automation pyramid, Comparison of PLC, PAC,

and SCADA on the basis of Performance criteria Control system audit, Performance criteria, Development of User Requirement Specifications (URS) for automation. Functional Design Specifications (FDS) for automation tools.

C) Process Modeling and Simulation:

Mathematical models for chemical engineering systems: Introduction, Use of mathematical models, Scope of coverage, Principles of formation, Fundamental laws, Continuity equation, Energy equation, Equations of motions, Transport equations, Equations of state, Equilibrium, Chemical kinetics. Examples of mathematical models of chemical engineering systems: Introduction, Series of isothermal, constant hold up CSTRs, CSTRs with variable hold-ups, Two heated tanks, Gas phase pressurized CSTR, Non-isothermal CSTR, Single component vaporizer, Multi-component flash drum, Batch reactor, Reactor with mass transfer, Ideal binary distillation: Batch distillation with holdup, pH systems. General Concepts of Simulation for Process Design: Introduction, Process simulation models, Methods for solving non-linear equations, Recycle partitioning and tearing, Simulation examples. Computer simulation: Simulation examples, Gravity flow tank, Three CSTRs in series, Non-isothermal CSTR, Binary distillation column, Multi-component distillation column, Batch reactor.

D) Biomedical Signal Processing:

Acquisition, Generation of Bio-signals, Origin of bio-signals, Types of bio-signals, Study of diagnostically significant bio-signal parameters Electrodes for bio-physiological sensing and conditioning, Electrode-electrolyte interface, polarization, The electrode skin interface and motion artifact, biomaterial used for electrode, Types of electrodes (body surface, internal array of electrodes, microelectrodes), Practical aspects of using electrodes Acquisition of bio-signals (signal conditioning) and Signal conversion (ADC's DAC's) Processing, Digital filtering, Biomedical signal processing by Fourier analysis, Biomedical signal processing by wavelet (time-frequency) analysis (Computation of signal parameters that are diagnostically significant), Classification of signals and noise, stationary random signals and non-stationary signals, Principle component analysis, Correlation and regression, Analysis of chaotic signals Application areas of Bio –Signals analysis EEG- frequency component analysis, ECG- QRS detection, R amplitude, interval detection, Phonocardiogram- heart valve disorders etc, EMG analysis.

Sampling theorem, z-transforms, linear shift invariant systems, Correlation and convolution, Signal flow graphs for digital networks, Canonical forms -Design of digital filters -IIR and FIR filters. Image Processing: Acquisition, Image representation, Sampling and Quantization, Histograms, Image Quality, Noise in Images, Image enhancement: Histogram equalization and Contrast Enhancement.

E) Transducer Design and Optical Instrumentation:

Review of transducers for various parameters like temperature, pressure, flow, level, humidity, acceleration, vibration, density etc. Design considerations and selection criterion as per standards, Sensor fabrication techniques, process details, and latest trends in sensor fabrication, fiber optics sensors, electromechanical sensors, Solid state chemical sensors, Bio-sensors, Piezo-resistive sensors, characterization of sensors, effect of sensors on process identification, signal conditioning techniques.

Optical fiber waveguide - total internal reflection, and electromagnetic mode theory of optical propagation, cylindrical fiber, manufacturing of optical fiber. Transmission characteristics of optical fiber -Attenuation, material absorption losses, scattering losses, nonlinear and linear scattering, dispersion, intermodal dispersion, dispersion modified single mode fiber, dispersion flattened fibers, polarization, nonlinear phenomena. Optical sources and detectors - Optical fiber sensors -Introduction to fiber optics sensors, sensors based on intensity modulation, application of optical fiber for displacement, strain, stress and pressure measurement. Active multimode FO sensors, micro-bend optical fiber sensors, current sensors, phase modulated, polarization modulated optical fiber sensors, fiber optic gyroscope. LASER applications - Introduction, application of LASER in biomedical instrumentation, LASER interferometry, performance parameters, LASER telemeters, measurement of distance, LIDAR, holography: basic principle of holography, measurement of strain, stress, bending moments and vibrations using hologram.

F) Soft Computing:

Artificial Neural Networks: Building Blocks of ANN. ANN Terminologies: Architecture, Setting of Weights, Activation Functions, Mcculloch - Pitts Neuron Model, Hebbian Learning Rule, Perception Learning Rule, Delta Learning Rule. Fuzzy System: Fuzzy Sets, Properties and Operations - Fuzzy Relations, Cardinality, Operations and Properties of Fuzzy Relations, Fuzzy Composition; Fuzzy Variables, Types of Membership Functions. Genetic Algorithms: (GA): Biological Terminology, Elements of GA: Encoding, Types of Selection, Types of Crossover, Mutation, Reinsertion, Theoretical Foundation: Schema, Fundamental Theorems of GA.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Electronics and Telecommunication Engineering

Section - II

Specialization

A) Electronics:

Carrier transport in silicon: diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. p-n junction diode, Zener diode, tunnel diode, BJT, JFET, MOS capacitor, MOSFET, LED and photo diode, Basics of LASERs. Device technology: integrated circuits fabrication process, oxidation, diffusion, ion implantation, photolithography, n-tub, p-tub and twin-tub CMOS process.

Small Signal Equivalent circuits of diodes, BJTs, MOSFETs and CMOS. Simple diode circuits, clipping, clamping, rectifiers. Biasing and bias stability of transistor and FET. Amplifiers: Low and High frequency single-and multi-stage amplifiers, differential and operational, feedback amplifiers, Sinusoidal oscillators; criterion for oscillation and power amplifiers. Frequency response of amplifiers. Simple Operational Amplifier (Op-amp) circuits, Function generators and wave shaping circuits, 555 Timers.

B) Communication Systems:

Random signals and noise: probability, random variables, probability density function, autocorrelation, power spectral density. Analog communication systems: amplitude and angle modulation and demodulation systems, spectral analysis, realizations of analog communication systems; signal-to-noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM) for low noise conditions. Basics of information theory and channel capacity theorem. Digital communication systems: pulse code modulation (PCM), differential pulse code modulation (DPCM), digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), matched filter receivers, bandwidth consideration and probability of error calculations for these schemes. Fundamentals of TDMA, FDMA and CDMA and GSM.

Microwave Tubes and Amplifiers, Principle of working of Radar and Satellite Communication, Basics of Optical Communications, Computer networking, Network management and Mobile communication.

C) Digital System Design & VLSI Design:

Boolean algebra, minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinatorial circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift-registers. Sample and hold circuits, ADCs, DACs. Semiconductor memories. Microprocessor (8085, 8086 & 80386) Microcontroller 8051: architecture, programming, memory and I/O interfacing. Real time systems, ARM Processor and controller, Real Time & Database Applications, Microcomputer Embedded System Design, Software Development and Tools for Embedded system, PIC Microcontroller and Interfacing.

Solid State Devices; MOS Circuit design and Layout & Simulation, CMOS Digital Circuit Design, Design of Semiconductor Memories, Mixed Signal and RF Circuit Design, ASIC. Basic MOS Physics and Equivalent Circuits and their Models, VLSI Design Methodologies, Low Power VLSI Design, MEMS and IC Integration , VLSI Design Rules, Floor Planning, MOS Transistor Principles and CMOS Inverter, Combinational Logic Circuits, Arithmetic Building Blocks and Memory Architectures, Interconnect and Clocking Strategies, MOSFET Devices, Nano-Scaled Classical MOSFETs, Non-Classical MOSFETs, Compact Models For Circuit Simulators ,Hardware Descriptive Language .

D) Signal and Image Processing:

Definitions and properties of Laplace transform, continuous-time and discrete-time Fourier series, continuous-time and discrete-time Fourier Transform, DFT and FFT, z-transform. Sampling theorem. Linear Time-Invariant (LTI) Systems: definitions and properties; causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay. Signal transmission through LTI systems. Analog filter design – IIR filter Design & FIR Filter Design. Multi-rate Signal Processing and its Applications

Digital Image Fundamentals, Image Transforms, Image Enhancement- Spatial and Frequency Domain, Image Restoration, Image Segmentation, Image Compression, Computer Vision.

E) Microwave Engineering:

Electrostatics; Maxwell's equations: differential and integral forms, boundary conditions, wave equation, Pointing vector; Plane waves and properties: reflection and refraction, polarization, phase and group velocity, propagation through various media, skin depth; Transmission lines: equations, characteristic impedance, impedance matching, impedance transformation, S-parameters, Smith chart; Waveguides: modes, boundary conditions, cut-off frequencies, dispersion relations. Antenna: types and radiation effects.

F) Soft Computing:

Artificial Neural Networks (ANN): Artificial Neural Networks, Building Blocks of ANN. ANN Terminologies: Architecture, Setting of Weights, Activation Functions, Mcculloch- Pitts Neuron Model, Hebbian Learning Rule, Perception Learning Rule, Delta Learning Rule.
Fuzzy Systems: Fuzzy System: Fuzzy Sets, Properties and Operations - Fuzzy Relations, Cardinality, Operations and Properties of Fuzzy Relations, Fuzzy Composition; Fuzzy Variables, Types of Membership Functions.
Genetic Algorithm (GA): Biological Terminology, Elements of GA: Encoding, Types of Selection, Types of Crossover, Mutation, Reinsertion, Theoretical Foundation: Schema, Fundamental Theorems of GA.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Mechanical Engineering

Section - II

Specialization

A: DESIGN STREAM

ADVANCED MECHANICS OF SOLIDS-Introduction to Three Dimensional Theory of Elasticity Plane stress and Plane strain problems, Differential Equations of equilibrium, strain-displacement relations in Cartesian and polar co-ordinates, Boundary conditions, Shear centre, Torsion.

ADVANCED THEORY OF MECHANISMS- Kinematics: Review of determination of velocity and acceleration of points and links in mechanisms- Analytical and graphical methods, Synthesis of Mechanisms, Analysis of Cams: Basic curves, pressure, angle-Cam size determination-Cam profile determination-Analytical and graphical. Static and Dynamic Force Analysis: Forces, Couples. Conditions of equilibrium- Free body diagram. Analysis of 4-bar linkage, slider crank mechanisms,

VIBRATION: Introduction, Fundamentals of system modeling, Free Vibration, Forced Vibration, Transient Vibration, Two Degree of Freedom Systems, Multi Degree of Freedom System. Dynamic balancing and alignment of machinery: Dynamic Balancing of Rotors, Field Balancing in one Plane, two Planes, and in several Planes.

TRIBOLOGY- Friction: Types of friction - dry-boundary and fluid-laws of friction and friction theories Variables in friction, theories of wear - stages of wear, Lubrication: Role of

lubrication Lubricants, Hydrodynamic bearings, Hydrostatic bearings, rolling element bearings.

DESIGN ENGINEERING- Design Fundamentals, , Design considerations – material selection, functional design, cost analysis. Fatigue considerations in design - fatigue in materials – fracture mechanics approach to fatigue – theories of fracture, Introduction to reliability in design – reliability function, failure data analysis, failure distribution functions, MTTF/MTBF, hazard rate and models, methods of improving reliability, reliability testing.

OPTIMIZATION TECHNIQUES: Introduction to Optimization, Formulation and Solution methodologies, Single variable optimization, Multivariable optimization with no constraints, with equality constraints and with inequality constraints. Kuhn-Tucker conditions, Lagrange multiplier method. Introduction to integer programming – Gomory's cutting plane method, branch and bound method.

FINITE ELEMENT METHOD- Basic concepts of FEM – a general procedure for finite element analysis, Truss structures: The direct stiffness method, Flexure - elements – elementary beam theory, flexure element, flexure element stiffness matrix and element load vector, Interpolation function for general element formation, one dimensional elements, triangular elements, rectangular elements, three dimensional elements.

B: THERMAL STREAM

ADVANCED THERMODYNAMICS: Reversible work - availability - irreversibility and second – law efficiency for a closed system and steady – state control volume. Availability analysis of simple cycles. Thermodynamic potentials. Different equations of state – fugacity – compressibility - principle of corresponding States - fugacity coefficient, Thermochemistry - First law analysis of reacting systems - Adiabatic flame temperature – entropy change of reacting systems.

ADVANCED ENGINEERING FLUID MECHANICS: Three dimensional continuity equation - differential and integral forms – equations of motion momentum and energy and their engineering applications.Rotational and irrorational flows, Laminar and turbulent Flow, Boundary Layer.

ADVANCED HEAT TRANSFER : One dimensional energy equations and boundary condition - three-dimensional heat conduction equations . radiation in gases and vapour, Momentum and energy equations - turbulent boundary layer heat transfer, heat exchanger , NTU approach

REFRIGERATION & AIR CONDITIONING SYSTEM DESIGN:

Estimation of Solar Radiation : Introduction to cooling and heating load calculations, Solar radiation, Solar geometry ,Selection of Air Conditioning Systems: Introduction to thermal distribution systems and their functions, Selection criteria for air conditioning systems, Classification of air conditioning systems.

Design of Air Conditioning ducts.

COMPUTATIONAL FLUID DYNAMICS HEAT TRANSFER: Conservation equation mass momentum and energy equations convective forms of the equations and general description. Numerical grid generation basic ideas transformation and mapping. Solution of finite difference equations iterative methods matrix inversion methods ADI method operator splitting fast Fourier transform applications.

C: PRODUCTION STREAM

THEORY OF METAL CUTTING: Mechanics of Metal Cutting, Tool Life and Tool Wear, Single Point Cutting Tool, Multipoint Cutting Tool, Grinding, Cutting Temperature, Cutting tool materials Cutting fluids.

ADVANCED MANUFACTURING PROCESSES: Non-Traditional Machining.

ADVANCED METAL FORMING: Fundamentals of Metal Forming, Rolling of metals, theories of cold and hot rolling, defects in rolling, Forging, forging defects, Extrusion Analysis of Extrusion process, defects in extrusion, Drawing, Sheet Metal forming.

ADVANCED CASTING AND WELDING TECHNOLOGIES: Laser Beam Welding, Friction Stir Welding, Electron Beam Welding, Ultrasonic Welding, Investment casting, shell moulding, squeeze casting, vacuum casting, counter-gravity flow-pressure casting, directional and monocrystal solidification, squeeze casting, semisolid metal casting, rheocasting.

ADVANCED CAD: Introduction To Cad,Geometric, Modelling:Synthetic Curves, Surface Modeling, Synthetic Surface, Advanced Surfaces, Transformations, 3-D Modelling, Design Applications.

COMPUTER AIDED MANUFACTURING: Compute-Aided Programming, Automatic Tool Path generation, Tooling for CNC Machines- Interchangeable tooling system, Adaptive control of machining processes like turning, grinding.

QUALITY ENGINEERING IN MANUFACTURING: Quality Value and Engineering, Tolerance Design and Tolerancing, Analysis of Variance (ANOVA), Orthogonal Arrays, ISO-9000 Quality System.

OPERATION RESEARCH: Linear programming, simplex method, transportation and assignment models PERT and CPM.

FINITE ELEMENT TECHNIQUES: Introduction to Finite Element Method, Stress and Equilibrium. Boundary conditions, Strain-Displacement relations, Stress-strain relations.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Chemical Engg.

Section - II

Specialization

A) 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.

B) 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.

C) 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.

D) 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.

E) 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.

F) 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.

G) 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.

H) 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.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Management

Section - II

Specialization

A: Behavioural Science

- **Understanding Organizational Behaviour** - Fundamental Concepts, Organizational processes, Organizational structure, Organizational Change and Innovation processes. **Effectiveness in organizations** - Models of Organizational Behaviour, Systems theory and time dimension of effectiveness, Developing competencies, Limitations of Organizational Behaviour, Continuing challenges.
- **Individual differences and work behaviour** - Why individual differences are important, The basis for understanding Work Behaviour, Individual differences influencing Work Behaviour. **Personality** - Sources of personality differences, Personality structure, Personality and Behaviour, Measuring Personality **Attitudes** - The nature of Employee Attitudes, Effects of Employee Attitudes, Studying Job satisfaction, Changing Employee Attitudes. **Perceptions, Attributions and Emotions** - The perceptual process ,Perceptual grouping, Impression management, Emotions, Emotional Intelligence
- **Job Design, Work and Motivation** - Job design and quality of work life, A conceptual model of job design, Job performance outcomes. **Evaluation, Feedback and Rewards** - Evaluation of Performance, Performance Evaluation feedback, Reinforcement theory A model of Individual rewards, Rewards Affect Organizational concerns, Innovative reward system. **Managing misbehaviour** - The emergence in Management of the study of misbehaviour, Selected misbehaviours. **Stress and Counselling** - What is stress?, Stress model, Work stressors, Stress outcomes, Stress moderators, Stress prevention and management, Employee counselling, Types of counselling
- **Informal and Formal Groups** - Group Dynamics, The nature of informal, Organizations, Formal groups. **Teams and Team Building** - Organizational context for teams, Teamwork, Team building. **Managing Conflict and Negotiation** - Conflict in Organizations, A contemporary perspective on intergroup conflict, What causes ntergroup conflict, **Power and Politics** - The concept of power, Sources of power, Interdepartmental power, Illusion of power, Political strategies and tactics, Ethics,

power and politics, Using power to manage effectively. **Empowerment and Participation** - The nature of empowerment and participation,

- **Communication** - Communicating within organizations, Information richness, **Decision Making** - Types of decisions, A Rational Decision-making Process, Behavioural influences on decision making, Group decision making, Creativity on group decision making. **Leadership** - What is leadership, Trait approaches, Behavioural approaches, Situational approaches, Other perspectives, concepts and issues of leadership.
- **Organizational Structure and Design** - Designing an organizational structure, Division of labour, Delegation of authority, Departmental biases, Span of control. **Managing Change and Innovation** - Change at work, Resistance to change, Alternative change management approaches, Learning principles in change management, **Organizational behaviour across cultures** - Conditions affecting multinational operations, Managing International Workforce.

B: Entrepreneurship

The Entrepreneurial Development Perspective: Concept of Entrepreneurship and Development, Conceptual models of entrepreneurship Role of Entrepreneur in Indian economy and developing economies Tiny & SME & Its Contribution in the National Economy; Corporate Entrepreneurship
Entrepreneurial team – matching human resources needs and skills. Identifying business opportunities and planning for business service & production. Business promotion – process – stages – facilities and incentives. Creating Entrepreneurial Venture, Business Planning Process, Environmental Analysis – Search and Scanning; Identifying; Stages in starting the new venture. Project Management a) Meaning, Objectives and How to choose a project b) Technical, Financial, Marketing, Personnel Feasibility c) Estimating and Financing Funds requirement. Schemes offered by various commercial banks and financial institutions.

Role of Central Govt. and State Govt. in Promoting Entrepreneurship; Introduction to various incentives, subsidies and grants, Promotion of Export oriented units; Fiscal and Tax concessions Role of Govt.

Problems of Entrepreneurs- Marketing, Finance, Human Resource, Production, Research and External Problems, beginning and growth as a entrepreneur.

C: FINANCE MANAGEMENT

- **Management Accounting:** Nature and scope of costing; Cost concepts and Classifications; Usefulness of Costing to Managers, **Marginal costing:** Break—even analysis, decision involving alternative choices. **Budgeting:** Types of budgets and their

preparation, Performance budgeting and Zero-base budgeting. **Ratio analysis:** Liquidity, profitability and solvency.

- **Financial management:** Objectives of financial management; Time value of money, sources of finance, **Investment decisions:** Importance, Difficulties determining cash flows, methods of capital budgeting **Risk analysis :** Cost of capital; Concept and importance, Computations of cost of various sources of finance; Weighted Average Cost of Capital; **Capital Structure decisions**; Theories of capital structure, Factors determining capital structure.

- **Stock Market:** Introduction to Indian Stock Market, scope and features of an investment program, investment risk, interest risk, market risk, inflation risk, default risk, systematic and unsystematic risk, problems related to risk and return. **Corporate Risk Management**: Introduction and overview.

- **Corporate Finance:** Basic Concepts; Valuation Methods; Value Creation and New Valuation Tools; Alternative Valuation Approaches to Specific Cases. Optimum capital structure; **Management of working capital** - Cash, Receivables and Inventory Management, Internal Financing and Dividend Policy; Financial Modeling.

- **Taxation:** introduction, basic concepts and theories, direct taxation and Indirect taxation, tax management.

- **Banking and Insurance:** concepts of banking institutions and insurance policies and products in the market. Overview of Indian financial systems and insurance markets, basic issues in banking, regulations in banking and insurance.

- **Foreign exchange market:** introduction and overview of Structure, types of transactions, International monetary system: Introduction, exchange rate regimes,

- **Derivatives** its introduction & meaning, Characteristics, Types, Derivative Market in India, Functions of Derivative Market, Significance of Derivatives, Traders in Derivatives Market.

D: Human Resource Management

Human Resource Management – Significance; Objectives, Function; A Diagnostic Model; External And Internal Environment. Forces And Influences; Organizing HRM Function

Recruitment And Selection- Sources Of Recruits; Recruiting Methods; Selection Procedure; Selection Tests; Placement And Follow Up.

Performance Appraisal System- Importance And Objectives; Techniques Of Appraisal System; New Trends In Appraisal System.

Evaluation Of Performance For Development-Competency Mapping;

Development Of Personnel- Objectives; Determining Needs; Methods Of Training And Development Programmes; Evaluation.

Human Resource Development- HRD Structure; Functions; Systematic approach to Needs Assessment; Training Program Design; Evaluating HRD Programs; Evaluation Process; Training Outcomes; Potential Legal Issues Related To Training; Cross-Cultural Training; The Future Of Training And Development

Career Planning and Development – Concept of Career; Career Planning and Development Methods.

Compensation And Benefits- Job Evaluation Techniques; Wage And Salary Administration; Fringe Benefits; Human Resource Records And Hr Audit.

Employee Discipline- Importance; Causes and Forms; Disciplinary Action; Domestic Enquiry.

Grievance Management- Importance; Process and Practices; Employee Welfare and Social Security Measures.

Labour and Social Security Laws- The Employees Provident Fund & Miscellaneous Provisions Act, 1952; Employees State Insurance Act, 1948; Factories Act, 1948; Payment Of Gratuity Act, 1972; Employee's Compensation Act, 1923; Maternity Benefit.

Industrial Relations- Importance; Industrial Conflicts; Causes; Dispute Settlement Machinery. Trade Unions – Importance of Unionism; Union Leadership; National Trade Union Movement. Collective Bargaining – Concept; Process; Pre Requisites; New Trends in Collective Bargaining.

Industrial Democracy and Employee Participation – Need for Industrial Democracy; Prerequisites for Industrial Democracy; Employee Participation – Objectives; Forms Of Employee Participation.

Future of HRM – Six Sigma Practices; Flexible Work Options, Virtual Organization.

E: Marketing Management

- **Marketing:** Introduction & overview; Marketing philosophies; Marketing management process; Concept of marketing mix.

- **Consumer Behavior**: Introduction & overview; factors influencing consumer-buying behavior; consumer-buying process; The consumer research paradigms and process; **Consumerism**

- **Marketing Research**: Introduction & overview; Marketing research Process; Applications of Marketing Research.

- **Distribution & Inventory Management**: Introduction & overview; Marketing Channels: Defining and importance; Functions of marketing channels.

- **Industrial Marketing**: Introduction; Overview & Functional Applications.

- **Services Marketing**: Introduction & Overview; Growth of service sector economy; Classification of service marketing mix; Service Quality Gap Model; **Event Management; Hospitality & Hotel Management**.

- **Advertising and Sales Promotion**: Integrated marketing communications concepts; Basics of Advertising; Creativity strategy; Sales Promotion.

- **Sales Management**: Introduction & overview; Selling Skills; Selling process; Sales Force management.

- **Customer Relationship Management**: Introduction & overview; Types of CRM; CRM Strategies & Models.

- **Retail Marketing**: Basics; Retail Format & Types; Supply Chain Management; Software for Merchandise.

- **Rural & Agro Marketing:** Rural Market; Rural Marketing Index; Agri Business & Marketing; Government support to Agri Business.

- **International Business Marketing**: Theories of international trade; Role of multinationals, Trade Policies, Balance of Payment, Trade Deficits, Regulatory framework, tariffs & quotas

- **Social Marketing**: Introduction & overview; Working on Non-Profit organization; NGOs.

- **Social Media & Internet Marketing:** Internet Age of marketing; Data Mining in Marketing; Social Media Marketing; Online marketing.

- **Travel & Tourism Marketing**: Changing facets of Tourism; Tourism Development; Travel Agency and Tour Operator

- **Product& Brand Management**: Product Management; Product Strategy; PLC; Branding; Brand Equity.

- **Corporate Communications**: Media Relations; Management and Surveillance; Web based Communications.

- **Direct & Network Marketing:** Introduction; Overview; Functional Applications.

- **Green Marketing:** Introduction; Overview; Functional Application.

F: Operation and Production Management

Deterministic Model in Operation research-Linear Programming (Graphical Method, Simplex method, Duality Theory, Sensitivity Analysis),Network Flow (CPM),Transportation Model, Assignment Model

Probabilistic Models in Operation Research-Probability Theory, Decision Theory, Network Flow (PERT), Queuing Model, Simulation Techniques

Game Theory, Integer Programming, Dynamic Programming, Non linear Programming

Role and Scope of Production Management; Facility Location; Layout Planning and Analysis; Production Planning and Control – Production Process Analysis; Demand Forecasting for Operations; Determinants of Product mix; Production Scheduling; Work measurement; Time and Motion Study; Statistical Quality Control.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Applied Chemistry

Section –II

Specialization

A: Reaction dynamics and surface chemistry

Reaction Kinetics: Introduction, Rates of chemical reactions, Methods of determining rate laws, Mechanisms of chemical reactions and steady state approximation, Laws of photochemistry, Kinetics of photochemical and composite reactions, Chain and oscillatory reactions, Collision and transition state theories, Stearic factor, Treatment of unimolecular reactions, Ionic reactions: salt effect. Homogeneous catalysis and heterogeneous catalysis, free radical polymerization, enzyme catalysis, and reaction dynamics. Effect of pressure on reaction rate, Kinetics of catalytic reactions, Kinetics of surface reaction, autocatalysis, unimolecular and bimolecular surface reaction.

Fast Reaction: Luminescence and Energy transfer processes, Study of kinetics by stopped-flow technique, Relaxation method.

Adsorption: Surface tension, Capillary action, Gibbs adsorption isotherm, Estimation of surface area (BET equation), Surface films on liquids (Electro-kinetic phenomenon), Catalytic activity at surfaces.

Properties and stability of colloids, Surface active agents, Reverse micelles, Critical micellar concentration (CMC), Factors affecting the CMC of surfactants, Thermodynamics of micellization, Micro emulsion.

Course Outcome: The students will acquire knowledge of

1. Mechanism for chemical reactions for optimizing the experimental conditions.
2. Application of homogeneous and heterogeneous catalysis in chemical synthesis
3. Importance of adsorption process and catalytic activity at the solid surfaces
4. Concept of colloidal material and their stability for many practical uses.

Recommended Books

1. *Atkins, P.W., Physical Chemistry, W.H. Freeman (1990).*
2. *Laidler, K.J., Chemical Kinetics, Dorling Kingsley (1998).*
3. *Rajaraman, J., and Kuriacose, J., Kinetics and Mechanism of Chemical Transformations, McMillan (2008).*
4. *Moroi, V., Micelles Theoretical and Applied Aspects, Springer (1986).*
5. *Gowarikar, V.A., Vishwanathan, N.V., and Sreedhar, J., Polymer Science, New Age International (1986).*

B: Organic Chemistry

IUPAC Nomenclature of Simple Organic and Inorganic Compounds.

Concept of Chirality: Recognition of symmetry elements and chiral structures, R-S nomenclature, diastereoisomerism in acyclic and cyclic-systems, E-Z isomerism. Conformational analysis of simple cyclic (chair and boat cyclohexanes) and acyclic systems, Interconverison of Fischer, Newman and Sawhorse projections.

Stereochemistry and Conformational Analysis: Newer methods of assymetric synthesis (including enzymatic and catalytic nexus), enantio-and diastereo selective synthesis. Effects of conformation on reactivity in acyclic compounds and cyclohexanes.

Aromaticity: Huckel's rule and concept of aromaticity : annulenes and heteroannulenes,fullerenes. (C60)

Organic reaction mechanisms: Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzynes and nitrenes. Addition, elimination E1, E2 and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.

Named reactions and rearrangements: Aldol, Perkin, Stobbe, Dieckmann condensations, Hofmann, Schmidt, Lossen, Curtius, Backmann and Fries rearrangements; Reimer – Tiemann, Reformatsky and Grignard reactions. Diels-Alder reactions; Claisen rearrangements; Friedel–Crafts reactions and Witting reactions. Routine functional group transformations and inter-conversions of simple functionalities. Hydroboration, Oppenaur oxidations; Clemmensen, Wolf-Kishner, Meerwein – Ponndrof – Verley and Birch reductions.

Organic transformations and reagents: Use of the following reagents in organic synthesis and functional group transformations; Complex metal hybrids, Gilman's reagent, Lithium dimethylcuprate, Lithium di-iso propylamide (LDA) dicyclohexylcarbodimide. 1,3 – Dithiane

(reactivity umpolung), trimethylsilyl iodide, tri-n-butyl tin hybride, Woodward and provost hydroxylation, osmium tetroxide, DDQ, selenium dioxide, phase transfer catalysts, crown ethers and Merrified resin, Peterson's synthesis, Wilkinson's catalyst, Baker's yeast.

Pericyclic Reactions: Selection rules and stereochemistry of electrocyclic reactions, cycloaddition and sigmatrophic shifts, Sommelet-Hauser, Cope and Claisen rearrangements.

Photochemistry: Principles of energy transfer, cis-trans isomerization, Paterno-Buchi reaction, Norrish Type I and II reactions, Photo reduction of ketones, di-pi-methane rearrangement, photochemistry of arenes.

Heterocycles: Synthesis and reactivity of furan, thiophene, pyrrole, pyridine, quinoline,isoquinoline and indole. Skraup synthesis, Fischer indole synthesis.

Chemistry of natural products: Familiarity with methods of structure elucidation and biosynthesis of Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenoids, steroids, alkaloids, cholesterol and hormones. Function and application of enzymes and coenzymes.

Spectroscopy: Combined applications of mass, UV-VIS, IR and NMR spectroscopy for structural elucidation of compounds.

References

1. R.T. Morrison and R. N. Boyd's, **Organic Chemistry**, 6thed., Spring 2008.

2. I.L. Finar, **Organic Chemistry Vol. I & II**, 5th ed, Pearson Education, Singapore, 2004.

3. Micheal B.Smith and Jerry March, **March's Advanced Organic Chemistry Reactions, Mechanishms and Structure**, 6thed., JohnWiley&Sons Inc., New Jersey, 2007.

4. Peter Skyes, **A Guide book to Mechnism in Organic Chemistry**, Orient Longman Private Limited., New Delhi, 2003

5. J.M.Coxon and B. Halton, **Organic Photochemistry**, 2nd edition, Cambridge University Press, 2011.

6. Jagdamba Singh, **Photochemistry and Pericyclic Reactions**, 3rd edition, New Age Science, 2009.

C: Environmental Chemistry

Unit-1

Ecosystem : Structure and function of ecosystem , Food chain, Food web, Energy flow, biogeochemical cycle, Biomagnification.

Unit-2

Air : Natural and anthropogenic sources of pollution. Primary and Secondary pollutants, Transport and diffusion of pollutants, Methods of monitoring of air pollution SO2 , NOx , CO, SPM Effects of pollutants on human beings, plants, animals, materials and on climate, Air Quality Standards.

Unit-3

Water : Sources, types and consequences of water pollution (ground water and surface water). Sampling and physico-chemical analysis of water quality. Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand, Heavy metal pollution, surfactant and their toxicity, Water Quality Standards.

Unit-4

Soil : Soil and soil profile, Trace metals and organic matter in soil, Physico-chemical analysis of soil Industrial waste effluents and heavy metals their interactions with soil components. Different kinds of synthetic fertilizers (N,P & K) and pesticides and their interactions with different components of soil.

Unit-5

Solid Waste: Sources and generation of solid wastes, their characterization, chemical composition and classification of municipal and hazardous wastes, Different methods of disposal and management of solid wastes – sanitary landfill, incineration, composting, pyrolysis

Suggested Books –

1. Standards methods for the Examination of Water and Wastewater, APHA / AWWA / WPCF Publishing, 19th Ed. 1995.
2. Quantitative organic analysis : Qualitative inorganic analysis : Qualitative organic analysis, series By – Vogel's.
3. Analysis of Chemicals by Vogel P.K.Goel , Water Pollution Causes Effects and Control. New Age International,2009.
4. M. Petrovic and D. Barcelo, The handbook of Environmental Chemistry.
5. Meyers A. Robert (Eds.) Encyclopedia of Environmental Analysis and Remediation Vol. 1-8, John Wiley & Sons, 1998

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Applied Mathematics

Section - II

Specialization

A: Celesial Mechanics

1. **Lagrange and Hamilton Equations**: Introduction; Classification of a Dynamical System; Lagrange's Equations for Simple Systems; Principle of Virtual Work- D' Alembert's Principle; Lagrange Equations for General Systems; Hamilton's equations;Ignorable Coordinates; The Routhian Function.
2. **Hamiltonian Methods**: Introduction; Hailton's Principle—Hamilton's Principle for Conservative System, Principle of Least action; Characteristic function of Hamilton-Jacobi Equation; Phase Space and Liouville's Theorem; Special Transformations—Lagrange and Poisson Brackets; Calculus of Variations.

B: Fuzzy Logic / Game Theory/Algebra

1. Sets and mappings
    a. Sets
    b. Relations
    c. Mappings
    d. Binary Operations
    e. Cardinality of sets
2. Matrices
    a. Matrices
    b. Operations on matrices
    c. Determinant function
    d. Properties of Determinant function
3. Groups
    a. Semi groups and groups
    b. Homomorphism
    c. Subgroups and cosets

   d. Generators and relations
   e. Normal subgroup
   f. Direct products
   g. Sylow's Theorem
4. Rings
   a. Definitions and elementary properties
   b. Subrings and characteristics of a ring
   c. Ideals and Homomorphism
   d. Sub modules
   e. Polynomial ring
5. Modules and vector spaces
   a. Definitions and examples
   b. Sub modules and direct sums
   c. Free modules
   d. Representation of linear mapping
6. Fuzzy Sets
   a. Definition and examples
   b. Operations on Fuzzy Sets
   c. Zero person game
   d. Two person game
   e. n-person game

References:

1. Bhattacharya P.B., Jain S.K. :Basic abstract algebra, Cambridge University Press
2. Lotfi A. Zadeh : Fuzzy Sets information and control, 1965
3. Von Neumann, J: Theory of games and economic behavior, Princeton University Press, 1947

C: FIXED POINT THEORY AND APPLICATION

Topological Spaces: open sets, closed sets, neighbourhoods, bases, subbases, limit points, closures, interiors, continuous functions, homeomorphisms.

Quotient Topology: Construction of cylinder, cone.

Connectedness and Compactness: Connected spaces, Connected subspaces of the real line, Components and local connectedness, Compact spaces, Heine-Borel Theorem, Local - compactness.

Separation Axioms: Hausdorff spaces, Regularity, Complete Regularity, Normality, Urysohn Lemma, Tychonoff embedding and Urysohn Metrization Theorem, Tietze Extension Theorem.

Complete metric spaces: Function spaces, Characterization of compact metric spaces, equicontinuity.

Normed spaces: Continuity of linear maps. Hahn-Banach Extension and Separation Theorems. Banach spaces. Dual spaces and transposes. Uniform Boundedness Principle and its applications. Closed Graph Theorem, Open Mapping Theorem and their applications.

Inner product spaces: Hilbert spaces. Orthonormal basis. Projection theorem and Riesz Representation Theorem.

Fixed Point Theorems with Applications: Banach contraction mapping theorem, Brouwer fixed point theorem, Leray-Schauder fixed point theorem. Calculus in Banach spaces, Gateaux as well as Frechet derivatives, chain rule, Taylor's expansions, Implicit function theorem with applications, subdifferential.

Fuzzy Logic: Crisp set and Fuzzy set, Basic concepts of fuzzy sets, membership functions. Basic operations on fuzzy sets, Properties of fuzzy sets, Fuzzy relations. Propositional logic and Predicate logic, fuzzy If – Then rules, fuzzy mapping rules and fuzzy implication functions, Applications.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Syllabus for Entrance Examination in Ph.D. Programme 2015

Discipline: Applied Physics

Section - II

Specialization

A: Biomedical Physics

1 Concept of Quantum theory, Wave particle duality, Photoelectric effect, de Broglie Wave , Compton effect , Compton scattering, X-rays ,Properties of X-Rays, Practical Application of X-Rays. Types of indirectly ionizing photon radiation

2 Important derived physical constants and relationships, Speed of light in a vacuum: Reduced Planck's constant × speed of light in a vacuum: Fine structure constant: Bohr radius: Rydberg energy: Rydberg constant: Classical electron radius: Compton wavelength of the electron: Classification of radiation: Non-ionizing radiation (cannot ionize matter). Ionizing radiation (can ionize matter either directly or indirectly):

3 Photon fluence and energy fluence, KERMA, Absorbed dose, Stopping powers, radiation dosimeter, Ionization chambers, TLDs,

4 X ray machines for radiotherapy, Gamma ray beams and Gamma ray units

5 Radioactivity: Modes of radioactive decay, Radiosurgical techniques, Gamma Knife, Linac based radiosurgery

Reference Books : 1 ATTIX, F.H., Introduction to Radiological Physics and Radiation Dosimetry, Wiley.

2. KHAN, F.M., The Physics of Radiation Therapy, Lippincott, Williams and Wilkins

3. HORTON, J., Handbook of Radiation Therapy Physics, Prentice Hall, New York .

B: Nano Science & Applications

Unit no. 1: Nanotechnology

1.1 Introduction 1.2 Emergence of nanotechnology 1.3 Bottom up and Top down approaches 1.4 Zero dimensional nanostructures: nanoparticles

Unit no. 2: Nanowires and nanorods

2.1 Introduction to one –dimensional Nanostructures 2.2 Evaporation – condensation growth 2.3 Dissolution – condensation growth 2.4 Vapor (or solution)- liquid-solid (VLS or SLS) growth 2.5 Templet based synthesis

Unit no. 3: Thin films

3.1 Introductoin to Two – Dimensional Nanostructures 3.2 Fundamentals of film growth 3.3 Physical Vapor Deposition (PVD) 3.4 Chemical Vapor deposition (CVD) 3.5 Atomatic Layer deposition (ALD) 3.6 Electrochemical deposition 3.7 Sol- Gel films

Unit no. 4: Characterzation and Properties of Nanomaterials

4.1 Structural characterization (XRD, SEM, TEM) 4.2 Chemical Characterization (Optical spectroscopy , Electron spectroscopy) 4.3 Physical properties of nanomaterials 4.4 Electrical conductivity

Unit no. 5: Application of nanomaterials

5.1 Molecular Electronics and nanoelectronics 5.2 Nanobots 5.3 Biological applications of nanoparticles 5.4 Bandgap engineered quantum device

5.5 Nanomechanics

Reference Book

Nanostructures and nanomaterials: Synthesis, properties and application : Cuozhong Cao

Thin Film Fundamentals : A. Goswami

Nanophysics and Nanotechnology: An introduction to modern concept in nanoscience: Edward L. Wolf

C: Luminescence & Applications

Types of luminescence. *Luminescent* Materials. Resonance, spontaneous, and stimulated luminescence. Three- and four-level luminescence. Chemiluminescence, electroluminescence (cathodoluminescence), mechanoluminescence, photoluminescence (fluorescence, phosphorescence), radioluminescence, sonoluminescence, thermoluminescence. X-ray fluorescence analysis, fluorescence yields for K and L shells.

Thermo luminescence - models: Jablonski model, Configuration-coordination model, energy band model, thermoluminescence mechanisms, Method of analysis; methods using different rates, half width method, initial rise method, Applications of thermoluminescence in radiation dosimetry and dating

Mechanoluminescence: Mechanoluminescent materials, Characteristics, mechanisms, theories of Mechanoluminescence, applications. Lyoluminescence, LL reader, Inorganic lyoluminescence phosphors, mechanisms, enhancements and spectra

D: Solid State Ionics & Material Science

1. **Experimental Material Science** :

   Material Preparation and characterization studies and solid-state electrochemical device applications viz. solid state batteries. supercapacitor, light emitting elechrochemical cell of ionic composites, nano-composites, ionic polymers and polymer nano-composite electrolyte materials.

2. **Theoretical Material/Nano-material Science :**

   (i) **Mathematical -Modeling**: Mathematical modeling and evaluation of transport properties of some ionic/superionic solids by using space charge depolarization method. Modeling of electrochemical devices viz. solid state batteries, super capacitors and sensors are also in progress.

   (ii) **DFT based first principle studies : M**olecular structure, electronic/electrical, mechanical, optical and transport properties using density functional based approach of nano-matrials, biomaterials, ionic/super-ionic solids and electronic/ionic conducting polymers implemented in SIESTA / transiesta software.

   (iii) **Molecular mechanics and Molecular dynamic simulation** of polymer nano-composite materials for solid state battery, super capacitor, organic light emitting diode(OLED), light emitting electrochemical cell (LEEC) applications.

***

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

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

Discipline: Pharmacy

Section - II

Specialization

A) Pharmaceutics

Recent advances in solid dosage form manufacturing. Principle and technology involved in Disperse systems, Molecular dispersion, emulsion- micro and multiple emulsion. Design and fabrication of Oral controlled release drug delivery systems. Parenteral products and Ocular drug delivery systems. Implantable products, Transdermal therapeutic system. Prodrugs as sustained chemical delivery system, Biochemical and Molecular approach to Controlled Drug delivery. Drug kinetics in coarse disperse systems, drug diffusion in coarse disperse systems.

Dosing considerations and bioavailability assessment. Transport of drugs through membranes and barriers other than GI Tract, Buccal absorption, Salivary excretion of drugs, excreting of drugs via sweat, excretion of drugs in to milk, penetration of drugs into eye, transfer across placenta, passage of drugs into and out of cerebrospinal and brain. Consideration of one, two and multiple compartment model on Intravenous administration, Intravenous infusion and first order absorption of single dose.

B) Pharmacognosy

Plant growth regulators. Origin of secondary metabolism in relation to the basic metabolic pathway. Methods of investigation of biosynthetic pathway such as tracer techniques and autoradiography, biogenesis of some important secondary metabolites, stress compound. WHO guidelines for assessment of crude drug. Mutation – polyploidy and hybridization in relation to the improvement of vegetable drugs, chemical rashes. Cell – tissue culture techniques role of plants growth regulators, micro-propagation of medicinal and aromatic plants, germplasm storage and methods of cell immobilization.

C) Pharmacology

Clinical Pharmacokinetics: Dose – response in man, Influence of renal and hepatic disease on pharmacokinetics, Therapeutic drug monitoring, Population pharmacokinetics. Adverse drug reactions: Definition and classification, epidemiology, predisposing factors, mechanism of ADR & different types of ADR. Statistical treatment of model problems in evaluation of drugs. Methods of biological assay, principles of biological assays with certain examples. Development of new bioassay methods. Receptors, ion channels and their modulators i.e. calcium, potassium, sodium and chloride channels, enzymes and

carrier proteins, mechanism of signal transduction.

D) Quality Assurance

General principles of validation of processes- manufacturing & analytical, and products. Calibration of instruments, equipments, etc. & their validation. Types of validation - prospective, concurrent, retrospective and revalidation. Genesis of Quality control and Quality Assurance. Concept of Total Quality Management; CGMP and GLP, ICH and ISO 9000. Statistical Quality Control. Types of sampling systems/plans followed and interpretation.

E) Pharmaceutical Chemistry

Historical perspective, Drug Discovery Strategies in Direct Drug Design (Structure based) and Indirect drug design, Target selection and lead identification, Natural product sources, Fermentation / Microbial sources, Synthetic, Introduction to pharmacogenomics. QSAR: Parameters, Lipophilicity, electronic, stearic factors, Quantitative Models, Hansch analysis, Free Wilson Analysis, Mixed approach, Other QSAR Approaches, Applications of Hansch Analysis, Free Wilson Analysis.

***

Chhattisgarh Swami Vivekanand Technical University, Bhilai

List of Approved Research Center

S. No.	Name of Research Center	Name of discipline
1	Bhilai Institute of Technology, Durg	Applied Chemistry
		Applied Mathmatics
		Applied Physics
		Civil Engineering
		Computer Application
		Electrical & Electronics Engineering
		Information Technology
		Computer Science Engineering
		Electrical Engineering
		Electronics & Telecommunication
		Mechanical Engineering
		Managment
2	Shri Shankaracharya Technical Campus, (Shri shankaracharya Group of Institutions) Junwani, Bhilai	Applied Chemistry
		Applied Mathmatics
		Applied Physics
		Computer Application
		Computer Science Engineering
		Electrical Engineering
		Electrical & Electronics Engineering
		Electronics & Instrumentation
		Electronics & Telecommunication
		Information Technology
		Mechanical Engineering
		Management

Chhattisgarh Swami Vivekanand Technical University, Bhilai

List of Approved Research Center

S. No.	Name of Research Center	Name of discipline
3	Shri Shankaracharya Technical Campus Junwani Bhilai (Shri shankaracharya Engineering College)	Applied Physics
4	Rungta College of Engineering & Technology, Bhilai	Applied Chemistry
		Applied Mathmatics
		Applied Physics
		Computer Application
		Computer Science Engineering
		Electrical Engineering
		Electronics & Telecommunication
		Mechanical Engineering
		Humanities
		Managment
5	Disha Institute of Management & Technology, Raipur	Applied Chemistry
		Applied Physics
		Managment
6	Raipur Institute of Technology, Raipur	Bio-Technology
		Mechanical Engineering
		Chemical Engineering
		Applied Chemistry
7	Chhatrapati Shivaji Institute of Technology, Durg	Computer Application
		Computer Science Engineering
		Mechanical Engineering
8	Columbia Institute of Pharmacy, Raipur	Pharmacy
9	School of Studies – Pharmacy (Chouksey Engineering College Bilaspur)	Pharmacy
10	Shri Rawatpura Sarkar Institute of Pharmacy, Kumhari, Durg	Pharmacy (Pharmaceutical Science)
11	Rungta College of Pharmaceutical Sciences and Research, Bhilai	Pharmacy

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seats with Discipline

S. No.	Name of discipline	No. of Vacant Seat
1	Applied Chemistry	60
2	Applied Mathmatics	77
3	Applied Physics	50
4	Humanities	05
5	Managment	27
6	Bio-Technology	05
7	Chemical Engineering	11
8	Pharmacy	101
9	Civil Engineering	20
10	Computer Application	18
11	Computer Science Engineering	58
12	Electrical Engineering	13
13	Electrical & Electronics	10
14	Electronics & Instrumentation	00
15	Electronics &	23
16	Information Technology	08
17	Mechanical Engineering	99
TOTAL		**585**

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Bhilai Institute of Technology, Durg**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Civil Engineering	DR. M. K. GUPTA	Structures	3
		DR. S.K. JAISWAL	Water Resources	5
		DR. S.J. SINDHU	Envirnomental	6
		DR. S. P. MISHRA	Civil	6
2	Mechanical Engineering	DR. ARUN ARORA	Thermal	2
		DR. S.K. GANGULY	Production	2
		DR. S.K. MOULICK	Design	2
		DR.(MRS.) SHIENA SHEKHAR	Production	5
		DR. RAGHWENDRA BANCHHOR	Production	6
		DR. MANOJ KUMAR PAL	Thermal	6
		DR.(MRS.) SUBHRATA NAGPAL	Design	6
3	Electrical Engineering	DR.(MRS.) SHASHWATI RAY	Optimization & Control	4
		DR.S.P.SHUKLA	Power Systems	1
		DR.(MRS). A. GUPTA		6
4	Electronics & Telecommunication	DR. MANISHA SHARMA	Electronics & Communication	0
5	Computer Science Engineering	DR. METTA VENKATA PADMAVATI	Algorithms, Formal Languages and Automata theory	4
		DR. RAMESH KUMAR	Moems Moduling &	0
		DR. ARPANA RAWAL	Data Structures	5
6	Information Technology	DR. ANI THOMAS	Text Mining & Subjective	6
7	Electrical & Electronics	DR. ANUP MISHRA	Instrumentation & Control	4
		DR. SUREKHA BHUSNUR	Instrumentation & Control, Robust Control	6
8	Computer Application	DR. SANJEEV KARMAKAR	Computer Application	1
9	Applied Physics	DR.(MRS.) RUBY DAS	Electronics Plasma	3
		DR. SAMIT TIWARI	Solid State Solid state Physics	6
		DR. RAJESH LALWANI	Electronics Experimental Solid State Materials	6
10	Applied Chemistry	DR. MADHURIMA PANDEY	Envirnomental Chemistry	5
		DR. SANTOSH SAR	Surface Chemistry Kinetics	4
		DR. SHWETA CHOUBEY	Envirnomental Chemistry	6
		DR. SUMITA NAIR	Inorganic Chemistry	6

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Bhilai Institute of Technology, Durg**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
11	Applied Mathmatics	DR. A. NARAYAN	Celestial Mechanics & Stability Therory	**2**
		DR. SANJAY SHARMA	Fun Analysis & Fixed Point & Fuzzy Logic	**4**
		DR. N.K. SINGH	Fun Analysis & Fixed Point	**6**
		DR. M.D. PANDEY	Celestial Mechanics	**6**
		DR. A.K. DUBEY	Functional Analysis	**6**
12	Managment	DR. SANJAY GUHA	Marketing, HR	**1**
		DR. ASHOK CHANDRA	Marketing	0
		DR. URVASHI SHRIVASTAVA	Finance	**6**
		DR. SHEETAL SHARMA	Human Resource	**6**

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Shri Shankaracharya Technical Campus, (Shri Shankaracharya Group of Institutions) Junwani Bhilai**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Mechanical Engineering	DR. J.K.TIWARI	Mech. Engineering	6
		DR. P.B. DESHMUKH	Mech. Engineering	1
		DR. GAURAV GUPTA	Mech. Engineering	6
		DR. UMESH KUMAR VISHWAKARMA	Mech. Engineering, Production Engg.	6
2	Electrical & Electronics Engineering	DR. R.N. PATEL	Power System Energy System	0
3	Electronics & Telecommunication	DR. MONISHA SHARMA		1
		DR. NEETA TRIPATHI	DSP Speech Processing	3
		DR. R.H. TALWEKAR	VLSI	5
4	Computer Science Engineering	DR. SHRIKANT TIWARI	Biometrics Image Processing	6
		DR. PADMA J BONDE	Wireless Networking	6
		DR. SIDDHARTHA CHOUBEY	Image Processing,	6
		DR. ABHA CHOUBEY	Medical Image Processing	6
		DR. AKHILESH TIWARI	Signal Processing Encryption Security	6
5	Information Technology	DR. G. R. SINHA	Digital Image Processing	2
6	Computer Application	DR. SMITA SELOT	NLP, KR	5
		DR. SNEHLATA BARDE	Multimodal Biometrics	6
7	Applied Physics	DR. M.L. VERMA	Material Science	3
		DR. MINI A. PATERIA	Solid StatePhysics,	2
		DR. D.D. RAGHUWANSHI	Solid State & Opto-	6
		DR. K. DESHMUKH	Solid State Physics	6
		DR. B. KESHAV RAO	Material science	6
8	Applied Chemistry	DR. SUPRIYA BISWAS	Kinetics	1
		DR. REKHA TRIVEDI	Envirnomental Field	6
		DR. PRACHI P NIMJE	Organic Chemistry	6

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Shri Shankaracharya Technical Campus, (Shri Shankaracharya Group of Institutions) Junwani Bhilai**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
9	Applied Mathmatics	DR. SAMIR DASHPUTRE	Celestial Mechanics & Stability Therory	2
		DR. RAKSHA RANI AGRAWAL	Fun Analysis & Fixed Point & Fuzzy Logic	6
		DR. VANDANA RAI	Fun Analysis & Fixed Point	6
		DR. SHILPI DEWANGAN	Celestial Mechanics	6
		DR. M.M SINGH		4
		DR. SANDEEP SHRIVASTAVA	Functional Analysis	5
10	Managment	DR. SOUREN SARKAR	Marketing, HR	2
		DR. MONICA SHRIVASTAVA	Management	5
11	** Pharmacy	DR. A.K.JHA	Pharma. Chemistry	3
		DR. SHEKHAR VERMA	Pharmaceutics	4
		DR. ROHITASH DESHMUKH	Biotechnology	6

Note	** The institute is not reconized in Pharmacy but eligiable supervisor can supervise the scholars using the nearest Research Center as the place of work.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Rungta College of Engineering & Technology, Bhilai (R1)**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Mechanical Engineering	DR. RAKESH L. HIMTE	Production Engineering	3
2	Electrical Engineering	DR. SATYA PRAKASH DUBEY	Power Electronics	2
3	Electronics & Telecommunication	DR. MOHAN AWASTHI	Digital VLSI Design & Testing	4
		DR. HARPAL THETI	Signal Processing	4
		DR. SANDEEP KUMAR	Signal Processing	6
4	Computer Science Engineering	DR. H. R. SHARMA	Data Mining, Network Analysis	0
		DR. SIPI DUBEY	Image Processing	0
		DR. SOURABH RUNGTA	Computer Networking	5
		DR. ASHA AMBHAIKAR	Data Mining, Mobile-	4
		DR. NITIN MISHRA	Web Security & Machine Learning System	6
5	Computer Application	DR. S.M. GHOSH	Cloud Computing & Software Engg.	4
6	Applied Physics	DR. ARTI VERMA	Applied Physics	6
		DR. ARCHANA SHARAN	Applied Physics	6
7	Applied Chemistry	DR. MANISHA AGRAWAL	Physico-Organic Chemistry	4
		DR. ABHA SINHA	Organic Chemistry	6
		DR. RICHA SHARMA	Organic Chemistry	6
8	Applied Mathmatics	DR. SHUBHASH CHANDRA SHRIVASTAVA	Celestial Mechanics & Stability Therory	6
		DR. NIDHI SHRIVASTAVA	Fun Analysis & Fixed Point & Fuzzy Logic	6
		DR. MANJU SANGHI	Fun Analysis & Fixed Point	6
		DR. C. RAMESH	Celestial Mechanics	6
9	Managment	DR. MANOJ VERGHEESE	Marketing & Finance	2
10	Humanities	DR. JAYA MISHRA	Poetry (T.S. Eliot Literature)	5

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Chhatrapati Shivaji Institute of Technology, Durg**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Mechanical Engineering	DR. ANURAG VERMA	Design (Mechanisms)	6
		DR. MAHESH B. PARAPPAGOU	Manufacturing Science	6
		DR. K. SRIDHAR	Quality Engg.	6
		DR. PANKAJ KUMAR GUPTA	Thermal & Fluid Mechanics	6
		DR. VIVEK MISHRA	Production	6
2	Computer Science Engineering	DR. PUNYABAN PATEL	Inage Processing, Software Engg.	4
3	Computer Application	DR. PUNYABAN PATEL	Wireless & Sensor Network, Cloud Computing	2

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Raipur Institute of Technology, Raipur**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Mechanical Engineering	DR. J. SUDHEER REDDY	Composite Materials	6
		DR. M. VENU GOPALA RAO	Production Technology	6
		DR. N. K. SAIKHEDKAR	Heat Transfer & solar Energy	6
2	Biotechnology	DR. TANUSHREE CHATTERJEE	Microbiology	5
3	Chemical Engineering	DR. HARENDRA KUMAR	Three Phase Fluidization	5
		DR. R.K. TIWARI	Design & development	6
4	Applied Chemistry	DR.(Mrs.) DEEPTI SAHARE	Organic Chemistry & Envirnomental Chemistry	6

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Disha Institute of Management and Technology, Raipur**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Management	DR. J. H. VYAS	Human Resource	5
2	Applied Chemistry	DR. SONAL CHOUBEY	Chemistry Envirnoment	4
3	Applied Physics	Supervisor not available		

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **School of Pharmacy, Chouksey Engineering College, Bilaspur (C.G.)**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Pharmacy	DR. D.K. AHIRWAR	Pharmacognosy	2
		DR. SWEETY LANJHIYANA	Pharmacognosy	6
		DR. RITESH JAIN	Pharmacology	6
		DR. SHRUTI RATHORE	Pharmaceutics	6
		DR. UTPAL JANA	Pharmaceutics	6
		DR. STATISH SAHU	Pharma. Chemistry	6
		DR. NEERAJ KUMAR SHARMA	Pharmacognosy	6

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Rungta College of Pharmaceutical Science and Research, Bhilai (C.G.)**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Pharmacy	DR. DULAL KRISHNA TRIPATHI	Pharmaceutics	2
		DR. AJAZUDDIN	Pharmaceutics	6
		DR. AMIT ALEXANDER	Pharmaceutics	6
		DR. KARTIK TULARAM NAKHATE	Pharmacology	6

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Shri Rawatpura Sarkar Institute of Pharmacy, Kumhari, Durg (C.G.)**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Pharmacy	DR. CHANCHAL DEEP KAUR	Pharmaceutics	6
		DR. HEMANT KUMAR DHONGADE	Pharmacognosy	6
		DR. KHOMENDRA KUMAR SARWA	Pharmaceutics	6
		DR.(Mrs.) PRANITA KASHYAP	Pharmaceutical Chemistry	Left Institute
		DR. SUHAS N. SALARKAR	Pharmaceutics	Left Institute

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Columbia Institute of Pharmacy**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Pharmacy	DR. AMIT ROY	Pharmacognosy	1
		DR. RAVINDRA PANDEY	Pharmacognosy	6
		DR. RAM KUMAR SAHU	Pharmacognosy	6
		DR. SHIV SHANKAR SHUKLA	Quality Assurance	6
		DR. TRILOCHAN SATAPATHY	Pharmacology	6

Chhattisgarh Swami Vivekanand Technical University, Bhilai

No. of Vacant Seat at Research Center

Name of research Center: **Shri Shanakaracharya Technical Campus Junwani Bhilai (Shri Shanakaracharya Engineering College)**

S. No.	Name of discipline	Name of Supervisor	Specialization	Total No. of Vacant Seat
1	Applied Physics			No Guide Available

CHHATTISGARH SWMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI

Ordinance No. 10

(Under Section 38)

Modified Ordinance for Doctor of Philosophy

(The underlined portion in the following paragraphs is the modification/addition)

Preamble

1. The degree of Doctor of Philosophy (Ph.D.) may be granted in any discipline belonging to any Faculty of Chhattisgarh Swami Vivekanand Technical University (hereinafter: University), in which Post-Graduate studies and/or research is available at the University or at its affiliated Colleges/Institutions that are recognized as Research Centers by the University.

2. All academic matters related to Ph.D. degree shall be processed by a Departmental Research Committee (hereinafter: DRC) consisting of the following:

i. Head of the School/Department (Chair), for UTD or Principal/Director (Chair) for affiliated Colleges/Institutions of the University
ii. Head of the concerned department for affiliated college/institution provided the Head of the department holds a Doctorate degree in the relevant discipline
iii. Two members from the UTD/Research Center who are recognized as Ph.D. Supervisors
iv. One member nominated by the Kulpati

Provided that three members including the Chairman will form the quorum.

3.0 Eligibility for registration for degree of Doctor of Philosophy

A candidate for the PhD must at the time of application

3.1 Holds Master's degree with at least 55% marks or an equivalent grade of the University, a deemed University or any other University incorporated by any law for the time being in force and recognized by the University.

OR

He/She possesses M. Phil. degree through a regular programme from an University, a deemed university or any other university incorporated by any law for the time being in force and recognized by the university, who has at least three years of experience of research/teaching with at least three papers published in standard research journals (with ISSN) may be permitted to get registered for Ph.D. degree, even if he/she does not possess 55% marks at Master's Level.

OR

He/She holds Bachelor of Engineering/Technology/Architecture/Pharmacy Degree of a recognized University with at least 65% marks or equivalent in aggregate and possessing demonstrable research capabilities shall be eligible to seek enrollment for the Degree of PhD under special circumstances.

3.2 The requirement of marks at the Master's level may be relaxed to a maximum of 5% for SC/ST/Differently abled candidates.

3.3 The selection for admission to Ph.D. degree programme will be done through an Entrance Test to be conducted at the University level followed by personal interview of the candidate. The Entrance Test will be conducted at the University level once in an year (however looking into the number of applications the frequency of holding the Entrance Test may be increased to Twice in an year)

3.4 The requirements of entrance test is relaxed for

i. Candidates with valid score card of UGC/CSIR (JRF) examination, NET, SLET or GATE.
ii. Candidates possessing M.Phil. degree through a regular programme from an University, a deemed university or any other university incorporated by any law for the time being in force and recognized by the university.
iii. Teacher fellowship holder and University/College teachers holding a regular position (regular appointment) and has completed two years of service as teacher in a department of the University/affiliated college/Institution.
iv. Scientist of any recognized National/International Institutions having two years of research experience.

3.5 The validity of the Entrance Test will be for two years.
3.6 The cut-off marks for the entrance test will be 50%.
3.7 The modalities of the Entrance Test will be decided by the University.
3.8 The DRC shall scrutinize the candidate's eligibility for appearing at the entrance test.

4.0 Procedure for Admission/Registration

4.1 An eligible candidate (refer clause 3) must apply for registration for Ph.D. degree of his/her subject on the prescribed form obtainable on payment of prescribed fee. The application shall be considered by the DRC of the concerned UTD/School of the University/Affiliated College/Institution.

4.2 The DRC will allocate the Supervisor/Co-supervisor, with mutual consent of the candidate and Supervisor/Co-supervisor, for an eligible candidate depending on the number of students per Supervisor/Co-Supervisor, the available specialization among the faculty supervisors and the research interest of the student as indicated during personal interview of the student.

4.3 Supervisors must be a faculty member of the School/Teaching department of the University or a regular teacher (regular appointment) or a superannuated teacher of the University/Affiliated college/Institution previously holding a regular position.

4.4 Co-supervisor can be outside the jurisdiction of the University as well.

4.5 All eligible candidates except in 3.4 (ii) shall be required to undertake course work for a minimum period of one semester. The course work must include Research Methodology which may consist of quantitative methods and computer applications. The course content shall be designed by the Board of Studies (BoS) of the concerned subject. The course work may also involve reviewing of published research works in the relevant field.

4.6 The scheme of teaching and examination for the course work will be decided by the University. The contents of the course work/s specific to the area of research of the candidate are to be proposed by the Supervisor in consultation with the Co-Supervisor/s if any.

4.7 On the recommendation of the supervisor, the course work may be carried out by the candidates at the approved Research Center/University/any other recognized oragnisation outside the jurisdiction of the University. The candidate shall be evaluated at the end of the semester. If the candidate is not able to pass the course with minimum 50% marks in aggregate along with at least 40% marks in theory paper of the concerned subject and at least 60% marks in the internal assessment, the candidate shall be allowed to reappear at the examinations within next 12 months. The respective DRC will conduct the evaluation at the Institutional /Departmental level.

4.8 While granting provisional admission to the candidates to Ph.D. programme the DRC will pay due attention to the National/State reservation policy.

4.9 The candidate shall have to pay fees as decided by the University from time to time.

4.10 Provided that the teachers of the University/Affiliated colleges and teachers under the UGC/AICTE teacher fellowship scheme or any other scheme will not be required to pay the fees, except the registration fee and six-monthly progress report fee.

Note: *No TA/DA shall be payable to the candidates appearing at the Personal Interview. In case of postponement of the Personal Interview due to unavoidable reasons, no compensation will be provided to the candidates.*

5.0 Research Degree Committee (RDC)

The candidate shall be eligible to submit synopsis (as per the prescribed format) of his/her proposed research work, after successfully completing the course work, alongwith the title of the thesis (in six copies) duly forwarded by the Chairman of the relevant DRC. He shall be required to make an oral presentation of the proposed work before the Research Degree Committee (RDC) consisting of the following members:

i. Kulpati or his nominee.
ii. Dean of the faculty.
iii. Head of the University Teaching Department/School of Studies/Institution in the subject.
iv. Chairman, Board of Studies in the subject.
v. One external subject expert of the rank of University Professor to be nominated by the Kulpati, ordinarily out of a panel of 5 experts given by the Chairman of the Board of Studies concerned. The term of panel shall be co-terminous with the term of Chairman Board of Studies.

External Expert and two other members will form the quorum.

Note:

i) The Supervisor/Co-Supervisor are entitled to be present during the oral presentation of the candidate.
ii) No TA and DA shall be payable to the candidate and the supervisor/co-supervisor (if any) for attending the RDC meeting.

6.0 The meeting of the RDC shall be held in the University office twice a year preferably in July and January. The committee shall confirm a list of approved Supervisor/Co-Supervisor along with their specialization, prepared by the DRC. This list shall be available with the Registrar/Academic Section of the University.

The committee shall formally recommend the registration of the candidate for the Ph.D. Degree.

On approval by the RDC the candidate shall be registered and enrolled as a student from the date of his/her application. He/she will also be required to pay regular tuition, library and laboratory fees (six-monthly) during his/her research tenure. The RDC has the right to suggest revision/alterations (if required) in the synopsis forwarded by the DRC.

Provided that if the RDC does not recommend a candidate for registration to Ph.D. Degree, the caution money deposited by the candidate shall be refunded.

7.0 A candidate shall ordinarily be permitted to work for Ph.D. degree in the subject in which he/she has obtained his/her Post-graduate degree or the Bachelor degree (as per clause 3).

Provided that research work leading to Ph.D. degree may be encouraged in allied subjects of interdisciplinary nature of the same faculty or of allied faculties. In such cases the candidate may also be permitted to work under one or two co-supervisors, along with the supervisor of the University.

8.0 A candidate shall pursue his/her research at the institution from where his/her application form has been forwarded under Clause 3 (b) of the Ordinance.

Provided that a candidate permitted to work in a research establishment recognized by the University shall be required to take at least one co-supervisor along with the supervisor; one of them should be the teacher of the University and the other a Teacher/Scientist/Research Officer/Director of the Institution where the candidate is actually working.

* Includes Institutions and Laboratories run and sponsored by the Union/State Governments or its agencies; and Foreign University/Institution of repute.

Provided also a candidate may be permitted to carry out his/her research/practical work in a Research Institution/Research Laboratory/Laboratory of a University recognized by the University for the purpose under the supervision of a Scientist/Director/Teacher of the Institution who or may not be the co-supervisor of the candidate.

9.0 Supervisor/Co-supervisors

The person recommended as Supervisor/Co-supervisor to guide the Research Scholar must be:

A Professor in a University Teaching Department/School of Studies.

OR

A Reader/Associate Professor of the University/ a Professor, Associate Professor/Reader in a College/Institution affiliated to the University possessing a Doctorate Degree and has published five research papers in standard Research Journals.

OR

A Lecturer/Assistant Professor of the University Teaching Department/School of Studies/Colleges affiliated to the University who has obtained a Doctorate Degree in the subject and has published at least five Research papers in standard Research Journals (with ISSN) and has at least <u>five years of teaching experience</u>.

However, in order to encourage research interest among teachers of this category, exemption from five years teaching experience shall be granted to those who have been awarded with research projects from the State (for example CGCOST)/National (for example DST, CSIR, UGC etc.) International (for example, WHO, Ford Foundation etc.) Sponsoring Agencies or those who have already published at least five papers SCI/SSCI/A&HCI journals (as listed and revised by Thomson Reuters from time to time).

OR

A Scientist /Director/Scholar not below the rank of a University lecturer/Assistant Professor, working in a State or Central research Institute /Organization/ Establishment/Laboratory/Library recognized by the University as a research centre, who has obtained a Doctorate Degree in the subject and published 5 research papers on concerned subject in Standard journals and has five years of experience in the respective field.

Provided that a recognized supervisor who fails to publish and research paper/publication over duration of five years shall not be eligible to enroll and new candidate under his/her supervision.

Provided that the persons who have been recognized as Supervisors/Co-supervisors shall be eligible to supervise even after their superannuation. However, in this case the superannuated faculty, with their permission of the Chairman, DRC, shall have to co-opt and additional Co-supervisor, who is in service, from the relevant research center approved by the University.

Provided also a recognized Supervisor/Co-supervisor under the repealed ordinance shall continue to be recognized as Supervisor/Co-supervisor.

The person recommended as Co-Supervisor to guide the Research Scholar must be:

(a) A recognized Supervisor of the University

(b) An Officer working in the University/Organization of State/Central Government who has obtained a doctorate degree in the relevant subject and has published at least five research papers in reputed journals (with ISSN) and has at least two years of experience in teaching /research.

(c) A Scientist/Director working in a research institute/organization/ establishment/ laboratory recognized by the University as a research center, who has obtained a doctorate degree and published five research papers on concerned subject and has two years post-doctoral research experience.

Provided further that a person who is himself registered for Ph.D. degree of the University in the subject shall not be eligible to act as Supervisor/Co-supervisor in the concerned subject or member of the RDC related to the concerned subject mentioned in this Ordinance.

9.1 Any teaching department/Center/School of University/Research laboratory of State/Central Government or Government undertaking or an affiliated college/institution may apply for getting the recognition as research center for carrying out Ph.D. Degree programme on depositing the required fees for the same.

The teaching department/Center/School/affiliated college/institution, organization will be recognized as a Research Center based on the recommendations of a committee formed for this purpose.

Once an establishment has been recognized as a Research Center will continue to act as recognized Research Center of the University, however, the University will have the right to make surprise visit and if not found updated for the purpose of carrying out research programme, the organization/institution may be de-recognized as a Research Center.

10.0 Tenure of Ph.D. Work

(a) The candidate shall pursue his/her research at the approved research center under the Supervisor/Co-supervisors on the approved subject and topic. The candidate shall be permitted to submit his/her thesis not earlier than 24 months and not later than four calendar years from the date of registration. In case a candidate does not submit his/her thesis within four calendar years, from the date of registration and does not apply for extension on time, his/her registration shall stand automatically cancelled. Provided that the period for submission of thesis can be extended by one year by the Kulapati, if he/she applies for extension within one month after the expiry of registration period together with the prescribed fee. In case the candidate does not submit his/her thesis within the extended period, his/her registration shall stand automatically cancelled.

Provided also that Kulpati may permit a candidate to get re-registered on the same topic on payment of the prescribed re-registration fee. The minimum period of 24 months and attendance shall not apply to such re-registered candidate.

(b) The candidate possessing M. Phil degree or a teacher (as per clause with 3.4) 2 years teaching experience at the time of registration can submit his/her thesis after 18 months instead of 24 months as provided in clause 10 (a) of the Ordinance.

(c) The candidate shall put in at least 200 days attendance, including actual attendance he/she will earn during the course work, in the Institution or with the Supervisor.

11.0 Change of Supervisor

The candidate may be allowed to change the Supervisor by the Kulapati, on the recommendation of the committee constituted by the Kulapati for this purpose under special circumstances. No major change in the topic of research will be permitted due to changes in supervisor.

12.0 Six-monthly progress Report

The candidate shall submit every six months a record of attendance, receipt of fees paid and progress report of the work through his/her supervisor in the prescribed format. If the progress of work is not found to be satisfactory in two successive reports or no reports are received for a period of one year or the candidate fails to deposit the prescribed fees, the Kulapati may order the removal of the name of the scholar from the list of those registered for the Ph.D. degree.

13.0 Submission of Summary of Thesis

(a) Prior to submission of the thesis, the candidate shall make a pre-Ph.D. presentation before the DRC that may be open to all faculty members and research students, for getting feedback and comments, which may be suitably incorporated into the draft thesis under the advice of the supervisor.

(b) The candidate shall submit six copies of the summary of the thesis together with a list of at least two research papers published or accepted for publication in a standard journal through his/her Supervisor to the Registrar about two months prior to the anticipated date of submission of the thesis.

(c) The supervisor shall submit a panel of at least six names of examiners actively engaged in the concerned area of research not below the rank of University Reader/Associate Professor or College Professor in a sealed cover to the Registrar. Provided that the panel of examiners shall be obtained from the Chairman, Board of Studies of the Subject concerned, in case the candidate is related to the supervisor.

(d) On the receipt of the panel of examiners from the supervisor and summary from the candidate, the Registrar shall call a meeting of Examination Committee of the subject constituted as per the statute & ordinance of the University. The Committee considering the panel submitted by the Supervisors/Chairman, Board of Studies will prepare a panel of six names to act as examiners.

(e) The term "relations" shall include: Father, Mother, Wife, Husband, Daughter, Son, Grand Son, Grand Daughter, Brother, Sister, Nephew, Niece, Grand Nephew/Niece, Uncle, Aunt, Son-in law, Sister-in law, Father-in-law, First cousin-in-law etc.

(f) The Kulpati shall appoint two examiners from outside the state out of the panels submitted separately by the Supervisor and Examination Committee.

(g) The consent of the examiners shall be obtained by sending them the extended abstract.

14. The candidate shall submit three hard copies of his/her thesis along with the followings:

(a) The candidate shall have to produce evidence of publication of two research papers (or evidence of acceptance for publication) based on this /her thesis work in standard journal. Such evidence (reprints of publications or acceptance letter for publication) has to be appended at the end of the thesis).

(b) The thesis must be accompanied by a declaration from the candidate that the thesis embodies his/her own work and he/she has worked under the Supervisor at the approved Research Center for the required period as per provisions of Clause-10 of the Ordinance.

(c) The certificate from the Supervisor together with Co-supervisor, if any, that the thesis fulfills the requirements of the Ordinance relating to the Ph.D. degree of the University is to be attached.

(d) The candidate shall also remit with the thesis the prescribed examination fee.

(e) Submission of Electronic copy of the Thesis/Dissertation (ETD) is mandatory at the time of submission of the Ph.D. thesis. The University shall submit a soft copy to UGC within a period of fifteen days after the award of the degree, for hosting the same in INFLIBNET, accessible to all Institutions/Universities.

(f) The thesis must follow the guidelines of the University for writing the Ph.D. Thesis.

15. Evaluation Procedures following Submission of the Thesis

On receipt of the thesis along with the certificates and fee it shall be sent to the examiners already consented as per Clause 13 (g) of the Ordinance.

16. The thesis to be accepted for the award of the Ph.D. degree must comply with the following conditions.

(a) It must be a piece of research work characterized either by the discovery of the facts or by a fresh approach towards the interpretation of facts or an innovative application in the area of engineering & technology. In either case it should evince the candidate's capacity for critical examination and sound judgment.

(b) It must be satisfactory in point of language and presentation of the subject matter.

17. The examiners shall categorically recommend in the prescribed proforma for acceptance, revision or rejection of the thesis together with detailed comments on the points spelled out in clause 16 of the Ordinance. The examiner must also give a list of the questions he/she wishes to ask at the viva-voce examination.

18. (a) The examiners may seek clarification of the subject matter of the thesis from the

Supervisor. The provision will be incorporated in the letter to be sent to the examiners while sending the thesis.

(b) The Kulapati can recall the thesis from an examiner who fails to send the report within three months of the date of dispatch of the thesis and appoint another examiner.

19. **(a)** In case both the examiners reject the thesis or one of them rejects the thesis and the other recommends a revision the thesis shall be rejected.

(b) If both the examiners recommend for the revision of the thesis the candidate shall be called upon to revise the thesis in the light of the observations of the examiners.

(c) If one examiner approves the thesis and the other rejects it or recommends for revision, the thesis shall be sent to the third examiner drawn from the panel of the examiners by Kulapati. The opinion of the third examiner shall be final.

(d) In case both the original examiners accept the thesis for the award of the Ph.D. Degree or in the event of it being referred to the third examiner, the third examiner accepts the thesis for the award of Ph.D. degree, the candidate shall be called upon to appear at the viva-voce examination before a board examiners comprising of the Supervisor, Co-Supervisor (if any) and one of the two examiners selected by the Kulapati who has accepted the thesis for the award of the Ph.D. Degree. Provided that the Kulapati shall appoint the Chairman, DRC or Chairman, Board of Studies of the subject concerned to act as viva-voce examiner, in place of the Supervisor in case the candidate is related (Clause 13 e) to the Supervisor.

(e) The Supervisor, Co-Supervisor, Chairman of DRC, Dean of the Concerned Faculty, Chairman of Board of Studies of the subject concerned, as the case may be, shall be communicated the name of the external examiner appointed by the Kulapati to conduct the viva-voce examination at the approved Research Center where the candidate has carried out his/her research work.

Provided in special circumstances, Kulapati may appoint alternate viva-voce examiners if both the examiners are not in a position to conduct the viva-voce examination.

(f) The date, time and place of viva-voce examination shall be notified by the Head of the UTD/School of University/Head of the affiliating college/Institution on the concerned Notice Board about a week in advance under intimation to Registrar of the University. At the time of viva-voce examination the board of examiners shall be provided with the reports of the examiners which shall be returned along with the report of viva-voce examination and record of attendance of the examination to the Registrar.

(g) The candidate shall present the work embodied in the thesis before the board of examiners, members of the faculty, research scholars and other interested persons. After the presentation of the research work the Board shall ask questions together with those questions which have been provided along with the reports of the examiners. Others in the audience can also ask questions and the candidate shall reply only those questions permitted by the external examiner.

(h) In case the recommendation of the viva-voce examiner differs from that of the thesis examiner or there is difference of opinion between the viva-voce examiners, the candidate shall re-appear at a second viva-voce examination within six months. If the candidate fails to satisfy the viva-voce examiners a second time, his/her thesis shall be finally rejected. Such candidates would be required to pay the prescribed additional fee for the second viva-voce. The external examiner for second viva-voce shall be appointed by the Kulapati.

20. If the examiners recommend that the candidate be asked to revise/improve his thesis, the Kulpati shall permit the candidate to resubmit his thesis not earlier than six months and not later than eighteen months the period being counted from the date of the issue of order to the candidate. The candidate shall be provided examiner(s) reports without disclosing the names of the examiners to enable him/her to improve the thesis. All the copies of the thesis shall be returned to the candidate.

In case the candidate is allowed to resubmit the thesis he/she will have to pay the prescribed fee afresh at the time of resubmission, but it shall not be necessary for him to reproduce any certificate of further attendance at the institution at which he/she carried out the work.

The resubmitted three copies of the thesis must make clear mention that it is a revised version.

The thesis shall be got examined as far as possible, by the examiners who recommended the revision.

In case a candidate is asked to revise under clause 19 and one of the examiners recommends again for revision and the other accepts the thesis for award then the thesis shall be sent to the third examiner. If the third examiner rejects or recommends for revision the thesis shall stand rejected. In case the examiner accepts for award of Ph. D. degree then the candidate shall be awarded the Ph. D. degree on successful viva- voce examination as per provision of clause 19 of the Ordinance.

If the revised thesis required to be revised a second time it shall automatically stand rejected.

21. Maximum number of research candidates that can be registered and allowed to pursue research work under a supervisor at any particular time shall be six only. The submission of a thesis shall create a vacancy for the admission of a new candidate for Ph.D. degree under the concerned supervisor.

Provided that the candidates registered with the Co-supervisor shall not be counted for the number of candidates under a supervisor.

Provided that the candidates registered with the co-supervisor shall not exceed five candidates.

22. No research scholar shall join any other course of study or appear at any other examination conducted by any University leading to a degree (except Certificate/Diploma course of languages, Research Methodology, Statistics, and Computer Science).

23. The candidate, if so desires, is allowed to publish his/her thesis. However, such publication shall state on the title page itself that this was a thesis approved for the award of the Ph.D. degree of the University.

24. The University agrees that a Ph.D. student is the owner of the copyright in his/her thesis.

25. After the viva-voce, the recommendation of the examiners shall be reported to the Executive Council for the award of Ph.D. Degree to the candidate. One copy of the thesis will be kept in the University library and another copy will be kept in the Departmental Library of the Institution where the research work was carried out; the third copy will be returned to the Supervisor.

Along with the Degree, the University shall issue a Provisional Certificate certifying to the effect that the Degree has been awarded in accordance with the provisions of the UGC (Minimum Standards and Procedure for the Awards of M.Phil./Ph.D. Degree) Regulation, 2009

26. After the declaration of the result, the candidate on payment of prescribed fee may be provided with the copies of the reports of examiners who recommended for the award of the Ph.D. degree on payment of the prescribed fee. The reports will not disclose the identity of the examiners.

27. The candidates who have been already registered for Ph. D. degree under the repealed/previous Ordinance shall continue to be governed by the provision of the repealed/previous Ordinance.

The candidates who have applied for registration but have not been registered till this Ordinance comes into force shall be governed by the provisions of this Ordinance.

28. On detection of any irregularity, the University shall take suitable steps to withdraw the degree as per the provisions of the Ordinance & Statute of the University.

29. In all cases Kulpati shall have powers to condone the time limit up to six months for valid reasons to be recorded therein.

-0000-