

# 2017 SYLLABUS SCHEME B. TECH IN COMPUTER SCIENCE & ENGINEERING



# VEER MADHO SINGH BHANDARI UTTARAKHAND TECHNICAL UNIVERSITY



# EVALUATION SCHEME & SYLLABUS W.E.F. ACADEMIC SESSION 2009–10

## **SCHEME OF EXAMINATION**

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## **SYLLABI**

## for

## B.Tech I<sup>st</sup>Year (Common to All B.Tech Courses) (Effective from the session: 2009-2010)



Uttrakhand Technical University, Dehradun

## UTTRAKHANDTECHNICAL UNIVERSITY, DEHRADUN STUDY AND EVALUATION SCHEME B.Tech I<sup>st</sup>Year (Common to All B.Tech Courses) (Effective from the session: 2009-2010)

Year: I, Semester-1

	Course Code Subject		Periods			EV	ALUAT		CR		
S.No						SESS	IONAL	EXAM	Exter nal Exam.	Subje ct Total	EDI T
			L	Т	Р	СТ	TA	Total			
1	TMA 101	Mathematics - I	3	1	0	30	20	50	100	150	4
2	TPH 101 / TCY 101	Engg,Physics / Engg.Chemistry	3	1	0	30	20	50	100	150	4
3	THM 101	Basic Technical Communication – I	3	0	2	40	10	50	100	150	3
4	TEE 101 / TME 101	Basic Electrical Engineering / Mechanical Engineering	3	1	0	30	20	50	100	150	4
5	TCS 101 / TEC 101	Fundamentals of Computer & Programming / Fundamentals of Electronic Engineering	3	1	0	30	20	50	100	150	4
*	TES 101	Environmental Studies	2	0	0	-	-	-	-	-	-

#### Practicals

1	PPH 101 / PCY 101	Physics / Chemistry	0	0	2	-	-	25	25	50	2
2	PEE 101 / PME 101	Basic Electrical Engineering / Mechanical Engineering	0	0	2	-	-	25	25	50	2
3	PCS 101 / PEC 101	Fundamentals of Computer & Programming / Fundamentals of Electronic Engineering	0	0	2	-	-	25	25	50	2
4	PWS 101/PED 101	Workshop Practice / Engineering Drawing	0	0	2	-	-	25	25	50	2
		TOTAL	-	-	-					950	27

#### UTTRAKHANDTECHNICAL UNIVERSITY, DEHRADUN STUDY AND EVALUATION SCHEME B.Tech I<sup>st</sup>Year (Common to All B.Tech Courses) (Effective from the session : 2009-2010) Year: I, Semester-11 UTTRAKHANDTECHNICAL UNIVERSITY, DEHRADUN

			Periods			EVA	LUATI				
S.No	Course Code	Subject				SESS	IONAL	EXAM	Exter nal Exa m.	Subj ect Tota l	CRE DIT
			L	Т	Р	СТ	TA	Total			
1	TMA 201	Mathematics - II	3	1	0	30	20	50	100	150	4
2	TCY 201 / TPH 201	Chemistry / Physics	3	1	0	30	20	50	100	150	4
3	THM 201	Advanced Technical Communication	3	0	2	30	20	50	100	150	3
4	TME 201 / TEE 201	Basic Mechanical Engineering / Electrical Engineering	3	1	0	30	20	50	100	150	4
5	TEC 201 / TCS 201	Fundamentals of Electronic Engineering / Fundamentals Computer & Programming	3	1	0	30	20	50	100	150	4
*	TES 201	Environmental Studies	2	0	0	30	20	50	-	50	-
		Pr	actica	ls							
1	PCY 201 / PPH 201	Chemistry / Physics	0	0	2	-	-	25	25	50	2
2	PME 201 / PEE 201	Basic Mechanical Engineering / Electrical Engineering	0	0	2	-	-	25	25	50	2
3	PEC 201 / PCS 201	Fundamentals of Electronic Engineering / Fundamentals Computer & Programming	0	0	2	-	-	25	25	50	2
4	PED201/P WS 201	Engineering Drawing / Workshop Practice	0	0	2	-	-	25	25	50	2
		TOTAL	-	-	-	-	-			1000	27

### MATHEMATICS -I (TMA101)

**Matrices** 10L Elementary row and column transformations Rank of matrix, linear dependence, Consistency of linear system of equations, Characteristic equation, Cayley-Hamilton theorem, Eigen values and Eigen vectors, Diagonalization, Complex and unitary matrices.

#### UNIT-2

**UNIT-1** 

#### **Differential Calculus-I**

Leibnitz theorem, Partial Differentiation, Euler's theorem, Change of variables, Expansion of functions of several variables.

#### **UNIT-3**

#### **Differential Calculus-II**

Jacobian, Approximations and errors, Extrema of functions of several variables, Lagrange method of multipliers

#### **UNIT-4**

#### **Multiple Integrals**

Double and triple integrals, Change of order, Change of variables, beta and gamma functions, Application to area, volume, Drichlet integral and applications.

#### **Vector Calculus**

Point functions, Gradient, divergence and curl of a vector and their physical interpretation, Line, surface and volume integrals, Green, Stokes and Gauss divergence theorem.

#### **References:**

- Advanced Engineering Mathematics, Kreyszig, Wiley India .
- A Text book of Engineering Mathematics (Vol.1) by Peter V. O' Neil, Cengage Learning .
- B. S. Grewal: higher Engineering Mathematics, Khanna Publications. .
- N. Piskunov: Differential & Integral Calculus, *Moscow Peace Publications*. G Shankar Rao, Text book of engineering mathematics, BS Publication, Hyderabad

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### **ENGINEERING PHYSICS** (TPH-101/201)

#### UNIT-I

#### **Relativistic Mechanics:**

#### Inertial and Non-inertial Frames, Postulates of Special Theory of Relativity, Galilean and Lorentz Transformation, Length Contraction and Time Dilation, Addition of Velocities, Mass Energy Velocity. Radiation: Kirchoff's Law, Stefan's law (only Equivalence and Variation of Mass with statement), Energy spectrum of Blackbody Radiation, Compton Effect.

#### **UNIT-II**

Interference: Coherent Sources, Conditions of Interference, Fresnel's Biprism Experiment, Displacement of Fringes, Interference in Thin Films - Wedge Shaped Film, Newton's Rings. Diffraction: Single and n-Slit Diffraction, Diffraction Grating, Raleigh's Criterion of Resolution, Resolving Power of Grating.

#### **UNIT-III**

Polarization: Phenomenon of Double Refraction, Ordinary and Extra-ordinary Rays, Nicol Prism, Production and Analysis of Plane, Circularly and Elliptically Polarized Light, Fresnel Theory, Optical Activity, Specific Rotation, Polarimeter. Laser: Principle of Laser Action, Einstein's Coefficients, Construction and Working of He-Ne and Ruby Laser.

#### UNIT-IV

Electromagnetic: Ampere's Law and Displacement Current, Maxwell's Equations in Integral and Differential Forms, Electromagnetic Wave Propagation in Free Space and Conducting Media, Pointing Theorem. Magnetic Properties of Materials: Basic Concept of Para-, Dia and Ferro-Magnetism, Langevin's Theory of Diamagnetism, Phenomenon of Hysteresis and Its Applications

#### **UNIT-V**

#### Superconductivity:-

Essential properties of superconductors (zero resistivity), London equations, penetration depth and coherence length, Meissner effect, critical field, critical current Isotope effect, heat capacity, Type I and Type II superconductors, Characteristics of superconductors in superconducting state, applications of superconductors. Wave Mechanics : Wave Particle Duality, de Broglie Concept of Matter Waves, Heisenberg Uncertainty Principle, Schrödinger Wave Equation and Its Applications: Particle in a Box.

#### **Reference Books:**

- Introduction to Special theory of Relativity Robert Resnick Wiley India •
- Physics of Atoms ,Wehr Richards & Adia •
- Fundamentals of Physics, Halliday, Wiley India •
- Engineering Electromagnetics, William Hayt, 7<sup>th</sup> Ed.(TMH) •
- Ashutosh Asthana, Engg. Physics, BS Publication, Hyderabad

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#### ENGINEERING CHEMISTRY (TCY -101/201)

#### **UNIT – I GENERAL & ORGANIC CHEMISTRY**

Molecular orbital diagram of diatomic molecules, valence bond theory & molecular orbital Theory linear combination of atomic orbitals, hybridization, hydrogen bonding, band theory of solids, liquid crystals with their classification applications, Bragg's Law, Fullerenes & their application, Nature of organic molecules, attacking reagents, inductive effect, electromeric, mesomeric (resonance) effect, hyper conjugation, reaction intermediates types of organic reaction (substitution, addition, elimination reaction & organic rearrangements), Saytzeff's rule, organic name reactions (cannizzaro's reaction, aldol condensation, Pinnacol-pinnacolon rearrangement, Beckmann's rearrangement, Hoffmann's rearrangement), Optical isomerism & confirmations, E-Z nomenclature, R-S configuration.

#### **UNIT – II PHYSICAL & WATER CHEMISTRY**

Rate of reaction, order & molecularity of reaction, Zero order, First Order, Second order reaction, steady state approximation, concept of activation energy, energy barrier, cell potential, liquid junction potential, conductance & its variation with dilution, Transport no. Kohlraush's Law and its application, pH, buffer solution, calculation of pH of buffer mixture solubility & solubility Product, Nernst distribution law & its application, corrosion, its type, Mechanism & control, Theory of Electrochemical corrosion. Hardness of water, boiler feed water, Softening of water (Calgon Process, Zeolite process, Lime Soda process & Ion exchange process), Reverse osmosis, treatment of boiler feed water.

#### **UNIT – III CHEMISTRY OF ENGINEERING MATERIALS**

L Introduction & classification of polymers, Types of Polymerization, bulk solution, suspension & emulsion, copolymers, vulcanization, PVC, Polyamides, Polyurethane, Polyethylene, Poly propylene, PET, Resins (Phenol Formaldehyde), PMMA, PAN, Rubber, Conducting and Biodegradable polymers, Pyroceramics, Toughened glass, Strengthening of glass, Refractories, Nano Composites, Protective Coatings, Fe, Al, Cu, Pb & Zn alloys, Organometallics & their applications.

#### **UNIT – IV FUELS & COMBUSTION**

Classification of Fuels, calorific value of fuel, gross & net calorific value, determination of calorific value using Bomb calorimeter, Coal, Biomass and Biogas, Bio Fuel, Esterification & Transesterification, Introduction of Lubricants, Mechanism of Lubrication, Classification of Lubricant, Bio Lubricant, Flash and Fire Point, Pour Point, Cloud Point, Aniline point, Viscosity index. 7 L

#### **UNIT - V ANALYTICAL METHODS AND APPLICATIONS**

Titrimetric analysis with reference to acid-base, redox, precipitation and complexometric titrations. Elementary ideas and simple applications of UV, visible, mass and NMR spectral techniques NMR spectral techniques.

#### **REFERENCE BOOKS**

- Engineering Chemistry Wiley India .
- Engineering chemistry by Sivasankar, TMH, New Delhi.
- Organic Chemistry by Morrisson & Boyd, Pearson Publication. .
- Organic Chemistry by Loudon, Oxford University Press. •
- C Parameswara Murthy, C V Agrawal and etal., Engineering Chemistry, BS Publication, • Hyderabad

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#### BASIC ELECTRICAL ENGINEERING (TEE101/201) EE 101 (AUTUMN/ SPRING) L T P

#### UNIT-1 D.C. Network Theory :

Circuit theory concepts-Mesh and node analysis. Network Theorems- Super-position theorem. Thevenin's theorem, Norton's theorem, Maximum, Power Transfer theorem, Star Delta transformation.

#### Steady State Analysis of A.C. Circuits :

Sinusoidal and phasor representation of voltage and current: single phase A.C. circuit behavior of resistance, inductance and capacitance and their combination in series & parallel and power factor, series parallel resonance-band width and quality factor : magnetic circuit.

#### UNIT-2

#### Three Phase A.C. Circuits :

Star-Delta connections, line and phase voltage/current relations, three phase power and its measurement.

#### **3. Measuring Instruments:**

Construction and principle of operation of voltage and current measuring instruments; introduction to power and energy meters.

#### UNIT-3

#### **Transformer :**

Principle of operation, types of construction, phasor diagram, equivalent circuit, efficiency and voltage regulation of single phase transformer, O.C. and S.C. tests.

#### **Rotating Machine**

#### Unit-4

#### **D.C. Machines**

Principle of electromechanical energy conversion, types of d.c. machines, E.M.F. equation, Magnetization and load characteristics, losses and efficiency, Starter and speed control of d.c. motors, their applications.

Synchronous Machines: Principle of Operation of Alternator and synchronous motor. 2 UNIT-5

#### Three phase induction Motor 4

Principle of operation, types and methods of starting, slip-torque characteristics, applications. Single phase Motors : Principle of operation and methods of starting of induction motor, Stepper motor and Universal motor 3

#### **References :**

- 1. Dr. R. K. Singh and Dr. P.S. Subramanyam, Basic Electrical Engineering, BS Publication, Hyderabad.
- 2. Gaikwad, Basic Electrical Engineering, Wiley India
- 3. A.e. Fitgerald, D.E., Higginbotham and A Grabel, -Basic Electrical Engineering Mc Graw Hill.
- 4. H. Cotton, -Advanced Electrical Technology∥ Wheeler Publishing.

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#### MECHANICAL ENGINEERING ME 101 (Autumn / Spring)

#### **UNIT-1**

#### **Fundamental Concepts and Definitions**

Definition of thermodynamics, System, Surrounding and universe, Phase, Concept of continuum, Macroscopic & microscopic point of view. Density, Specific volume, Pressure, temperature. Thermodynamic equilibrium, Property, State, Path, Process, Cyclic and non cyclic processes, Reversible and irreversible processes, Quasi static process, Energy and its forms, Enthalpy. UNIT-2 **8**L

#### Zeroth law:

Zeroth law, Different temperature scales and temperature measurement First law: First law of thermodynamics. Processes - flow and non-flow, Control volume, Flow work and non-flow work, Steady flow energy equation, Unsteady flow systems and their analysis. Second law: Limitations of first law of thermodynamics, Essence of second law, Thermal reservoir, Heat engines. COP of heat pump and refrigerator. Statements of second law and their equivalence, Carnot cycle, Carnot theorem, Thermodynamic temperature scale, Clausius inequality. Concept of entropy. **8**L

#### UNIT-3

#### **Properties of steam:**

Properties of steam, Phase transformation process and its graphical representation on P-V, T-V & T-s diagram, Mollier diagram and Steam Tables, Processes involving steam in closed and open systems.

Introduction to I.C. Engines: Two & four stoke S.I. and C.I. engines. Otto cycle, Diesel cycle, Dual cycle.

#### **UNIT-4**

#### Force system and Analysis

Basic concept: Review of laws of motion, transfer of force to parallel position, resultant of planer force system, Free Body Diagrams, Equilibrium. Friction: Introduction, Laws of Coulomb friction, Equilibrium of bodies involving dry fiction.

#### **Structure Analysis**

Beams: Introduction, Shear force and bending moment, Shear force and bending moment diagram for statically determinate and indeterminate beams.

Trusses: Introduction, Simple Trusses, Determination of forces in simple truss members, Method of joints and Method of section.

#### **UNIT-5**

#### **Stress and Strain Analysis**

Simple stress and strain: Introduction, Normal shear stresses, Stress-strain diagrams for ductile and brittle materials, Elastic constants, One dimensional loading of members of varying cross section, Strain energy, Thermal stresses.

Compound stress and strains: Introduction, State of plane stress, Principal stress and strain, Mohr's circle for stress and strain.

**Pure Bending of Beams:** Introduction, Simple bending theory, Stress in beams of different cross sections. Torsion: Introduction, Torsion of Shafts of circular section, Torque and Twist, Shear stress due to Torque.

#### **Reference:**

1. Agarwal, Basic Mechanical Engineering, Wiley India

3. Holman, J.P.: Thermodynamics, Mc Graw Hill book Co. NY.

4. Singh Onkar, Bhavikatti S.S., Chandra Suresh : Introduction to Mechanical Engineering: Thermodynamics, Mechanics and Strength of Materials, New Age International Publishers

5. Yadav R. : Thermodynamics and Heat Engines, Vol I & II (SI Edition) Central Publishing House Allahabad.

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#### FUNDAMENTALS OF COMPUTER & PROGRAMMING (TCS 101/201)

#### UNIT-I

Introduction to Computer Systems; Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions. Binary arithmetic, Floating point arithmetic, signed and unsigned numbers IEEE standards, CPU organization, ALU, registers, memory, the idea of program execution at micro level. Concept of computing, contemporary Operating Systems such as DOS, Windows, UNIX etc. (only brief user level description). Introduction to organization and architecture of mainframe, mini and micro systems.

#### UNIT-II

Concept of flow chart and algorithm; Algorithms to programs: specification, top-down development and stepwise refinement, Introduction to the design and implementation of correct, efficient and maintainable programs, structured Programming,,Use of high level programming language for the systematic development of programs, programmability and programming languages, Object codes, compilers. Introduction to the Editing tools such as vi or MS-VC editors.

#### UNIT-III

C: Data types, Identifiers, Storage class, Constant, Operators, expression, Statements, console I/O statements, Selection statements: if-else, switch, Iteration Statements: for, while, do-while, Jump statements: return, go to, break, continue, comments. Function, Call by value, Call by reference, arguments to main(), return statements, recursion, function prototypes, , preprocessor directives.

#### UNIT-IV

Arrays:

Single dimensional arrays, two dimensional arrays, multidimensional arrays, variable length arrays. Strings, array of strings. Structures: array of structures, passing structure to function, structure pointers, structure within structures. Unions, bit fields, enumerations.

#### UNIT-V

Pointers: pointer variables, pointer operator, pointer expression, array of pointers, multiple indirection, pointers to functions, dynamic allocation functions.

File I/O : Streams and files, file system basics, fread, fwrite, fseek, random access I/O, fprintf(), fscanf(), standard streams.

#### **Reference Book**

- Gupta: Computer Concepts & C Programming, Comdex
- Jones, C Programming with problem solving, Wiley India
- Let Us C : Yashwant Kanetkar [BPB]
- Mastering C ,K.R.Venugopal,S.R.Prasad[TMH]
  - Computer Science- A Structured Programming Approach Using C, by Behrouz
    - A. Forouzan, Richard F. Gilberg, Thomson, [India Edition]

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#### FUNDAMENTALS OF ELECTRONIC ENGINEERING (TEC 101/201)

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#### UNIT-1

#### Semiconductor materials and properties

Group-IV materials, Covalent bond, electron-hole concepts Basic concepts of energy bands in materials, concepts of forbidden gap Intrinsic and extrinsic semiconductors, donors and acceptors impurities

#### UNIT-2

#### Junction diode and diode applications

p-n junction, depletion layer, v- i characteristics, diode resistance, capacitance diode ratings ( average current, repetitive peak current, non-repetitive current, peak-inverse voltage).

#### **Diode Applications**

rectifiers (half wave and full wave), calculation of transformer utilisation factor and diode ratings, filter (C - filter), calculation of ripple factor and load regulation

clipping circuits, clamping circuits, voltage multipliers

#### UNIT-3

#### **Breakdown diodes**

breakdown mechanisms (zener and avalanche), breakdown characteristics, zener resistance, zener diode ratings, zener diode application as shunt regulator

#### UNIT-4

#### **Bipolar Junction Transistor**

Basic construction, transistor action, CB, CE and CC configurations, input/outputCharacteristics, concept of Biasing of transistors-fixed bias, emitter bias, potential divider bias**Transistor Amplifier** 

# Graphical analysis of CE amplifier, concept of voltage gain, current gain, h-parameter model (low frequency), computation of Ai, Av, Ri, R of single transistor CE and CC amplifier

#### configurations.

#### **Field Effect Transistor**

JFET: Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristics equation CG, CS and CD configurations, Introduction to self and fixed biasing

MOSFFT: depletion and enhancement type MOSFET-construction, operation and characteristics. Computation of Av, Ri, Ro, of single FET amplifiers using all the three configurations

#### Switching theory and logic design

Number systems, conversions of bases, Boolean algebra, logic gates,

#### concept of universal gate, concept of K- Map

#### **Operational Amplifiers**

Concept of ideal operational amplifiers, ideal op-amp parameters, inverting, non-inverting and unity gain amplifiers, adders,

#### **Reference Books:**

- 1. R. K. Singh & Lal Kishor, Basic Electronics Engineering, B S Publication, Hyderabad.
- 2. Gaikwad, Basic Electronics, Wiley India
- 3. A Mottershead, Electronic devices and circuits'. PHI, 2000.
- 4. Morris Mano, \_Digital Computer Design', PHI, 2003.

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#### **BASIC TECHNICAL COMMUNICATION (THM 101)**

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#### **RELEVANCE OF TECHNICAL COMMUNICATION FOR TECHNOCRATS**

English Communication is an integral part of today's life. The advent of new technologies has lead to the rapid development of a global village. A budding technocrat must be equipped with English language proficiency so that he / she can make a mark in this global village. Engineering students come from different backgrounds with different mother tongues. It is imperative for them to overcome their native accentual patterns and gain proficiency in speaking standard English. They also need to acquire optimum writing skills. Hence proper training in English speaking and writing is necessary. This goes hand in hand with the development of reading and listening skills. The course of Basic Technical Communication will help in the development and improvement of the communication skills and linguistic competence of engineering students.

#### **OBJECTIVES:-**

- 1. To help students perform better in all academic subjects through greater command over the English language.
- 2. To promote efficiency in English language with the development of the four skills of communication i.e., LSRW (Listening, Speaking, Reading and Writing).
- 3. To prepare students face the challenges of their professional lives in an increasingly globalised world.

#### UNIT – I: COMMUNICATION

- 1) Communication Definition. Process of communication,
- 2) Types of communication—Verbal and Non-Verbal communication; Formal and Informal communication (grapevine) and their significance.
- 3) Barriers to Communication—Semantic barriers, Physical barriers, Psychological barriers, Interpersonal barriers and Organizational barriers. Language as a tool of communication.
- 4) Importance of communication with reference to students, professionals business etc.
- 5) Technical communication: Definition, Oral and Written technical communication. Difference between general writing and technical writing.
- 6) Computer-aided Technical Communication.
- 7) Style in Technical Communication. Features of technical writing.
- 8) Importance of Technical Communication

#### UNIT-2: READING SKILLS

- 1) Importance of Reading Skills, Types of Reading Skills, Methods of Improving Reading Skills, Objectives of Improving Reading Skills
- 2) Vocabulary Building: Antonyms, Synonyms, Homophones, Word formation (Prefixes and Suffixes). One Word substitution,
- 3) Jargon/Technical Terminology Use of Jargon and examples of Jargon.
- 4) Paragraph: Definition. Requirements of a paragraph -- Understanding, Unity, Coherence and Emphasis in a paragraph. Identifying the Topic Sentence. Development of a Paragraph using Deductive order, Inductive order, Chronological Order (Time Order), Spatial Order (Space Order), Expository Order, Question and Answer Order, Comparison and Contrast Order. Devices used to impart Coherence and Emphasis in a Paragraph. Analysis of a given Paragraph in terms of Unity, Coherence and Emphasis.
- 5) Developing Reading Skills and Reading Comprehension through the study of thematic and value based critical reading of the following essays –

- 1. Of Discourse by Francis Bacon
- 2. Unity of Minds by Dr. A.P.J. Abdul Kalam

#### UNIT-3:- WRITING SKILLS.

- 1) Importance of Writing Skills, Types of Writing Skills, Methods for Improving Writing Skills, Objectives of Improving Writing Skills
- 2) Functional Grammar- Parts of Speech.
- 3) Common Grammatical Errors: Errors of Syntax, Concord etc.
- 4) Sentence and Paragraph construction. Writing Expository, Argumentative, Deductive etc. Paragraphs.
- 5) Précis Writing
- 6) Letter writing: Formal and Informal Letters.
- 7) Developing Writing Skills through the study of thematic and value based critical reading of the following short stories–
  - 1. After Twenty Years by O. Henry
  - 2. The Open Window by Saki (H.H. Munro)

#### UNIT 4:- LISTENING SKILLS

- 1) Importance of Listening Skills, Process of listening, listening and hearing, Active and Passive Listening. Types of Listening: Academic listening, Appreciative listening, Attentive Listening, Critical Listening, and Discriminative listening etc.
- 2) Methods for Improving Listening Skills, Objectives of Improving Listening Skills.
- 3) Barriers to listening: Semantic barriers, Physical barriers, and Psychological barriers.
- 4) Listening Comprehension: Identifying general content, Identifying specific information.
- 5) Listening for Note taking and drawing inferences.
- 6) Developing listening skills and listening comprehension through the study of thematic and value based critical reading of the following one-act play.

1. The Refund by Fritz Karinthy

#### 7) Practice of Listening Skills through Language Laboratory

- 1. Listening to a recording of a telephone conversation for identifying specific information as well as details.
- 2. Listening to a recording of a railway / airport announcement for selective listening and identifying specific information.
- 3. Listening to a recording of a radio / television news bulletin for identifying specific as well as over-all information
- 4. Listening to a recording of the description of a place, event or inc ident for note-taking, identifying details, descriptions and overall idea.
- 5. Listening to a recording of a lecture / talk on for note taking and identifying facts and drawing conclusions.
- 6. Listening to a recording of a television panel discussion on any topic for identifying facts, analyzing those drawing inferences and explaining the conclusion of the discussion in a logical manner.
- 7. Listening to passages that are read out for practicing note taking and identifying general and detailed content.
- 8. Listening to dialogues that are read out for identifying specific, general and detailed content.

#### UNIT-5:- SPEAKING SKILLS.

- 1) Importance of Speaking Skills, Types of Speaking, Methods for Improving Speaking Skills, Objectives of Improving Speaking Skills
- 2) Organs of Speech, Mechanism of Speech.
- 3) Phonetics: Classification of English Sounds, Vowel (short vowels and long vowels), Consonants, Diphthongs, Phonemes, Allophones, Phonetic transcription.
- 4) Syllable: Definition, Types of Syllable. Monosyllabic, Polysyllabic words etc.
- 5) Stress, Rhythm, Intonation: Rising Tone, Falling Tone and Rising-Falling Tone.
- 6) Everyday Conversation: Tips and characteristics of a good conversation. Common manners and etiquette.
- 7) Debate, Making a speech, Role play,
- 8) Extempore, JAM Session (just a minute session).
- 9) Practice of Speaking Skills through Language Laboratory
- 1. Practicing the following modules through self-learning software:
  - a. Grammar with special emphasis on Tenses
  - b. Pronunciation: of consonants, vowels, syllables and individual words c. Word Stress: based on accentual patterns
  - d. Rhythm in speech based on content words and strong words e.
  - Intonation: rising, falling and rising-falling tone
  - f. Pause groups
  - g. Speech making / public speaking
- 2. Introducing self and others keeping in mind kinesics.
- 3. Common conversation practice (making small talk etc.).
- 4. Asking for permission.
- 5. Making requests.
- 6. Describing events / people / places
- 7. Extempore.
- 8. JAM Session (Just a Minute Session).
- 9. Role play
- 10. Holding informal discussions.
- 11. Logical presentation of one's views on a given topic.
- 12. Delivering a speech using Stress, Rhythm and Intonation.

Note: The two class tests for theory will be of 10 marks each and two class tests of Basic Technical Communication will be of 10 marks each so that the total marks for class test will be of 40 marks and 10 marks will be for tutorial/attendance/home assignments. The subject faculty is requested to send the class test marks indicating both for theory and lab saparetly.(b) Kindly make following changes in the structure of B.Tech. Ist year syllabus. In the subject of THM 101 Basic Technical Communication indicate

#### SUGGESTED REFERENCES BOOKS:

- Kavita Tyagi & Padma Misra Basic Technical Communication, PHI, New Delhi
- Norman Lewis: Word Power Made Easy, W.R Goyal Pub. & Distributors.
- Ruther Ford A: Basic Communication Skills; Person Education, N. Delhi
- Joans Daniel: English Pronouncing Dictionary, Cambridge
- John Seely: The Oxford Guide to Writing and Speaking. OUP, Delhi
- Mohammad Aslam: Introduction of English Phonetics and Phonology Cambridge

• Y Kameswari, Successful Career Soft Skills and Business English, BS Publications,

Hyderabad

# ENVIRENVIRONMENTAL STUDIES (TES 101/201)

#### UNIT-1 NATURAL RESOURCES:

**Renewable and Non-renewable Resources :** 

Natural resources and associated problems.

- a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) Food resources : World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- e) Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

• Role of an individual in conservation of natural resources.

• Equitable use of resources for sustainable lifestyles.

#### UNIT-2 ECOSYSTEMS

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystems :
  - a. Forest ecosystem
  - b. Grassland ecosystem
  - c. Desert ecosystem
  - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

#### UNIT- 3 BIODIVERSITY AND ITS CONSERVATION

- Introduction Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- Inida as a mega-diversity nation
- Hot-sports of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.

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- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situconservation of biodiversity.

#### UNIT-4 ENVIRONMENTAL POLLUTION & SOCIAL ISSUES

- Definition
- Cause, effects and control measures of :
  - a. Air pollution
  - b. Water pollution
  - c. Soil pollution
  - d. Marine pollution
  - e. Noise pollution
  - f. Thermal pollution
  - g. Nuclear hazards
- Disaster management : floods, earthquake, cyclone and landslides.
- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.

#### **REFERENCE BOOK**

- M Ajni Reddy, Text book of environmental Science, BS Publication, Hyderabad
- Environmental Studies by Daniel, Wiley India
- Environmental Studies by Erach Bharucha, University Press.
- Fundamental of Ecology, E.P.Odum, Cengage Learning.
- Environmental Science and Engineering by Wright, Pearson Publication.
- First Ecology by Beeby and Brennan, Oxford University Press.
- Environment Science by Miller, Cengage Learning, New Delhi.
- Hand book of Environmental laws, Rules, Guidelines, Compliances and Standards Vol. 1 & Vol. 2, Bharat Publication, New Delhi.

#### ENGINEERING DRAWING (PED 101/201)

#### 1. Introduction

Graphics as a tool to communicate ideas, Lettering and ' dimensioning, Construction of geometrical figures like pentagon and hexagon.

#### 2. Orthographic Projection

Principles of orthographic projections, Principal and auxiliary planes, First and Third angle projections.Projection of points. Pictorial view.Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes. Application to practical problems.Projection of solid in simple position, Axis or slant edge inclined to one and parallel to other plane,Solids lying on a face or generator on a plane.Sectioning of solids lying in various positions, True shape of the section.Development of lateral surfaces, sheet metal drawing.

#### **3. Isometric Projection**

Principles of isometric projection, Isometric projection using box and offset methods.

- 1. Bhatt. N.D.: Elementary Engineering Drawing, Charothar Publishing.
- 2. D A Hindoliya, Text book of Egg. Graphics, BS Publication, Hyderabad

#### WORKSHOP PRACTICE (PWS 101/201)

LTP 002

**1. Carpentry Shop:** 1. Study of tools and operation and carpentry joints. 2. Simple exercise using jack plain. 3. To prepare half- lap corner joint, mortise and tennon joints. 4. Simple exercise on woodworking lathe.

**2. fitting Bench Working Shop :** 1. Study of tools and operations 2. Simple exercises involving filling work. 3. Making perfect male-female joint 4. Simple exercise involving drilling/tapping/dieing.

**3. Black Smithy Shop :** 1. Study of tools and operations 2. Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.

**4. Welding Shop :** 1. Study of tools and operations . 2. Simple butt joint. 3. Lap joint. 4. oxy acetylene welding.

**5. Sheet metal shop :** 1. Study of tools and operations. 2. Making funnel complete with soldering. 3. Fabrication of tool box, tray, electrical panel box etc

**6. Machine Shop :** 1. Study of tools and operations. 2. Plane turning. 3. Step turning. 4. Taper turning 5. Threading. 6. Single point cutting tool grinding.

#### **Reference:**

**1.** Hajra, Bose, Roy: Workshop Technology Vol 1 & 2, Media Promotors **2.** Raghuvanshi B.S.: Workshop Technology, Vol 1 & 2, Dhanpatrai

#### C Programming Lab (PCS-101\PCS201) List of Experiments

- 1. Practice of all internal and External DOS Commands
- 2. Practice of all UNIX commands and write simple shell script.
- 3. WAP to perform simple arithmetic operations using different data types.
- 4. WAP to swap two numbers without using third variable.
- 5. WAP to find out whether the given number is prime or not.
- 6. WAP using conditional operator to determine whether a year is leap year or not.
- 7. WAP to print the ASCII code and their equivalent characters.
- 8. WAP to print corresponding days of a week using switch case.
- 9. WAP to print factorial of a number using recursion.
- 10. WAP to print Fibonacci series using function.
- 11. WAP to print an array and find greatest element of the array.
- 12. WAP to arrange elements of a given array in ascending order.
- 13. WAP for Matrix multiplication and find the inverse of resultant matrix.
- 14. WAP to print name, price & no. of pages of 3 books using structures.
- 15. WAP to remove the trailing blanks in a string input by the user, and print the resulting string using pointer.

#### CHEMISTRY PRACTICALS (CPY 101/201)

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#### LIST OF EXPERIMENTS

- 1. Determination of alkalinity in the given water sample.
- 2. Determination of temporary & permanent hardness in water sample using EDTA as standard solution.
- 3. Determination of available chlorine in bleaching powder.
- 4. Determination of chloride content in the given water sample by Mohr's method.
- 5. Determination of iron content in the given ore by using external indicator.
- 6. Determination of Acid & Base no. in lubricating oil by potentiometric method.
- Determination of Equivalent weight of Iron by the chemical displacement method. The equivalent weight of copper is 63.5 (Note : The procedure to be followed in carrying the above experiment is given as annexure)
- 8. Determination of viscosity index of lubricating oil.
- 9. Determination of iron concentration in sample of water by colorimetric method. The method involves the use of KCNS as colour developing agent & the measurements are carried out at ?max 480nm.

Note : The general procedure of estimation is given on pp653-8 of the textbook Of Quantitative Chemical Analysis by A.I.Vogel 6  $^{\rm th}$  Edition, Publisher : Pearson Education Ltd.2000

10. Determination of heat of neutralization of Hydrochloric acid & Sodium hydroxide

11. Determination of flash & fire point of lubricating oil

12. Determination of Carbon residue of lubricating oil.

13. Determination of Sulphated ash of motor oil.

14. Determination of saponification value of lubricating oil & vegetable oil.

15. Separation of metal ions by paper chromatography.

#### MATHEMATICS-II (TMA-201)

LTP 31 0

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#### Unit-1 Differential Equations

Ordinary differential equations of first order, Exact differential equations, Linear differential equations of first order, Linear differential equations of nth order with constant coefficients, Complementry functions and particular integrals, Simultaneous linear differential equations, Solutions of second order differential equations by changing the dependent and independent variables, Method of variation of parameters.

#### Unit-2

#### Laplace Transform

Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Inverse Laplace transform, Laplace transform of periodic function, Unit step function, Convolution theorem, Applications to solve simple linear and simultaneous liner differential equations.

#### Unit-3

#### **Infinite Series**

Introduction, Sequences, Series: Convergence, Series of positive terms, Comparison tests, Integral tests, Comparison of ratio's, D'Alembert ratio test, Raabe's test, Cauchy root test, Alternating series: Lebnitz rule, Power series, Uniform convergence, Weierstress's M-test, Properties of uniformly convergent series.

#### Unit-4

#### **Fourier Series and Partial Differential Equations**

Periodic functions, Trigonometric series, Fourier series of periodic function, Euler's formula, Functions having arbitrary period, Change of intervals, Even and odd functions, Half range sine and cosine series.

Introduction to partial differential equations, Linear partial differential equations with constant coefficients of second order and their classifications: parabolic, hyperbolic and elliptic with illustrative examples.

#### Unit-5

#### **Applications of Partial Differential equations**

Method of separation of variables for solving partial differential equations, One dimensional wave equation, Laplace equation in two dimensions, Heat conduction equations of one dimension and two dimension.

#### **References:**

- 1. A Text book of Engineering Mathematics (Vol.2) by Peter V. O' Neil, Cengage Learning.
- 2. B. S. Grewal: Higher Engineering Mathematics, Khanna Publications.
- 3. C. Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya.

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- 4. E. Kreyszij: Advanced Engineering Mathematics, Wiley Eastern.
- 5. M.D. Raisinghania: Ordinary & Partial Differential Equations, S. Chand Publication.

### ADVANCED TECHNICAL COMMUNICATION

#### L T P 3 0 2

#### MAXIMUM MARKS -100

#### **UNIT 1 : TECHNICAL COMMUNICATION**

- 1. Introduction to technical communication, types of technical communication, history of the development of technical communication.
- 2. Difference between general and technical communication, importance of technical communication.
- 3. Characteristic features of technical communication. Elements of style in technical communication.
- 4. Process of preparing a technical document.
- 5. Elements, features and objectives of scientific articles, research papers, dissertation and thesis.

#### **UNIT 2:-BUSINESS COMMUNICATION**

- 1. Importance and Features of Business Communication
- 2. Business Correspondence Principles, Features, Types, Format and layout of Business letter.
- 3. Types of Business Correspondence letters of Enquiry, Quotation, Order, Instructions, Sales, Credit, Complaint, Collection etc.
- 4. Some more types of Business Correspondence -- Notice, Agenda, Minutes, Memorandum.
- 5. Job Application letters -- Covering letter, Resume, Bio-data and C.V.

#### **UNIT 3:- TECHNICAL PROPOSAL and TECHNICAL REPORT**

- 1. Technical Proposal Introduction, purpose, features, types, format, importance, process of preparation. Writing technical proposals.
- 2. Technical Report -- Features, Types, Style, Format, Relevance. Writing Technical Reports.

#### UNIT 4:-LITERATURE

- 1. Critical reading and thematic, value-based study of the Novella, **'Animal Farm'** by George Orwell.
- 2. Critical review, study of theme, plot, symbolism, characterization, style of writing etc.

#### UNIT 5:- SOFT SKILLS

# This unit should be covered in classroom teaching as well as judicious use of language lab, (There should be optimum use of software's related to accent, presentation skills etc.)

- 1. Kinesics, Para language, Proxemics.
- 2. Presentation skills Features, Types, Structure, Aids and Importance.
- 3. Interpersonal communication skills Role of Personality and its various attributes like EQ, attitude, motivation, stress management and accepting criticism in determining efficacy of interpersonal communication.

- 4. Corporate communication skills Role of business etiquette, conducting meetings, managing conflict, negotiation, team spirit, decision-making, time management and problem solving skills.
- 5. Group Discussion skills Features and Importance
- 6. Facing Interviews Interview Tips.

#### ✤ Practice of Soft Skills using Language Laboratory

- 1. Practicing the following modules through self-learning software:
  - a. Pronunciation: of consonants, vowels, syllables and individual words
  - b. Word Stress: based on accentual patterns
  - c. Rhythm in speech based on content words and strong words
  - d. Intonation: rising, falling and rising-falling tone
  - e. Pause groups
  - f. Presentation skills
- 2. Participating in Mock Interviews
- 3. Participating in Group Discussions
- 4. Giving Presentations keeping in mind Kinesics, Para language, and Proxemics
- 5. Participating in Role Play for enhancing interpersonal and corporate communication skills

#### SUGGESTED REFERENCE BOOKS

- Kavita Tyagi & Padma Misra, Advance Tech. Communication, PHI, New Delhi
- Gupta
  Gupta
  Advanced Technical Communication, Cambridge University Press, N. Delhi
   George Orwell
   Animal Farm, Penguin Publishing Company, N. Delhi
   Business Correspondence and Report Writing, TMH, N Delhi.
- Rubens Science & Technical Writing, Foundation books,
  - Cambridge, N. Delhi
- Daniel Riordan
  Technical Communication, Cengage Learning, N. Delhi
  - Raman & Sharma Technical Communication, OUP, N. Delhi
- Wallace, Masters
  Personality Development, Cengage Learning, N. Delhi
- Robert Barrass
  Students Must Write, Foundationbooks, Cambridge,

#### N. Delhi

- Bhaskar Rao, Successful Career Soft Skills and Business English, BS Publications, Hyderabad
- Chakrawarthi: Soft Skills for Professionals, Wiley India

#### PHYSICS PRACTICALS (Autumn / Spring)

#### **ASP** 11

L T P 0 0 2

#### List of Experiments (At least Ten)

1. To determine the wavelength of monochromatic light by Newton's ring.

2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.

3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.

4. To determine the specific rotation of cane sugar solution using half shade polarimeter.

5. To determine the wavelength of spectral lines using plane transmission grating.

6. To determine the specific resistance of the material of given wire using Carey Foster's bridge.

7. To determine the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of the coil.

8. To verify Stefan's Law by electrical method.

9. To calibrate the given ammeter and voltmeter.

10. To study the Hall effect and determine Hall coefficient, carnier density and mobility of a given semiconductor material using Hall-effect set up.

11. To determine energy bank gap of a given semiconductor material.

12. To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.

13. To draw hysteresis curve of a given sample of ferromagnetic material and from this to determine magnetic susceptibility and permeability of the given specimen.

14. To determine the balistic constant of a ballistic galvanometer.

15. To determine the viscosity of a liquid.

# Note : Additional experiments may be added based on contents of syllabus.

#### CHEMISTRY PRACTICALS (Autumn / spring)

L T P 0 0 2

#### LIST OF EXPERIMENTS (AT LEAST TEN)

1. Determination of alkalinity in the given water sample.

2. Determination of temporary and permanent hardness in water sample using EDTA asstandard solution.

3. Determination of available chlorine in bleaching powder.

4. Determination of chloride content in the given water sample by Mohr's method.

5. Determination of iron content in the given ore by using external indictor 6. pH-metric titration.

7. Determination of Equivalent weight of Iron by the chemical displacement method. The equivalent weight of copper is 63.5 (Note : the procedure to be followed in carrying the above experiment is given as annexure)

8. Viscosity of an addition polymer like polyster by Viscometer.

9. Determination of iron concentration in sample of water by colorimetric method. The method involves the use of KCNS as colour developing agent and the measurements arecarried out at I max 480 nm.

Note : The general procedure of estimation is given on pp653-8 of the textbook of Quantitative Chemical Analysis by A.I. Vogel 6th Edition, Publisher : Pearson education Ltd. 2000)

10. Determination of heat of neutralization of Hydrochloric acid and Sodium hydroxide

11. Determination of amount of dissolved oxygen in water

12. Separation of metal ions by paper chromatography

13. Preparation of iodoform from acetone

14. Preparation of Sodium Cobaltinitrile salt.

15. Element detection & functional group identification in organic compounds

#### BASIC ELECTRICAL + ELECTRONICS LAB EE P 11 (Autumn / Spring )

#### List of Practical

FEP 11

#### Fundamentals of Electronics Lab (Any Ten)

- 1. Study of diode characteristics.
- 2. To study a half wave and full wave rectifier circuit.
- 3. Determination of ripple factor of capacitive and non capacitive filter for HW and FW diode rectifier circuit.
- 4. Study of characteristics of Zener Diode as constant voltage.
- 5. Verification of Application of Zener Diode as shunt regulator.
- 6. Study of Clipper and Clamper Circuit with different waveforms.
- 7. Determination of characteristics of BJT in CB and CE configuration.
- 8. Determination of characteristics of FET in CS and CD configuration.
- 9. Study of BJT as single stage amplifier and determination of A,  $V_i$ ,  $R_i$  and  $R_o$ .
- 10. Study of AND, NAND, OR, NOR and EXOR gates.
- 11. Verification of Universal gates.

#### List of Practical

FEP 11

#### Fundamentals of Electrical Engineering Lab (Any Ten)

- 1. Verification of Network Theorems.
- 2. Study of diode characteristics. Study of phenomenon of resonance in RLC series circuit.
- 3. Measurement of power in a three phase circuit by two wattmeter method.
- 4. Measurement of efficiency of a single phase transformer by load test.
- 5. Determination of parameters and losses in a single phase transformer by OC and SC test.
- 6. Study of characteristic of DC Motor.
- 7. Study of characteristic of AC Motor.
- 8. DC generator characteristics.
- 9. 10. Speed control of dc shunt motor.
- 10. Study running and reversing of a three phase induction motor.
- 11. Study of a single phase energy meter.

L T P 0 0 2

L T P 0 0 2

#### MECHANICAL ENGINEERING LAB MEP 11 (Autumn / Spring)

#### **List of Practical**

L T P 0 0 2

#### A minimum of 10 experiments from the following :

1. Study of Steam engine and steam turbine models.

2. Study of 2-stroke and 4-stroke I.C.E. models.

3. Study of Fiat engine and/ or Diesel engine prototype.

4. Study of a vapour compression Refrigeration unit tutor/refrigerator.

5. Study of a window type air conditioner.

6. To conduct the tensile test on a UTM and determine ultimate Tensile strength, percentage elongation for a steel specimen.

7. To conduct the compression test and determine the ultimate compressive strength for a specimen.

8. To conduct the Impact test (Izod / charpy) on the Impact testing machine and to find the impact strength.

9. To determine the value of acceleration due to gravity by Atwood's Machine appratus.

10. To verify the principle of moment by Bell Crank Lever Appratus

11. To determine the moment of inertia of a flywheel apparatus about its axis of rotation

12. To verify Newton's second law of motion by Fletcher's Trolley apparatus

13. To find out coefficient of friction by combined inclined plane & friction slide apparatus

14. To determine the velocity ratio, mechanical advantage & efficiency of a single purchase crab apparatus & draw graph between load vs effort, mechanical advantage and efficiency.

15. To determine the velocity ratio, mechanical advantage & efficiency of a double purchase crab apparatus.

#### COMPUTERS LABORATORY (Autumn / Spring)

**CSP** 11

L T P 0 0 2

#### List of Practicals

- 1. Practice of some internal and External DOS Commands
- 2. Write simple batch program.
- 3. File and program management in windows
- 4. Familiarization with the ftp ,http etc. supported by various protocols
- 5. Practice of some UNIX commands
- 6. Write simple shell script
- 7. Introduction to text editing and word processing
- 8. Exposure to advance feature supported by some editors
- 9. Net Surfing
- 10. Creation and usage of E-mail account
- 11. Write small program using C language
- 12. Handling of data structure in C

13. Familiarizing mail account using PINE, deleting, creating folder/ mailmessages, adding signature, creating directory of addresses.

14. Compressing data file using WINZIP & WINRAR

15. Introduction to various extension of files as TXT, EXE, BAK, BAT,

BMP, DOC, XLS, PPT, PDF, HTML, JPEG, MPEG, MP3, DAT & AVI

*Note :* List may be modified according to new software available.

## SCHEME OF EXAMINATION

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SYLLABI

for

B. TECH. COMPUTER SCIENCE & ENGINEERING SECOND YEAR (III & IV Semester) (Effective from the session: 2010-2011)



Uttrakhand Technical University, Dehradun

www.uktech.in

#### COURSES OF STUDY, SCHEME OF EXAMINATION & SYLLABUS FOR B.TECH CSE

#### Semester-III

Subject Code	Subject	Contact Hrs.	Credit
TCS-301	Discrete Structures	3-1-0	4
TCS-302	Computer Based Numerical & Statistical Techniques	2-0-0	2
TCS-303	Data Structures	3-1-0	4
TEC-301	Digital Electronics & Design Aspect	3-1-0	4
TCS-304	Object Oriented Programming	3-1-0	4
THU-301	Engineering Economics & Costing	2-0-0	2
PRACTICAL:			
PCS-302	Computer Based Numerical & Statistical Techniques Lab	002	2
PCS-303	Data Structure Lab	0 0 2	2
PEC-350	Digital Electronics	0 0 2	2
PCS-304	Object oriented programming using Java/ C++	002	2
PD III /GP III	Personality Development/ General Proficiency	002	-
TOTAL			28

#### Semester-IV

Subject Code	Subject	Contact	Credit
		Hrs.	
TCS-401	Computer Organization	3-1-0	4
TCS-402	Unix & Shell Programming	2-0-0	2
TCS-403	Theory Of Automata & Formal Language	3-1-0	4
TCS-404	Database Management System	3-1-0	4
TCS-405	Microprocessor	3-1-0	4
TCS-406	Software Engineering	2-0-0	2
Practical			
PCS-402	Unix & Shell Programming Lab	0-0-2	2
PCS-404	Database Management System Lab	0-0-2	2
PCS-405	Microprocessor Lab	0-0-2	2
PCS 407	Seminar	0-0-2	2
PD IV /GP IV	Personality Development/ General Proficiency	002	-
TOTAL			28

#### Semester-III

						EVALUATION SCHEME						
S.	SUBJECT		PERIODS			SI	ESSIO	NAL	ESE	Subject		
No	CODE	SUBJECT		+	ı			v1 +		Total		
•			L	Т	Р	СТ	TA	Total				
1	TEC-301	Discrete Structures	3	1	0	30	20	50	100	150		
2	TCS-302	Computer Based Numerical & Statistical Techniques	2	0	0	15	10	25	50	75		
3	TCS-303	Data Structures	3	1	0	30	20	50	100	150		
4	TEC-301	Digital Electronics & Design Aspect	3	1	0	30	20	50	100	150		
5	TCS-304	Object Oriented Programming	3	1	0	30	20	50	100	150		
6	THU-301	Engineering Economics & Costing	2	0	0	15	10	25	50	75		
PRA	ICTICALS				_	_						
7	PCS-350	Digital Electronics Lab	0	0	2		25	25	25	50		
8	PCS-302	Computer Based Numerical & Statistical Techniques Lab	0	0	2		25	25	25	50		
9	PCS-303	Data Structure Lab	0	0	2		25	25	25	50		
10	PCS-304	Object Oriented programming Lab using Java/C++	0	0	2		25	25	25	50		
11	PD III /GP III	Personality Development/ General Proficiency	0	0	2			50		50		
		Total								1000		

			EVALUATION SCHEME						ME	
S. No	SUBJECT CODE	SUBJECT	PERIODS			SI	ESSIO EXA	ESE	Subjec t	
•			L	Т	Р	СТ	TA	Total		Total
1	TCS-401	Computer Organization	3	1	0	30	20	50	100	150
2	TCS-402	UNIX & Shell Programming	2	0	0	15	10	25	50	75
3	TCS-403	Theory Of Automata & Formal Language	3	1	0	30	20	50	100	150
4	TCS-404	Database Management System	3	1	0	30	20	50	100	150
5	TCS-405	Microprocessor	3	1	0	30	20	50	100	150
6	TCS-406	Software Engineering	2	0	0	15	10	25	50	75
PRA	ACTICALS	·		•						
7	PCS-402	UNIX & Shell Programming Lab	0	0	2		25	25	25	50
8	PCS-404	Database Management System Lab	0	0	2		25	25	25	50
9.	PCS-405	Microprocessor Lab	0	0	2		25	25	25	50
10	PCS-407	Seminar-I	0	0	2		50	50	-	50
11	PD IV /GP IV	Personality Development/ General Proficiency	0	0	2			50		50
		Total								1000

#### **DISCRETE STRUCTURES**

#### L T P 3 1 0

Unit-I

**Set Theory:** Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets

**Relation:** Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation.

**Function:** Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.

Theorem proving Techniques: mathematical induction (simple and strong), pigeonhole principle, prove by contradiction.

#### Unit-II

Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

#### Unit-III

**Posets, Hasse Diagram and Lattices:** Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded I and complemented lattices.

#### Unit-IV

**Propositional Logic:** Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

#### Unit-V

**Combinatorics & Graphs:** Recurrence Relation, Generating function., Permutation & Combination, Probabilistic Permutation & Combination

#### Text books:

- 1. Liptschutz, Seymour, "Discrete Mathematics", McGraw Hill. 3rd edition
- 2. Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill, Reprint 2010

#### Reference Book:

- 1. Discrete Mathematics & its application with combinatory and graph theory, *K.H.Rosen, TMH*(6<sup>th</sup> ed).
- 2. C.L.Liu, 'Discrete Mathematics' TMH.

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#### COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

#### LTP

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#### Unit-I

**Introduction:** Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation.

#### Solution of Algebraic and Transcendental Equation:

Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Methods of finding complex roots, Muller's method, Rate of convergence of Iterative methods, Polynomial Equations.

#### Unit-II

**Interpolation:** Finite Differences, Difference tables Polynomial Interpolation: Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula.

Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation

#### Unit-III(

**Numerical Integration and Differentiation:** Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule.

**Solution of differential Equations:** Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta Methods, Predictor Corrector Methods, Automatic Error Monitoring and Stability of solution.

#### Unit-IV

**Statistical Computation:** Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines, Regression Analysis, Linear and Non linear Regression, Multiple regression, Statistical Quality Control methods.

#### Text Books:

- 1. Rajaraman V, "Computer Oriented Numerical Methods", PHI, 3<sup>rd</sup> edition.
- 2. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH, 1<sup>st</sup> Edition.
- 3. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int

#### References:

- 1. Gerald & Whealey, "Applied Numerical Analyses", AW
- 2. Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi.
- 3. Numerical Method Principles, analysis and algorithms ,Srimamta Pal (Oxford Higher ed)
- 4. Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.

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#### DATA STRUCTURES

#### L T P 3 1 0

UNIT – I

**Introduction:** Basic Terminology, Elementary Data Organization, Structure operations, Algorithm Complexity and Time-Space trade-off

**Arrays**: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices and Vectors.

**Stacks:** Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.

**Recursion:** Recursive definition and processes, recursion, example of recursion, Tower of Hanoi Problem, simulating recursion, Backtracking, recursive algorithms.

#### UNIT – II

**Queues:** Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues.

**Linked list**: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Garbage Collection and Compaction.

#### UNIT –III

**Trees**: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, path length algorithm. Huffman Algorithm.

**Binary Search Trees**: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm.

#### UNIT –IV

**Searching and Hashing**: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

**Sorting**: Insertion Sort, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys.

#### UNIT – V

**File Structures**: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

#### Text Books:

- 1. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.(2 nd ed).
- 2. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi, 2<sup>nd</sup> Edition.

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#### **Reference** books:

1. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002. Reprint 2010.

#### TEC-301

#### **DIGITAL ELECTRONICS & AND DESIGN ASPECT**

#### L T P

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#### Unit-I : Introduction

Characteristics of digital system, Types of Digital circuits, Number system: Direct conversion between bases Negative numbers & BCD and their arithmetic's, Boolean algebra, Minimization of Boolean Functions: K Map upto 6 variable and multiple output circuits error detection & correcting codes, Hamming & cyclic codes quine mcclusky method

#### **Unit-II : Combinational Logic Circuits**

Design Procedure, adders, subtractiors & code conversion, Multiplexers/Demultiplexers, encoder/decoders, decimal adders & amplitude comparators, ROM as decoder, PLA & PAL. DRC, RDC.

#### **Unit-III : Sequential Logic Circuits**

Flip-Flops and their conversions, analysis and synthesis of synchronous sequential circuit, excitation table, state table & diagram. Design of synchronous counters, shift registers and theie applications.

#### **Unit-IV : Logic Families**

Diode, BJT & MOS as a switching element concept of transfer characteristics, Input characteristics and output characteristics of logic gates, TTL, IIL, ECL, NMOS, CMOS Tri-state logic, open collector output, Interfacing between logic families, packing density, power consumption & gate delay.

#### Unit-V : Hazard ,Fault Detection &Memories

Hazard and Fault Detection: Static and dynamic Hazard: Gate delay, Generation of spikes, Determination of hazard in combinational circuits, Fault detection methods: Fault Table & Path sensitizing methods.

**Memories:** Sequential, Random Access, NMOS & CMOS Static and Dynamic Memory elements, one and multi-dimensional selection arrangement, Read-only memories, Formation of memory banks, internal & External address decoding

#### **Text Books :**

- 1. Digital Systems: Principles and Design, Raj Kamal, Pearson
- 2. M. Morris Mano and M. D. Ciletti, Digital Design, M. Morris Mano and M. D. Ciletti, 4th Edition, pearson

3.Switching Circuit & Logic Design, Hill & Peterson, Wiley

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#### **OBJECT ORIENTED PROGRAMMING**

#### LTP 310

#### Unit I

**Object Modeling**: Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys, constraints.Dynamic Modeling: Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model.

#### Unit II

**Functional Modeling:** Data flow diagram, specifying operations, constraints, a sample functional model.OMT (object modeling techniques) methodologies, examples and case studies to demonstrate methodologies, comparisons of methodologies, SA/SD, JSD.

#### Unit III

## Java Programming: Introduction, Operator, Data types, Variables, Methods & Classes, Multithread Programming, I/O, Java Applet.

#### Unit IV

**Java Library:** String Handling, Input/Output exploring Java.io, Networking, Exception Handling, Event Handling, Introduction to AWT, Working with window, Graphics, AWT Controls, Layout Manager and Menus, Images.

#### Unit V

#### Software Development using Java:

Java Swing, Migrating from C++ to java, Application of java, JDBC.

#### Text Books:

1. Herbert Schieldt, "The Complete Reference: Java", TMH, 7th Edition.

2. E. Balagurusamy, "Programming in JAVA", TMH, 4<sup>th</sup> Edition.

3. James Rumbaugh etal, "Object Oriented Modeling and Design", PHI

#### References:

1. Bjarne Stroustrup, "C++ Programming Language", Addison Wesley, 3<sup>rd</sup> Edition.

2. E. Balagurusamy, "Object Oriented Programming with C++", TMH, 2008.

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#### **ENGINEERING ECONOMICS AND COSTING**

#### LTP

200

Unit I

(6L) Time value of money : Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time -value equivalences. Present worth comparisons, Comparisons of assets with equal, unequal and infite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

#### Unit II

Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions.

#### Unit III

Analysis of public Projects: Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost -effectiveness analysis.

#### Unit IV

Depreciation, computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models.

Product and Process Costing, Standard Costing, cost estimation, Relevant Cost for decision making, Cost control and Cost reduction techniques.

#### Text Book :

1. Horn green, C.T., Cost Accounting, Prentice Hall of India

2. Riggs, J.L., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996

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#### PCS- 302 : Computer Based Numerical Techniques Lab

L T P 0 0 2

#### Write Programs in 'C' Language:

- 1. To deduce error envolved in polynomial equation.
- 2. To Find out the root of the Algebraic and Transcendental equations using
- 3. To implement Newton's Forward and Backward Interpolation formula.
- 4. To implement Gauss Forward and Backward, Bessel's, Sterling's and Evertt's Interpolation formula.
- 5. To implement Newton's Divided Difference and Langranges Interpolation formula.
- 6. To implement Numerical Differentiations.
- 7. To implement Numerical Integration using Trapezoidal, Simpson 1/3 and Simpson 3/8 rule.
- 8. To implement Least Square Method for curve fitting.
- 9. To draw frequency chart like histogram, frequency curve and pie-chart etc.
- 10. To estimate regression equation from sampled data and evaluate values of standard deviation, t-statistics, regression coefficient, value of R2 for atleast two independent variables.

#### PCS- 303 : Data Structure Lab

LTP

0 0 2

#### Write Program in C or C++ for following.

- 1. Program for Stack
- 2. Program Queue, Circular Queue
- 3. Program demonstrating Stack operation
- 4. Program for Stack Using Linked List
- 5. Program for Queue Using Linked List
- 6. Traversing of Tree Using Linked List
- 7. Queue Using Array
- 8. Program for Tree Structure, Binary Tree, Binary Search Tree
- 9. Program for Heap Sort
- 10. Program for Quick Sort
- 11. Graph Implementation BFS, DFS
- 12. Deletion in BST
- 13. Insertion in BST

#### PEC-350 DIGITAL ELECTRONICS LAB

L T P 0 0 2

- 1. Bread-board implementation of various flip-flops.
- 2. Bread-board implementation of counters & shift registers.
- 3. Determination of Delay time and NAND, NOR, Ex-OR, AND & OR Gates.
- 4. Bread Board Implementation of Flip-Flops.
- 5. Experiments with clocked Flip-Flop.
- 6. Design of Counters.
- 7. Bread Board implementation of counters & shift registers.
- 8. Implementation of Arithmetic algorithms.
- 9. Bread Board implementation of Adder/Subtractor (Half, Full)
- 10. Transfer characteristics of TTL inverters & TTL Schmitt Trigger inverter.
- 11. Transfer characteristics of CMOS inverters series and CD40 series and
- 12. estimation of Gate delay of CD40 series CMOS inverter.
- 13. Monoshot multivibrators using 74121 and 74123.
- 14. Clock circuit realization using 555 and CMOS inverter and quartz crystal.
- 15. Adder/ subtractor operation using IC7483 4 bit/ 8 bit.
- 16. Demultiplexer / Decoder operation using IC-74138.

#### PCS- 304 : Object Oriented Programming Using Java

### LTP

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- 1. To become familiar with classes that represent entities that can interact with the user.
- 2. To successfully write simple programs that involve if statements.
- 3. To gain practice in the use of Boolean operators like && and ||.
- 4. To construct a class that represents a simple ATM (automatic teller machine).
- 5. Write a new program called Options.java that will request that the user enter an integer and then will display the message .positive, . .negative, . or zero. if the value that was entered was greater than zero, less than zero, or equal to zero, respectively.
- 6. Write a simple program called RandomGeneration.java that will request N, the number of values desired, and then generate a list of N random double values. Use a ViewFrame for input and output.
- 7. Write program for Java Applets.
- 8. Use Java Servlets for proxy server.

#### **COMPUTER ORGANIZATION**

#### LTP 310

Unit-I Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Microoperation, Arithmetic Logic Shift Unit, Design of Fast address, Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers.

#### Unit-II

#### **Control Design:**

Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, performing of arithmetic or logical operations, fetching a word from memory, Storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Micro programmed control(Microinstruction, Microprogram sequencing, Wide-Branch addressing, Microinstruction with Next-address field, Prefetching Microinstruction).

#### **Unit-III**

#### **Processor Design:**

Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer.

#### **Input-Output Organization:**

I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.

#### Unit-IV

#### **Memory Organization:**

Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of Cache Memory, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

#### Unit – V(8L)

Parallel Processing, Pipelining- Arithmetic Pipelining, Instruction Pipelining, RISC Pipelining, Vector Processing, Array Processor. Multiprocessor: Characteristic of Multiprocessor, Interconnection Structure, Interprocessor Arbitration, Cache Coherence

#### Text Book:

1. Computer Organization, John P.Hayes, McGraw Hill, 3<sup>rd</sup> Edition.

2. Computer System Architecture, M. Mano, Pearson, 3<sup>rd</sup> Edition.

#### **Reference Book:**

1. Computer Organization, Vravice, Zaky & Hamacher (TMH Publication)

- 2. Structured Computer Organization, Tannenbaum(PHI)
- 3. Computer Organization, Stallings(PHI)
- 4. R.S.Gaonkar Microprocessor architecture Programming and Application with 8085/8080A - Wiley Eastern Limited.

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#### **UNIX AND SHELL PROGRAMMING**

#### LTP 200

#### Unit-1

#### Introduction

Introduction to UNIX, UNIX system organization (the kernel and the shell), Unix File System, Basic file attributes, Editors (vi and ed).

#### Unit-2

#### General Purpose Utilities: cal, date, echo, script, mailx, passwd, who, uname, tty, sty, cat, cp,rm, mv, more, file, wc, od, cmp, comm, diff, lp, banner, dos2unix, and unix2dos, gzip and gunzip, zip and unzip.

#### Unit-3

Unix Shell programming: Types of Shells, Shell Metacharacters, Shell variables, Shell scripts, Shell commands, the environment, Integer arithmetic and string Manipulation, Special command line characters, Decision making and Loop control, controlling terminal input, trapping signals, arrays.

#### Unit-4

Unix System Administration: File System, mounting and unmounting file system, System booting, shutting down, handling user account, backup, recovery, security, creating files, storage of Files, Disk related commands, User quota and accounting.

#### **Textbook:**

- 1. Sumitabh Das, "Unix Concepts and applications", TMH, 2003
- 2. Yashwant Kanitkar, "Unix Shell Programming", BPB, 2009

#### References

- 1. Parata, "Advanced Unix programming guide", BPB
- Meeta Gandhi, Tilak Shetty, Rajiv Shah, "The 'C' Odyssey Unix the open boundless 2. C", BPB.
- Mike Joy, Stephen Jarvis, Michael Luck, "Introducing Unix and Linux", Palgrave 3. Macmillan.
- 4. Rachel Morgan, Henry McGilton, "Introducing Unix System V", TMH

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#### THEORY OF AUTOMATA & FORMAL LANGUAGES

#### L T P 310

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#### Unit I

Introduction to defining language, Kleene closures, Arithmetic expressions, defining grammar, Chomsky hierarchy, Finite Automata (FA), Transition graph, generalized transition graph.

#### Unit II

Nondeterministic finite Automata (NFA), Deterministic finite Automata (DFA), Construction of DFA from NFA and optimization, FA with output: Moore machine, Mealy machine and Equivalence, Applications and Limitation of FA.

#### Unit III

Arden Theorem, Pumping Lemma for regular expressions, Myhill-Nerode theorem, Context free grammar: Ambiguity, Simplification of CFGs, Normal forms for CFGs, Pumping lemma for CFLs, Decidability of CFGs, Ambiguous to Unambiguous CFG.

#### Unit IV

Push Down Automata (PDA): Description and definition, Working of PDA, Acceptance of a string by PDA, PDA and CFG, Introduction to auxiliary PDA and Two stack PDA.

#### Unit V

Turing machines (TM): Basic model, definition and representation, Language acceptance by TM, TM and Type – 0 grammar, Halting problem of TM, Modifications in TM, Universal TM, Properties of recursive and recursively enumerable languages, unsolvable decision problem, undecidability of Post correspondence problem, Church's Thesis, Recursive function theory.

#### Text Books:

- 1. Hopcroft, Ullman, "Introduction to Automata Theory, Language and Computation", Nerosa Publishing House, 3<sup>rd</sup> Edition
- 2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science(Automata, Languages and Computation)", PHI, 3<sup>rd</sup> Edition

#### Reference Books:

- 1. Martin J. C., "Introduction to Languages and Theory of Computations", TMH
- 2. Papadimitrou, C. and Lewis, C.L., "Elements of theory of Computations", PHI
- 3. Cohen D. I. A., "Introduction to Computer theory", John Wiley & Sons
- 4. Kumar Rajendra, "Theory of Automata (Languages and Computation)", PPM

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#### **DATABASE MANAGEMENT SYSTEM**

### LTP

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#### Unit- I

**Introduction:** An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

#### Data Modeling using the Entity Relationship Model:

ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, Candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, Extended ER model, relationships of higher degree.

#### Unit- II

Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views, Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

#### Unit-III

#### Data Base Design & Normalization:

Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

#### Unit-IV

**Transaction Processing Concepts:** Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

#### Unit- V

Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.

#### Text Books:

1 Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill, 5th Edition

2 Elmasri, Navathe, "Fundamentals Of Database Systems", Addision Wesley,5th edition

#### **References:**

1 Date C J, "An Introduction To Database System", Pearson, 8th Edition.

2 Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication

3 Leon & Leon, "Database Management System", Vikas Publishing House.

4 Majumdar & Bhattacharya, "Database Management System", TMH

5 Ramakrishnan, Gehrke, "Database Management System", McGraw Hill

- 7. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.
- 8. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi.

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#### **TCS-405 MICROPROCESSOR**

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#### Unit I

Introduction – Microprocessors Evolution and types (Intel 4004 – Pentium IV and road maps), Overview of 8085, 8086, 80286, 80386, 80486, Pentium processors and Micontrollers.

#### Unit II

# Architecture of 8086 – Register Organization, Execution unit, Bus Interface Unit, Signal Description, Physical Memory Organization, General Bus Operation, I/O addressing capabilities, Minimum mode and maximum mode timing diagrams, Comparison with 8088

#### Unit III

8086 programming – Assembly language program development tools (editor, linker, loader, locator, Assembler, emulator and Debugger), Addressing modes, Instruction set descriptions,

#### Unit IV

Assembler directives and operators, Procedures and Macros. (Writing programs for use with an assembler MASM),8086 Interfacing – Interfacing 8086 with semiconductor memory, 8255, 8254/8243, 8251, 8279.

#### Unit V

A/D and D/A converters, Numeric processor 8087, I/O processor 8089, Bus Interface( USB, PCI).

#### Text Books:

1. D.V. Hall, "Microprocessors and Interfacing", TMH, 2 Ed. 1991.

2. Barry B Brey, "INTEL Microprocessors", Prentice-Hall.

#### References:

1. Y.-C. Liu and G. A. Gibson, "Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design", PHI, 2000.

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#### **SOFTWARE ENGINEERING**

#### L T P 2 0 0

#### **Unit-I: Introduction**

Introduction to Software Engineering, Software Characteristics, Software Crisis, Software Engineering Processes, Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

#### Unit-II: Software Requirement Specifications (SRS)

Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA), SEI-CMM Model.

#### **Unit-III: Software Design**

Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design.Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

#### Unit-IV: Coding, Testing & Software Maintenance

Top-Down and Bottom –Up programming, structured programming, Compliance with Design and Coding Standards.

Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing),

Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Constructive Cost Models (COCOMO),

#### **Text Books:**

**1.** Rajib Mall, Fundamentals of Software Engineering, PHI Publication, 3<sup>rd</sup> Edition.

- 2. Pankaj Jalote, Software Engineering, Narosa Publication, 3rd Edition
- 3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers, 3<sup>rd</sup> Edition.

#### **Reference Books:**

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill, 6<sup>th</sup> Edition.

2. Ian Sommerville, Software Engineering, Addison Wesley, 8th Edition.

3. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication

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#### PCS- 402 : UNIX & Shell Programming Lab

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1. Use Vi editor to create a file called myfile.txt which contain some text. Correct typing errors during creation, Save the file & Logout of the file

2.Open the file created in Exp 1, Add, Change, delete & Save the changes

3. Use the cat command to create a file containing the following data. Call it mutable use tabs to separate the fields 1425 ravi 15.65, 4320 ramu 26.27, 6830 sita 36.15, 1450 raju 21.86

4. Use the cat command to display the file, my table, use vi command to correct any errors in the file, my table, use the sort command to sort the file my table according to the first field. Call

the sorted file my table(same name) & print the file my table

5. Use the cut & paste commands to swap fields 2 and 3 my table. Call it mytable(same name) & print the new file, my table

6. Use the date and who commands in sequence ?(in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called my file2.Use the more command to check the contents of myfile2.

7. Develop an interactive grep script that asks for a word and a file name and then tells how many lines contain that word

8. Write A shell script that takes a command –line argument and reports on whether it is directry ,a file,or something else

9. Write a shell script that accepts one or more file name as a arguments and converts all of them to uppercase, provided they exits in the current directory

10. Write a shell script that determines the period for which a specified user is working on the system

#### **PCS- 404 : Database Management System Lab**

#### L T P

0 0 2

- 1. Write the queries for Data Definition and Data Manipulation Language.
- 2. Write SQL queries using logical operations (=,<,>,etc)
- 3. Write SQL queries using SQL operators
- 4. Write SQL query using character, number, date and group functions
- 5. Write SQL queries for relational algebra
- 6. Write SQL queries for extracting data from more than one table
- 7. Write SQL queries for sub queries, nested queries
- 8. Write programme by the use of PL/SQL
- 9. Concepts for ROLL BACK, COMMIT & CHECK POINTS
- 10. Create VIEWS, CURSORS and TRGGERS & write ASSERTIONS.
- 11. Create FORMS and REPORTS

#### Note:

- 1. The queries to be implemented on DBMS using SQL
- 2. Students are advised to use Developer 2000/Oracle9i or other latest version for above experiments. However student may use Power Builder/SQL SERVER or DB2.

Mini Projects may also be planned & carried out through out the semester to understand important concepts of database.

#### PCS-405 : Microprocessor Lab

L T P 0 0 2

- 1. To study 8085 microprocessor System
- 2. To study 8086 microprocessor System
- 3. To develop and run a programme to find out largest and smallest number
- 4. To develop and run a programme for converting temperature from F to C degree
- 5. To develop and run a programme to compute square root of a given number
- 6. To develop and run a programme for computing ascending/descending order of a number.
- 7. To perform interfacing of RAM chip to 8085/8086
- 8. To perform interfacing of keyboard controller
- 9. To perform interfacing of DMA controller
- 10. To perform interfacing of UART/USART



### UTTARAKHAND TECHNICAL UNIVERSITY

### Program: B. Tech-CSE

Year: Session: 2011 – 2012

#### Scheme and Evaluation Pattern

S.No	Course	Subject	Periods		E	valuatio	on		Total	
	No.		L	Т	Р	Sessional		al	External	Marks
						СТ	TA	Total	Exam	
	Semester:5 <sup>th</sup>									
Theory										
1.	TCS – 501	Computer Graphics	3	1	0	30	20	50	100	150
2.	TCS – 502	Computer Network	3	1	0	30	20	50	100	150
3.	TCS – 503	Design & Analysis of Algorithms	3	1	0	30	20	50	100	150
4.	TCS – 504	Principles of Programming Languages	2	1	0	15	10	25	50	75
5.	TCS – 505	Advance Java Programming	3	1	0	30	20	50	100	150
6.	TCS – 506	Modeling & Simulation	2	1	0	15	10	25	50	75
Practical	/Design									
1.	PCS -551	Computer Graphics Lab.	0	0	2	0	0	25	25	50
2.	PCS-552	Computer Network Lab.	0	0	2	0	0	25	25	50
3.	PCS-553	Algorithms Lab.	0	0	2	0	0	25	25	50
4	PCS-555	Adv. Java Lab.	0	0	2	0	0	25	25	50
5.	Discipline		0	0	2	0	0	50	0	50
	Semester: 6 <sup>th</sup>									
Theory	Course				-				Tatal	
3.10	No	Subject		T	D	Evaluation		50 51	Extornal	Marks
	NO.		L	'	F			Total	Fxam	IVIAI KS
1	TCS 601	Operating System	2	1	0	20	1A 20	101ai	100	150
1. ว	TCS = 601	Compiler Design	2	1	0	20	20	50	100	150
2.	TCS = 602	Artificial Intelligence	2	1	0	30	20	50	100	150
<u></u> Д	TCS = 603	Graph Theory	2	1	0	15	10	25	50	75
5.	TCS - 605	Visual Programming & DotNet Technologies	3	1	0	30	20	50	100	150
6.	THU - 608	Principles of Management	2	1	0	15	10	25	50	75
Practical	/Design									
1.	PCS-651	Operating System Lab.	0	0	2	0	0	25	25	50
2	PCS-652	Compiler Design Lab.	0	0	2	0	0	25	25	25
3.	PCS-653	Artificial Intelligence Lab.	0	0	2	0	0	25	25	50
4.	PCS-655	Visual Programming Lab.	0	0	2	0	0	25	25	50
5.	Discipline		0	0	2	0	0	50	0	50



### UTTARAKHAND TECHNICAL UNIVERSITY

## Program: B. Tech-CSE

Year: Session: 2012 - 2013

#### Scheme and Evaluation Pattern

S.No	Course	Subject	Periods			Total				
	No.		L	Т	Р	1	Sessional		External	Marks
						СТ	TA	Total	Exam	
Semester:7 <sup>th</sup>										
Theory										
1.	TCS- 701	System Administration	3	1	0	30	20	50	100	150
2.	TCS -702	Advance Computer Architecture	3	1	0	30	20	50	100	150
3.	TCS -703	Data Warehousing & Mining	3	1	0	30	20	50	100	150
4.	TCS-07X	ELECTIVE-I	3	1	0	30	20	50	100	150
5.	TOE-XX	Open Elective	3	1	0	30	20	50	100	150
Practical	/Design									
1.	PCS -757	Project	0	0	4	0	0	50	50	100
2.	PCS-758	Industrial Interaction/ Seminar (Term Paper)	0	0	2	0	0	25	25	50
3.	PCS-751	System Administration Lab	0	0	2	0	0	25	25	50
4.		Discipline	0	0	0	0	0	50	0	50
Semester: 8 <sup>th</sup>										
Theory										
S.No	Course	Subject	Periods		Evaluation				Total Marks	
	NO.		L	Т	Р		Sessiona	l	External	iviai K3
						СТ	ТА	Total	EXdili	
1.	TCS -801	Distributed Computing	3	1	0	30	20	50	100	150
2.	TCS-802	Web Technology	3	1	0	30	20	50	100	150
3.	TCS-02X	ELECTIVE-II	3	1	0	30	20	50	100	150
4.	TCS-03X	ELECTIVE-III	3	1	0	30	20	50	100	150
Practical	/Project				_	-				
1.	PCS-857	Project	0	0	6	0	0	100	200	300
2.	PCS-852	Web Technology Lab.	0	0	2	0	0	50	0	50
3.		Discipline	0	0	0	0	0	50	0	50

### **ELECTIVE-I**

- TCS-071 Digital Image Processing
- TCS-072 Soft Computing TCS-
- 073 Wireless Networks TCS-
- 074 Information Security

### **ELECTIVE-II**

TCS-081	Parallel Computing
TCS-082	Database Administration
TCS-083	Advance Computer Network
TCS-084	Fault Tolerant Computing

#### **ELECTIVE-III**

TCS-086	Computer	Vision

- TCS-087 Advanced DBMS
- TCS-088 Intrusion Detection Systems
- TCS-089 Cryptography & Network Security

#### **COMPUTER GRAPHICS (TCS-501)**

#### Unit-I

Line generation: Points lines, Planes, Pixels and Frame buffers, vector and character generation. Graphics Primitives: Display devices, Primitive devices, Display File Structure, Display control text.

#### Unit-II

Polygon: Polygon Representation, Entering polygons, Filling polygons. Segments: Segments table, creating deleting and renaming segments, visibility, image transformations.

#### Unit-III

Transformations: Matrices transformation, transformation routines, displays procedure. Windowing and Clipping: Viewing transformation and clipping, generalize clipping, multiple windowing.

#### Unit-IV

Three Dimension: 3-D geometry primitives, transformations, projection clipping.

Hidden Line and Surface: Back face removal algorithms, hidden line methods

#### Unit-V

Graphics Programming: The Sierpinski Gasket, Programming Two-Dimensional Applications, The OpenGL API, Primitives and Attributes, Color, Viewing, Control Functions, Polygons and Recursion, The Three-Dimensional Gasket, Plotting Implicit Functions

Input and Interaction: Interaction, Input Devices, Clients and Servers, Display Lists, Programming Event-Driven Input, Menus, Picking, Building Interactive Models, Animating Interactive Programs, Design of Interactive Programs, Logic Operations.

- 1. Hill, Jr. & Kelley; Computer Graphics Using OpenGL, 3rd Ed., Phi Learning Pvt. Ltd. (2009)
- 2. Donald D. Hearn, M. Pauline Baker; Computer Graphics with OpenGL; 3/E; Pearson Education
- 3. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
- 4. Asthana, Sinha, "Computer Graphics", Addison Wesley
- 5. Newman and Sproul, "Principle of Interactive Computer Graphics", McGraw Hill
- 6. Steven Harrington, "Computer Graphics:, A Programming Approach", 2<sup>nd</sup> Edition6.
- 7. Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.

#### **COMPUTER NETWORKS (TCS-502)**

#### Unit -I

Introduction Concepts : Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design. Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

#### Unit-II

Medium Access sub layer: Medium Access sub layer – Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

#### Unit - III

Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control ,Internetworking -TCP / IP - IP packet, IP address, IPv6. '

#### Unit - IV

Transport Layer: Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP – Window Management.

#### Unit-V

Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application, Example Networks - Internet and Public Networks.

- 1. Forouzen, "Data Communication and Networking", TMH
- 2. A.S. Tanenbaum, "Computer Networks", 3rd Edition, Prentice Hall India, 1997.
- 3. S. Keshav, "An Engineering Approach on Computer Networking", Addison Wesley, 1997
- 4. W. Stallings, "Data and Computer Communication", Macmillan Press.

#### **DESIGN & ANALYSIS OF ALGORITHMS (TCS-503)**

#### Unit -I

Introduction: Algorithms, analysis of algorithms, Growth of Functions, Master's Theorem, Designing of Algorithms. Sorting and order Statistics: Heap sort, Quick sort, Sorting in Linear time, Medians and Order Statistics.

#### Unit -II

Advanced Data Structure: Red-Black Trees, Augmenting Data Structure. B Trees, Binomial Heaps, Fibonacci Heaps, Data Stricture for Disjoint Sets.

#### Unit -III

Advanced Design and Analysis Techniques : Dynamic Programming, Greedy Algorithms, Amortized Analysis, Back Tracking.

#### Unit -IV

Graph Algorithms: Elementary Graphs Algorithms, Minimum Spanning Trees, Single-source Shortest Paths, Al I-Pairs Shortest Paths, Maximum Flow, and Traveling Salesman Problem.

#### Unit -V

Selected Topics: Randomized Algorithms, String Matching, NP Completeness, Approximation Algorithms.

- 1. Coreman, Rivest, Lisserson, "Algorithm", PHI.
- 2. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addision Wesley.
- 3. Horowitz, Sahani, and Rajasekaran "Fundamental of Computer Algorithms", Universities Press

#### PRINCIPLES OF PROGRAMMING LANGUAGES (TCS-504)

#### Unit -I

Introduction: Characteristics of programming Languages, Factors influencing the evolution of programming language, developments in programming methodologies, desirable features and design issues. Programming language processors: Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time.

#### Unit -II

Elementary and Structured Data Types, Structured data type and objects, Sub Program and programmer defined data types: Evolution of data types, abstractions, encapsulations, information hiding, sub programmes, abstract data types. Sequence Control; Implicit and Explicit sequence control, sequence control with within expression and statements, recursive sub programmes, exception handling, co-routines, Scheduled sub programmes, concurrent execution.

#### Unit -III

Data control referencing environments, static and dynamic scope, local data local data referencing environment, shared data: Explicit common environment dynamic scope parameter passing mechanism. Storage Management: Major run time requirements, storage management phases, static storage management, stack based, heap based storage management.

#### Unit -IV

Syntax and translation: General syntactic criteria, syntactic element of a language, stages in translation, formal syntax and semantics.

Introduction to Functional Programming, Lambda calculus, Data flow language and Object Oriented language, Comparison in various general and special purpose programming languages e.g. Fortran, C, Pascal, Lisp, etc.

- 1. Terrance W Pratt, "Programming Languages: Design and Implementation" PHI
- 2. Sebesta, "Concept of Programming Language", Addison Wesley
- 3. E Horowitz, "Programming Languages", 2nd Edition, Addison Wesley
- 4. "Fundamentals of Programming Languages", Galgotia.

#### **Advance Java Programming (TCS-505)**

#### UNIT-1

**Java Beans and Web Servers:** Introduction to Java Beans, Advantage, Properties, BDK, Introduction to EJB, Java Beans API Introduction to Servelets, Lifecycle, JSDK, Servlet API, Servlet Packages: HTTP package, Working with Http request and response, Security Issues.

**Java Script:** Data types, variables, operators, conditional statements, array object, date object, string object, Dynamic Positioning and front end validation, Event Handling

#### UNIT-2

**JSP:** Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages- Sharing Session and Application Data.

**Database Connectivity:** Database Programming using JDBC, Studying Javax.sql.\*package, accessing a database from a JSP page, Application-specific Database Action, Developing Java Beans in a JSP page, introduction to Struts framework.

#### UNIT-4

**Java Servlet:** Brief origin and advantages over CGI, J2EE Servlet 2.x Specification, Writing small Servlet Programs, Deployment Descriptor, Inter Servlet Collaboration, Session: Definition, State on web, Different ways to track sessions,

#### UNIT-5

**J2SE: Concepts and Prerequisites:** Data Types, Arrays, Dynamic Arrays, Type Casting, Classes and Objects, Inheritance, Interfaces, Exception Handling, Multi-Threading,

**J2EE Architecture:** J2EE as a framework, Client Server Traditional model, Comparison amongst 2-tier, 3-tier and N-tier architectures, Thin and Thick Clients

#### **TEXT BOOKS:**

- 1. Elliotte Rusty Harold, "Java Network Programming", O'Reilly publishers, 2000
- 2. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 1999.
- 3. Hortsmann & Cornell, "Core Java 2 Advanced Features, Vol II", Pearson Education, 2002.

#### **REFERENCES**:

- 1. Web reference: <u>http://java.sun.com</u>.
- 2. Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.

#### **MODELING AND SIMULATION (TCS-506)**

#### UNIT-I

**Introduction:** Systems, models, discrete event simulation and continuous simulation. **Discrete Event Simulation:** Time-advance mechanisms, event modeling of discrete dynamic systems, single-server single queue model, event graphs, Monte Carlo simulation.

#### UNIT-II

**GPSS:** Model structure, entities and transactions, blocks in GPSS, process oriented programming, user defined functions, SNA, logic switches, save locations, user chains, tabulation of result, programming examples.

Random Number Generation: Congruence generators, long period generators, uniformity and independence testing

#### UNIT-III

**Random Variate Generation:** Location, scale and shape parameters, discrete and continuous probability distributions; Inverse transform method, composition and acceptance-rejection methods

#### UNIT-IV

**Queuing Models:** Little's theorem, analytical results for M/M/1, M/M/1/N, M/M/c, M/G/1 and other queuing models.

#### **Books:**

- 1. Karian, Z.A. and Dudewicz, E.J., "Modern Statistical Systems and GPSS Simulation", 2nd Ed., CRC Press. 1999
- 2. Banks, J., Carson, L.S., Nelson, B.L. and Nicol, D.M., "Discrete Event System Simulation", 3rd Ed., Pearson Education. 2002
- Law, A.M. and Kelton, W.D., "Simulation, Modeling and Analysis", 3rd Ed., Tata McGraw-Hill. 2003

#### **COMPUTER GRAPHICS LAB (PCS-551)**

- 1. Implementation of line generation using slope's method, DDA and Bresenham's algorithms.
- 2. Implementation of circle generation using Mid-point method and Bresenham's algorithm.
- 3. Implementation of ellipse generation using Mid-point method.
- 4. Implementation of polygon filling using Flood-fill, Boundary-fill and Scan-line algorithms.
- 5. Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection and Shearing (write a menu driven program).
- 6. Implementation of Line Clipping using Cohen-Sutherland algorithm and Bisection Method.
- 7. Implementation of Polygon Clipping using Sutherland-Hodgman algorithm.
- 8. Implementation of 3D geometric transformations: Translation, Scalind and rotation.
- 9. Implementation of Curve generation using Interpolation methods.
- 10. Implementation of Curve generation using B-spline and Bezier curves.
- 11. Implementation of any one of Back face removal algorithms such as Depth-Buffer algorithm, Painter's algorithm, Warnock's algorithm, Scanline algorithm).

#### COMPUTER NETWORKS LAB (PCS-552)

- 1. Implementation of the Data Link Layer framing method such as character stuffing and bit stuffing.
- 2. Implementation of CRC algorithm.
- 3. Implementation of a Hamming (7,4) code to limit the nois e. We have to code the 4 bit data in to 7 bit data by adding 3 parity bits.
- 4. Implementation of LZW compression algorithm.
- 5. Write a socket program to implement a listener and a talker.
- 6. Simulation of a network of 3 nodes and measure the performance on the same network.
- 7. Write a program to encrypt 64-bit text using DES algorithm.

#### **ALGORITHMS LABORATORY (PCS-553)**

Programming assignments on each algorithmic strategy:

- 1. Divide and conquer method (quick sort, merge sort, Strassen's matrix multiplication),
- 2. Greedy method (knapsack problem, job sequencing, optimal merge patterns, minimal spanning trees).
- 3. Dynamic programming (multistage graphs, OBST, 0/1 knapsack, traveling sales person problem).
- 4. Back tracking (n-queens problem, graph coloring problem, Hamiltonian cycles).
- 5. Sorting: Insertion sort, Heap sort, Bubble sort
- 6. Searching: Sequential and Binary Search
- 7. Selection: Minimum/ Maximum, Kth smallest element

#### **ADVANCE JAVA LAB (PCS-555)**

At least following must be completed

- 1. Development of dynamic website of an online Departmental Store. The website should be user friendly and should have the following pages:
  - Home page
  - Registration and user login
  - User profile page
  - Items catalog
  - Shopping cart
  - Payment by credit card
  - Order confirmation
- 2. Add validations to the above site for registration, user login, user profile and payment by credit card using Java Script.
- 1. Creation of a JavaBean which gives the converted value of Temperature (in degree celcius) into equivalent Fahrenheit
- 2. Creation of a simple Bean with a label which is a "count" of number of clicks. Then create a BeanInfo class such that only the "count" is visible in the Property Window.
- 3. Creation of two Beans a) Keypad b) Display pad. After that integrate the two beans to make it work as a calculator.
- 4. Do the assignment 2 using JSP by converting the static web pages of assignment 2 into dynamic web pages. Create database with User Information and Item information. The Item catalog should be dynamically loaded from the database.
- 5. Implementation of currency converter program using JSP Struts Framework.

#### **OPERATING SYSTEMS (TCS-601)**

#### Unit -I

Introduction: Operating System and Function, Evolution of Operating System, Batch, Interactive, Time Sharing and Real Time System, System Protection. Operating System Structure: System Components, System Structure, Operating System Services.

#### Unit - II

Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Critical Section Problem, Semaphores, Classical Problems in Concurrency, Inter Processes Communication, Process Generation, Process Scheduling, Threads.

CPU Scheduling: Scheduling Concept, Performance Criteria, Scheduling Algorithm Evolution, Multiprocessor Scheduling.

#### Unit - III

Deadlock: System Model, Deadlock Characterization, Prevention, Avoidance and Detection, Recovery from Deadlock, Combined Approach.

Memory Management: Basic Machine, Resident Monitor, Multiprogramming with Fixed Partition, Multiprogramming with Variable Partition, Multiple Base Register, Paging, Segmentation, Paged Segmentation, Virtual' Memory Concept, Demand Paging, Performance, Paged Replaced Algorithm, Allocation of Frames, Thrashing, Cache Memory Organization, Impact on Performance.

#### Unit - IV

**File Concept**: Access Methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free space Management, Kernel I/O Subsystems, Disk Structure, Disk Scheduling, Disk Management, Swap, Space Management.

#### UNIT V

Linux overview: Kernel Architecture, Process, memory, file and I/O management, Interprocess communication and synchronization, Security.

Windows XP: System architecture, system management mechanisms, process, thread, memory and file management, I/O subsystem, Interprocess communication, Security.

#### Suggested Books and References:

- 1. Milenekovie, "Operating System Concept", McGraw Hill.
- 2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons (ASIA) Pvt. Ltd, Seventh edition, 2005
- 3. Harvey M. Deitel, Paul J. Deitel, and David R. Choffnes, "Operating Systems", Prentice Hall, Third edition, 2003
- 4. Petersons, "Operating Systems", Addision Wesley.
- 5. Tannenbaum, "Operating System Design and Implementation", PHI.
- 6. Stalling, Willium, "Operating System", Maxwell Macmillan
- 7. Gary Nutt, "Operating System, A Modern Perspective", Addision Wesley.

#### **COMPILER DESIGN (TCS-602)**

#### Unit-I

Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Implementation of lexical analyzers, lexical-analyzer generator, LEXcompiler,

Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages : Context free grammars, derivation and parse trees, capabilities of CFG.

#### Unit-II

Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence

parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers : LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables, constructing LALR sets of items.

#### Unit-III

Syntax-directed Translation: Syntax-directed Translation schemes,

Implementation of Syntax- directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser.

More about translation: Array references in arithmetic expressions, procedures call, declarations, case statements.

#### Unit-IV

Symbol Tables: Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.

#### Unit-V

Introduction to code optimization: Loop optimization, the DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

Implementation of a subset of C using YACC.

- 1. Aho, Sethi & Ullman, "Compiler Design", Addision Wesley/ Pearson.
- 2. O. G. Kakde; Compiler Design, 4/e; Universities Press (2008)
- 3. Chattopadhyay Santanu; Compiler Design; Phi Learning (2009)

#### **ARTIFICIAL INTELLIGENCE (TCS-603)**

#### UNIT I

**Introduction:** History of AI, Intelligent agents – Structure of agents and its functions, Problem spaces and search - Heuristic Search techniques – Best-first search, Problem reduction - Constraint satisfaction - Means Ends Analysis.

#### UNIT II

**Knowledge Representation**: Approaches and issues in knowledge representation, Knowledge Based Agent, Propositional Logic, Predicate logic – Unification – Resolution, Weak slot – filler structure, Strong slot - filler structure.

#### UNIT III

**Reasoning under uncertainty**: Logics of non-monotonic reasoning, Implementation, Basic probability notation, Bayes rule, Certainty factors and rule based systems, Bayesian networks, Dempster - Shafer Theory, Fuzzy Logic.

#### UNIT IV

**Planning and Learning:** Planning with state space search, conditional planning, continuous planning, Multi-Agent planning. Forms of learning - inductive learning - Reinforcement Learning - learning decision trees - Neural Net learning and Genetic learning

#### UNIT V

Advanced Topics: Game Playing: Minimax search procedure - Adding alpha-beta cutoffs. Expert System: Representation - Expert System shells - Knowledge Acquisition. Swarm Intelligent Systems – Ant Colony System, Development, Application and Working of Ant Colony System.

#### **TEXT BOOKS**

- 1. Elaine Rich, Kevin Knight and Shivashankar B.Nair, "Artificial Intelligence", Tata McGraw-Hill, Third edition, 2009. (UNITs I, II, III & V)
- 2. Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education Asia, Second edition, 2003. (UNIT IV)
- 3. N. P. Padhy, "Artificial Intelligence and Intelligent System", Oxford University Press, Second edition, 2005. (UNIT V)

#### REFERENCES

- 1. Rajendra Akerkar, "Introduction to Artificial Intelligence", Prentice-Hall of India, 2005.
- 2. Patrick Henry Winston, "Artificial Intelligence", Pearson Education Inc., Third edition, 2001.
- 3. Eugene Charniak and Drew Mc Dermott, "Introduction to Artificial Intelligence", Addison-Wesley, ISE Reprint, 1998.
- 4. Nils J.Nilsson, "Artificial Intelligence A New Synthesis", Harcourt Asia Pvt. Ltd., Morgan Kaufmann, 1988.

#### **GRAPH THEORY (TCS 604)**

Graph theoretic algorithms must be provided wherever required to solve the problems.

#### Unit- I

Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, trails, path & circuits, connected graphs, disconnected graphs and component, various operation on graphs, Euler graphs, Hamiltonian paths and circuits, the traveling salesman problem, directed graphs, some types of directed graphs, directed paths and connectedness, Hamiltonian and Euler digraphs.

#### Unit- II

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, trees with directed edges, fundamental circuits in digraph, algorithms of Prim, Kruskal and Dijkstra.

#### Unit -III

Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets, connectivity and separability, network flows, planer graphs, Euler's formula and its corollaries, Kuratowski's theorem and its application to planarity detection of graphs, combinatorial and geometric dual, some more criterion of planarity, thickness and crossings.

#### Unit -IV

Incidence matrix of graph, sub matrices of A(G), circuit matrix, cut set matrix, fundamental circuit matrix and rank of B, path matrix and relationships among  $A_{fi} B_{fi} \& C_f$ , adjacency matrices, adjacency matrix of a digraph, matrices A, B and C of digraphs, rank- nullity theorem, coloring and covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, enumeration, types of enumeration, counting of labeled and unlabeled trees.

- 1. Deo, N: Graph theory, PHI
- 2. Bondy and Murthy: Graph theory and application. Addison Wesley.
- 3. John M. Aldous and Robin J. Wilson: Graphs and Applications-An Introductory Approach, Springer
- 4. Robin J, Wilson: Introduction to Graph Theory, Addison Wesley.

#### Visual Programming & DotNet Technologies (TCS-605)

#### UNIT 1 The Philosophy of .NET

Understanding the previous states affair, The .NET Solution, The building Block of the .NET platform (CLR,CTS,CLS), the role of the .NET base class libraries, C# characteristics, additional .NET Aware programming Languages, An overview of .NET binaries (assemblies), The role of the common intermediate language, The role of .NET type metadata, The role of the assembly manifest, Compiling CIL to platform specific instruction, Understanding the common type system, Intrinsic CTS data types, Understanding the common languages specification, Understanding the common languages runtime, A tour of the .NET namespace, increasing your namespace nomenclature, Deploying the .NET runtime.

#### **UNIT 2 Building C# Applications**

The role of the command line compiler (CSC.exe), Building application using csc.exe, Working with csc.exe response file, generating bug reports, C# compiler option, The command line debugger, using the visual studio .Net IDE, Other key aspects of the VS.Net IDE, Documenting source code via XML, C# preprocessor directives, An interesting Aside: The System. Environment class.

C# Language Fundamentals : An Anatomy of a basic class, Creating objects: Constructor basic, the composition of an application, Default Assignment and variable scope, member initialization syntax, Basic input and output with the console class, Understanding value types and reference types, The master node: System. Objects, The system Data type (And C# aliases), Converting between value type and reference type: Boxing and Unboxing, Defining program constraints, Iterations constructs, control flow constructs, The complete set operator, Defining Custom class methods, Understanding static methods, Method parameter modifiers, Array manipulation, String manipulation, Enumerations, Defining structures, Defining custom namespaces.

#### UNIT 3 Object Oriented Programming with C#

Formal definition of the class, Definition the "Default public interface" of a type, Recapping the pillars of OOP, The first pillar: Encapsulation services, Pseudo Encapsulation: Creating read only field, The second pillar: Inheritance supports keeping family secrets: The "Protected" keyword, The Nested type definitions, The third pillar: Polymorphic support casting between types, Generating class definitions using Visual Studio.

Net. Exceptions and Objects Life Time Ode to errors, Bugs and exceptions, The role of .NET exceptions handling, The system. Exception base class throwing a generic exception catching exception, CLR system level exception (System. system exception), Custom application level exception (System. application exception), Handling multiple exception, The finally block The last chance exception, dynamically identify application and system level exception, Debugging system exception using VS.Net, Understanding Object life time, The CIT of new, The basic of garbage collection, Finalizing a type, Finalization process, building and Ad hoc destruction method, garbage collection optimization, The system .GC type.

#### **UNIT 4 Interfaces and Collections**

Defining interfaces using C#, Invoking interface member at the object level, Exercising the shape hierarchy, Understanding explicit interface implementation, Interfaces as Polymorphic agents, Building interface hierarchies, Implementing interface using VS.Net, Understanding the Iconvertible interface, Building a custom enumerator, Building cloneable objects, Building comparable objects, Exploring the system the collection namespace, Building a custom container (Retrofitting the cars type).

#### UNIT 5

Understanding .Net Assembles Problems with classic COM Binaries, An overview of .Net assembly, Building a simple file test assembly, A C# Client Application, A Visual Basic .Net Client application, Cross Language Inheritance, Exploring the Carlibrary's manifest, Exploring the Carlibrary's Types, Building the multi file assembly, Understanding private assemblies, Probing for private assemblies (The Basics), Private assemblies and XML Configuration files, Probing for private assemblies (The details),Understanding Shared assembly, Understanding Shared ass

#### **Text Book:**

- 1. Andrew Troelsen; Pro C# 2008 And The . Net 3. 5 Platform, 4Th Ed; Dreamtech Press
- 2. Bill Evjen, Christian Nagel, Karli Watson, Jay Glynn, Morgan Skinner; Proffessional C# 2008
- 3. Joel Murach; Murach's C# 2008; Shroff/murachs (2008)

#### PRINCIPLES OF MANAGEMENT (THU-608)

#### UNIT 1

INTRODUCTION TO MANAGEMENT: Theories of management: Traditional behavioral, contingency and systems approach. Organization as a system.

#### UNIT 2

MANAGEMENT INFORMATION: Interaction with external environment. Managerial decision making and MIS.

#### UNIT 3

PLANNING APPROACH TO ORGANIZATIONAL ANALYSIS: design of organization structure; job design and enrichment; job evaluation and merit rating.

#### UNIT 4

**MOTIVATION AND PRODUCTIVITY**: Theories of motivation, leadership styles and managerial grid. Co-ordination, monitoring and control in organizations. Techniques of control. Japanese management techniques. Case studies.

#### **TEXT BOOK:**

- 1. Peter Drucker, Harper and Row: The Practice of Management.
- 2. Koontz: Essentials of Management, PHI Learning.
- 3. Staner: Management, PHI Learning.
- 4. Daft: Principles of Management, Cengage Learning.
- 5. T. N. Chhabra: Principle and Practice of Management, Dhanpat Rai, New Delhi.
- 6. Hirschey: Managerial Economics, Cengage Learning.
- 7. T. R. Banga and S.C. Sharma: Industrial Organisation and Engineering Economics, Khanna Publishers.
- 8. O.P. Khanna: Industrial Engineering and Management, Dhanpat Rai.
- 9. Joel Dean: Managerial Economics, PHI learning.
- 10. V. L. Mote, Samuel Paul and G.S. Gupta: Managerial Economics Concepts & Cases, TMH, New Delhi.

#### **OPERATING SYSTEMS LAB (PCS-651)**

- 1. Simulation of the CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority
- 2. Simulation of MUTEX and SEMAPHORES.
- 3. Simulation of Bankers Deadlock Avoidance and Prevention algorithms.
- 4. Implementation of Process Synchronization (Reader-Writer, Sleeping Barber and Dining Philosopher's Problem)
- 5. Simulation of page Replacement Algorithms a) FIFO b) LRU c) LFU
- 6. Simulation of paging techniques of memory management.
- 7. Simulation of file allocation Strategies a) Sequential b) Indexed c) Linked
- 8. Simulation of file organization techniques a) Single Level Directory b) Two Level c) Hierarchical d) DAG

#### **COMPILER DESIGN LAB (PCS-652)**

- 1. Simulation of a Finite state Automata to recognize the tokens of various control statements.
- 2. Simulation of a Finite state machine to distinguish among Integers, Real Numbers & Numbers with Exponents.
- 3. Program in LEX tool to recognize the tokens and to return the token found for a C like Language
- 4. Parsing of arithmetic and algebraic expressions and equations.
- 5. Use of YACC tool to parse the statements of C like Language.

#### **ARTIFICIAL INTELLIGENCE LAB (PCS-653)**

- 1. Write a LISP Program to solve the water-jug problem using heuristic function.
- 2. Create a compound object using Turbo Prolog.
- 3. Write a Prolog Program to show the advantage and disadvantage of green and red cuts.
- 4. Write a prolog program to use of BEST-FIRST SEARCH applied to the eight puzzle problem.
- 5. Implementation of the problem solving strategies: Forward Chaining, Backward Chaining, Problem Reduction.
- 6. Write a Lisp Program to implement the STEEPEST-ASCENT HILL CLIMB ING.
- 7. Write a Prolog Program to implement COUNTE PROPAGATION NETWORK.

#### Visual Programming Lab. (PCS-655)

#### At least following should be covered

Starting with simple exercise given in the text book regarding C# language constructs (flow control structures, data types, file I/O and local libraries) the lab must graduate to a full project using GUI forms for data entry (with validation) processing, querying and reporting on .Net platform with database connectivity.



UTTARAKHAND TECHNICAL UNIVERSITY

### Program: B. Tech-CSE

Year: Session: 2012 – 2013

#### Scheme and Evaluation Pattern

S.No	Course	Subject		Period	S	Evaluation			Total	
	No.		L	Т	Р	Sessional		External	– Marks	
						CT	TA	Total	Exam	
Semester:7 <sup>th</sup>										
Theory										
1.	TCS- 701	System Administration	3	1	0	30	20	50	100	150
2.	TCS -702	Advance Computer Architecture	3	1	0	30	20	50	100	150
3.	TCS -703	Data Warehousing & Mining	3	1	0	30	20	50	100	150
4.	TCS-07X	ELECTIVE-I	3	1	0	30	20	50	100	150
5.	TOE-XX	Open Elective	3	1	0	30	20	50	100	150
Practical/Design										
1.	PCS -757	Project	0	0	4	0	0	50	50	100
2.	PCS-758	Industrial Interaction/ Seminar (Term Paper)	0	0	2	0	0	25	25	50
3.	PCS-751	System Administration Lab	0	0	2	0	0	25	25	50
4.		Discipline	0	0	0	0	0	50	0	50
			S	emeste	er: 8 <sup>th</sup>					
Theory										
S.No	Course	Subject	Periods		Evaluation				Total Marks	
	NO.		L	Т	Р	Sessio		1	External	11101 163
						СТ	TA	Total	EXdili	
1.	TCS -801	Distributed Computing	3	1	0	30	20	50	100	150
2.	TCS-802	Web Technology	3	1	0	30	20	50	100	150
3.	TCS-08X	ELECTIVE-II	3	1	0	30	20	50	100	150
4.	TCS-08X	ELECTIVE-III	3	1	0	30	20	50	100	150
Practical	/Project									
1.	PCS-857	Project	0	0	6	0	0	100	200	300
2.	PCS-852	Web Technology Lab.	0	0	2	0	0	50	0	50
3.	Discipline		0	0	0	0	0	50	0	50

### **ELECTIVE-I**

TCS-071 Digital Image ProcessingTCS-072 Fault Tolerant ComputingTCS-073 Wireless NetworksTCS-074 Soft Computing

#### **ELECTIVE-II**

TCS-081 Parallel ComputingTCS-082 Database AdministrationTCS-083 Adv. Computer NetworkTCS-084 Information Security

#### **ELECTIVE-III**

TCS-086	Computer Vision
TCS-087	Advanced DBMS
TCS-088	Intrusion Detection Systems
TCS-089	Cryptography & Network Security

#### SYSTEM ADMINISTRATION (TCS-701/TIT-701)

#### Unit-I

**Introduction:** Duties of the Administrator, Administration tools, Overview of permissions. Processes: Process status, Killing processes, process priority. Starting up and Shut down: Peripherals, Kernel loading, Console, The scheduler, init and the inittab file, Run-levels, Run level scripts.

**Managing User Accounts**: Principles, password file, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users.

#### Unit - II

**Managing Unix File Systems**: Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Boot disks

**Configuring the TCP/IP Networking :** Kernel Configuration; Mounting the /proc File system, Installing the Binaries, Setting the Hostname, Assigning IP Addresses, Creating Subnets, Writing hosts and networks Files, Interface Configuration for IP, ifconfig, netstat command, Checking the ARP Tables; Name service and resolver configuration.

#### Unit- III

**TCP/IP Firewall :** Methods of Attack, What Is a Firewall? What Is IP Filtering? Setting Up Linux for Firewalling Testing a Firewall Configuration; A Sample Firewall Configuration: IPAccounting, Configuring the Kernel for IP Accounting, Configuring IP Accounting, Using IPAccounting Results

**IP Masquerade and Network Address Translation :** Side Effects and Fringe Benefits, Configuring the Kernel for IP Masquerade, Configuring IP Masquerade.

#### **Unit-IV**

**The Network Information System :** Getting Acquainted with NIS, NIS Versus NIS+ , The Client Side of NIS, Running an NIS Server, NIS Server Security.

**Network file system:** Preparing NFS, Mounting an NFS Volume, The NFS Daemons, The exports File.

**System Backup & Recovery:** Log files for system and applications; Backup schedules and methods (manual and automated).

#### Unit- V

Active Directory, LDAP

#### **Text Books:**

- 1. L.L. Beck "System Software" (3rd Ed.)- Pearson Education
- 2. Michel Ticher "PC System Programming", Abacus
- 3. Kirch "Linux network Administrator's guide (2nd Ed.)" O'Rielly
- 4. Maxwell "Unix system administration" TMH
- 5. Limoncelli "The Practice of System & Network Administration"-Pearson
- 6. Wells, LINUX Installation & Administration, Vikas

#### **Reference Books:**

E. Nemeth, G. Snyder, S. Seebass, T. R. Hein – "Unix system administration handbook" – Pearson Education

#### **ADVANCE COMPUTER ARCHITECTURE (TCS - 702)**

#### Unit 1

**Parallel computer models:** The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

**Program and network properties:** Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

#### Unit 2

**System Interconnect Architectures:** Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Advanced processors: Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

#### Unit 3

**Pipelining:** Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design

**Memory Hierarchy Design:** Cache basics & cache performance, reducing miss rate and miss penalty, multilevel cache hierarchies, main memory organizations, design of memory hierarchies. Memory consistency models: SC, PC,WO/WC, RC;

#### Unit 4

**Multiprocessor architectures:** Symmetric shared memory architectures, distributed shared memory architectures, cache coherence protocols (MSI, MESI, MOESI), scalable cache coherence, overview of directory based approaches, design challenges of directory protocols, memory based directory protocols, cache based directory protocols, synchronization. Introduction of OpenMP and MPI, threads, mutex etc.

#### Unit 5

Introduction to multi-core architectures, multiprocessor Chip architecture case studies: Intel core 2 duo, Core i3, Core i5

#### **Text Books:**

- 1. Kai Hwang, "Advanced computer architecture"; TMH. 2000
- 2. D. A. Patterson and J. L. Hennessey, "Computer organization and design", Morgan Kaufmann, 2nd Ed. 2002
- 3. <u>www.intel.com</u>

#### **Reference Books:**

- 1. J.P. Hayes, "computer Architecture and organization"; MGH. 1998.
- 2. V. Rajaranam & C.S.R. Murthy, "Parallel computer-\_Theory and practices"; PHI. 2002.
- 3. J. Quin, "Parallel Computing", TMH
- R.K. Ghose, Rajan Moona & Phalguni Gupta, "Foundation of Parallel Processing", Narosa Publications, 2003
- 5. Kai Hwang and Zu, "Scalable Parallel Computers Architecture", MGH. 2001
- 6. Stalling W, "Computer Organization & Architecture", PHI. 2000
- 7. D.A. Patterson, J.L. Hennessy, "Computer Architecture :A quantitative approach"; Morgan Kauffmann, 2002.

#### DATA MINING AND DATA WAREHOUSING (TCS-703/TIT-702)

#### UNIT I

**Data Preprocessing, Language, Architectures, Concept Description:** Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

#### UNIT II

**Association Rule:** Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databasesmining multidimensional Association rules –association mining to correlation analysisconstraint based association mining.

#### UNIT III

**Classification and Prediction:** Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy.

#### UNIT IV

**Cluster Analysis:** Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, hierarchical methods, density based methods, grid based methods - Outlier Analysis. Recent trends - Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining

#### UNIT V

**Data Warehousing:** Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation - Data Warehousing to Data Mining -Data warehousing components-building a data warehouse – mapping the data warehouse to an architecture – data extraction - cleanup- transformation tools- metadata – OLAP - Patterns and models – Data visualization principles.

#### **TEXT BOOKS**

- 1. J. Han and M. Kamber, "Data Mining: Concepts and Techniques", Harcourt India /Morgan Kauffman, 2001. (UNITs 1 to IV)
- 2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data mining and OLAP", Tata McGraw-Hill, 2004. (UNIT V)

#### REFERENCES

- 1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2004.
- 2. Sam Anahory and Dennis Murry, "Data Warehousing in the Real World", Pearson Education, 2003.

#### **DIGITAL IMAGE PROCESSING (TCS-071)**

#### **UNIT-I Introduction and Fundamentals**

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

**Image Enhancement in Spatial Domain:** Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging;

Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening - The Laplacian.

#### UNIT-II

#### **Image Enhancement in Frequency Domain**

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

**Image Restoration:** A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

#### UNIT-III

#### **Color Image Processing**

Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.

**Morphological Image Processing:** Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components.

#### UNIT-IV

#### Registration

Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth

**Segmentation:** Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following.

#### UNIT-V

Feature Extraction: Representation, Topological Attributes, Geometric Attributes

Description: Boundary-based Description, Region-based Description, Relationship.

**Object Recognition:** Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

#### **Books:**

- 1. Rafael C. Gonzalvez and Richard E. Woods, Digital Image Processing 2nd Edition,.; PHI.
- 2. B. Chanda, D.D. Majumder, "Digital Image Processing & Analysis", PHI
- 3. R.J. Schalkoff; Digital Image Processing and Computer Vision, John Wiley and Sons, NY
- 4. A.K. Jain; Fundamentals of Digital Image Processing, Prentice Hall, Upper Saddle River, NJ.
## SOFT COMPUTING (TCS-072/TIT-074)

#### Unit –I

Introduction to soft computing. Applications of Artificial Neural Networks, fuzzy logic, genetic algorithms and other soft-computing techniques. Their strengths and weaknesses. Synergy of soft computing techniques. Artificial neural networks : over view of history, Mathematical Models of Neurons, ANN architecture.

## Unit-II

Introduction to artificial neural network

Neural Networks: Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Competitive learning networks, Kohonen self organizing networks, Hebbian learning; Hopfield Networks,

#### **Unit-III**

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations. Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

#### Unit - IV

Genetic algorithms(Gas), Evolution strategies(Ess), Evolutionary programming(EP), Genetic Programming(GP), Selecting, crossover, mutation, schema analysis, analysis of selection algorithms; convergence; Markov & other stochastic models.

#### Unit - V

Other Soft computing approaches Simulated Annealing, Tabu Search, Ant colony based optimization.

#### Text:

- 1. "Neuro-Fuzzy and Soft computing", Jang, Sun, Mizutani, Pearson
- 2. "Neural networks: a comprehensive foundation", Haykin,
- 3. "Genetic Algorithms", Goldberg,
- 4. "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI.

#### **Reference:**

- 1. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999
- 2. Hertz J. Krogh, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison- Wesley, California,
- 3. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
- 4. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999
- 5. Freeman J.A. & D.M. Skapura, "Neural Networks: Algorithms, Applications and Programming Techniques", Addison Wesley, Reading, Mass, (1992).

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#### WIRELESS NETWORKS (TCS-073/TIT-073)

#### **Unit – 1 Introduction**

Liberalization of communications Industry, Digitalization of content, changes in spectrum management, cellular reuse, drive towards broadband, IEEE 802.11 networks

#### Unit – 2 Wireless Network Systems

#### **Cellular networks**

Tthe GSM circuit switched network, GSM channel structure, Authentication and location updating, physical channels, TMN

## GPRS

Introduction to GPRS, contexts, PDP context, Mobility management context, MS-SGSN physical layer, MS-SGSN protocols, GPRS operations

#### Unit – 3 Principles of access network planning

#### Circuit voice networks

Introduction to CVN, coverage, capacity, planning for circuit multimedia services

#### Planning for packet multimedia services

Planning approaches, buffer-pipe model, characterization of applications, practical modeling methodologies, multiuser packet transport configurations

#### Unit – 4 Planning and design

RAN, GSM RAN, UMTS RAN, Cellular OFDM RAN, Mesh network

## Unit – 5 Network operation and optimization

Enhanced telecom operations model (eTOM), wireless network life cycle – strategy, infrastructure and product, operations, enterprise management, GSM network performance optimization – principles and key performance indicators, coverage optimization, GPRS RAN optimization, UMTS network performance optimization

#### **Text Books:**

- 1. Deploying Wireless networks, Andy wilton, Tim charity, Cambridge university press
- 2. Fundamental of Wireless Networking, Ron Price, TMH
- 3. 3G Wireless Networks, Clint Smity, TMH
- 4. Essentials of UMTS, Christopher Cox, Cambridge University Press

# UNIT I

**Introduction:** Security problem in computing, Secure system characteristics, What to secure –How to secure- at what cost?

Elementary Cryptography – DES – AES – Public Key Encryption – Uses of Encryption.

## UNIT II

**Program Security:** Security Programs – Non-malicious Program Errors – Virus and other Malicious Code – Targeted Malicious Code – Control against program Threats.

# UNIT III

**Security in Operating Systems:** Protected Objects and Methods of Protection – Memory and Address Protection –Control of Access generated Objects – File Protection Mechanisms – User Authentication – Trusted Operating Systems – Models of Security.

## UNIT IV

**Database and Network Security:** Database Security Requirements – reliability and integrity – Sensitive Data – Inference – Multilevel Databases and Multilevel Security – Threats in Networks –Network Security Controls – Firewalls – Intrusion Detection Systems – Secure Email.

## UNIT V

Administering Security and Ethical Issues: Security Planning – Risk Analysis – Organizational Security Policies – Physical Security – Protecting Programs and Data – Information and the Law –Software Failures – Computer Crime – Privacy – Ethical Issues.

## **TEXT BOOK**

1. Charles B. Pfleeger, and Shari Lawrence Pfleeger, "Security in Computing", Pearson Education, Third edition, 2003.

## REFERENCES

- 1. Matt Bishop, "Computer Security Art and Science", Pearson Education, First edition, 2003.
- 2. William Stallings, "Cryptography and Network Security Principles and Practices", Prentice-Hall of India, Third edition, 2003.
- 3. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.

# SYSTEM ADMINISTRATION LAB (PCS-751/PIT-751)

- 1. Installation of operating system (Window 7 and LINUX)
- 2. Installation of office productivity software (MS Office/ Open Office)
- 3. User Management
- 4. Security Management
- 5. Startup & Shutdown scripts
- 6. Network planning subnet creation
- 7. Firewall configuration
- 8. Basic properties of Windows Registry
- 9. Study of Important Windows Services
- 10. Study of Important LINUX Services

# PROJECT (PCS-757)

The project is intended to develop and test complete understanding of various ICT Technologies for practical real life applications. Proper project work is necessary for over all development of the student. Its need cannot be over emphasized for improving employability of the students.

Students must work for at least 50 hours to develop the project. Project topic must be decided within first two weeks of the start of the semester.

# INDUSTRIAL INTERACTION/ SEMINAR (TERM PAPER) (PCS-758)

It will involve documentation of technical activities of some prominent industry/company in IT field by a group of students (not more than 4). Students must deliver a seminar on current technology in covered in the syllabus which must be submitted as hard copy document in the form of a term paper.

## Unit–I

**Characterization of Distributed Systems**: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges.

System Models: Architectural models, Fundamental Models

**Theoretical Foundation for Distributed System**: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.

# Unit–II

**Distributed Mutual Exclusion**: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

**Distributed Deadlock Detection**: system model, resource Vs communication deadlocks deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

**Agreement Protocols**: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem.

## Unit–III

**Distributed Objects and Remote Invocation**: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.

**Distributed File Systems**: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

# Unit-IV

**Transactions and Concurrency Control**: Flat and nested distributed transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

**Distributed Transactions**: Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Atomic Commit protocols.

## Unit –V

**Introduction to Grid Computing:** Basics of grid Computing, Benefits of grid computing, Grid terms and concepts, Grid user roles, Standards for grid environments, Grid security requirements.

**Introduction to Cloud Computing:** basics of cloud computing, Layers of Cloud Computing, types of cloud computing, Cloud Computing Features, Cloud Computing Security requirements, Cloud Computing Challenges.

## Books:

- 1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
- 2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.

## **INTRODUCTION TO WEB TECHNOLOGY (TCS-802/TIT-603)**

#### UNIT I:

**Internet Principles and Components:** History of the Internet and World Wide Web-HTML; protocols – HTTP, SMTP, POP3, MIME, IMAP. Domain Name Server, Web Browsers and Web Servers

#### UNIT II: HTML, DHTML and XML

List, Tables, Images, Forms, Frames, CSS Document type definition, Dynamic HTML, XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX, Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script.

#### **UNIT III: Web Services**

Introduction to Web Services, UDDI, SOAP, WSDL, Web Service Architecture, Developing and deploying web services. Ajax – Improving web page performance using Ajax, Programming in Ajax. CORBA,

#### UNIT IV: Web 2.0

Interactive and social web: Blogs, wikis, and social networking sites – The technology behind these applications- AJAX, RSS and syndication, Ruby on Rails, Open APIs,

#### UNIT V:

Web 3.0: Semantic Web, Widgets, drag & drop mashups (iGoogle) - The technology behind these applications- RDF

Web based Information Systems, Search engines, Recommender Systems, Web Mining

#### **Books:**

- 1. Burdman, "Collaborative Web Development" Addison Wesley.
- 2. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech
- 3. Joel Sklar, "Principal of web Design" Vikash and Thomas Learning
- 4. Jon Duckett, "Beginning Web Programming with HTML, XHTML, and CSS", Wiley India Pvt Ltd (June 2008)
- 5. http://ugweb.cs.ualberta.ca/~c410/F06/schedule/index.html

# PARALLEL COMPUTING (TCS-081)

# UNIT-1

Introduction: What is parallel and distributed computing, Scope of parallel and distributed computing, Scope of parallel computing. Parallel Programming Platforms: implicit parallelism, Dichotomy of parallel computing platforms, Physical organization for parallel platforms, communication cost in parallel machines, routing mechanism for interconnection networks.

# UNIT-2

Basic Communication Operation: One-to-all broadcast; All-to-all broadcast; Reduction and prefix sums; One-to-all personalized communication; All-to-all personalized communication;

## UNIT-3

Performance and Scalability of Parallel Systems: Performance matrices for Parallel systems ? Run time, Speed up, Efficiency and Cost; The effect of granularity on performance

# UNIT-4

Sorting: Sorting networks; Bubble sort and its variants; Quick sort and other sorting algorithms

## UNIT-5

Dynamic Programming: Overview of dynamic programming, Serial monadic DP Formulations: The shortest path Problem, the 0/1 Knapsack Problem, Serial Polyadic DP Formulation : all pair shortest paths algorithms.

#### **References:**

- Vipin Kumar, Ananth Grama, Anshul Gupta and George Karypis; Introduction to Parallel Computing, The Benjamin/Cumming Publishing Company, Inc., Masschachusetts
- 2. George Coulouris, Jean Dollimore and Tim Kindberg; Distributed Systems Concepts and Design, Addison-Wesley, Masschachusetts
- 3. S G Akl; The Decision and analysis of parallel algorithms, PH Englewood Cliffs, New Jersey.
- 4. Advanced Computer Architecture: Parallelism, Scalability, Programmability, TMH.
- 5. J Jaja; An Introduction to Parallel Algorithms, Addison Wesley, Masschachusetts
- 6. T G Lewis and H E Rewini; Introduction to Parallel Computing, Prentice-Hall, Englewood Cliffs, New Jersey
- 7. M J Quinn; Parallel Computing: Theory and Practice, McGraw-Hill, New York.

#### DATABASE ADMINISTRATION (TCS-082/TIT-083)

# Any of MySQL, Oracle, DB2 or Microsoft SQL Server may be used. Replace Oracle word with the selected RDBMS.

#### UNIT 1 DBA Fundamental I

Oracle Architectural Components, Getting Started With Oracle Server, Managing an Oracle Instance, Creating a Database, Data Dictionary Contents and Usage, Maintaining the Control File, Redo Log Files, Managing Tablespaces and Data Files, Storage Structures and Relationships, Managing Undo Data, Tables, Indexes, Maintaining Data Integrity, Managing Password, Managing Security, Resources, users, Privileges & Roles, Loading Data Into a Database & Globalization Support

#### UNIT 2 DBA Fundamental II

Networking Overview, Basic Oracle Net Architecture, Server-Side Configuration, Basic Oracle Net Services Client-Side Configuration, Usage and Configuration of the Oracle Shared Server, Backup and Recovery Overview, Instance and Media Recovery Structures, Configuring the Database Archiving Mode, Oracle Recovery Manager Overview and Configuration, User Managed Backups, RMAN Backups, User Managed Complete & Incomplete Recovery, RMAN Complete Recovery, Incomplete Recovery & Maintenance, Recovery Catalog Creation and Maintenance, Transporting Data Between Databases

#### **UNIT 3** Performance Tuning

Overview Of Oracle 9i Performance Tuning, Diagnostic and Tuning Tools, Sizing the Shared Pool & the Buffer Cache, Sizing The Other SGA Structures, Database Configuration and I/O Issues, Optimizing Sort Operations, Diagnosing Contention For Latches, Tuning Rollback Segments, Monitoring and Detecting Lock Contention, Tuning The Oracle Shared Server, Application Tuning, Using Oracle Blocks Efficiently

SQL Statement Tuning, Tuning the OS and Using Resource Manager

#### **UNIT 4** Managing Oracle

Oracle10i: Overview, Preparing the Operating System & Install Oracle9i Software, Create a Custom Oracle Database, Install and Configure Enterprise Manager, Customize the Oracle Database Linux Measurement Tools, Oracle Measurement Tools, Tuning Oracle

#### **UNIT 5** Database Troubleshooting

One Time Troubleshooting, Adhoc Troubleshooting, Escalations, Connectivity, Business Continuity, High Availability and Scalability, Data Sharing and information Integration

#### BOOKS:

For Oracle:

- 1. Oracle Database Administrator's Guide
- 2. Oracle DBA Handbook
- 3. Oracle DBA on Unix and Linux by Michael Wessler

## ADVANCE COMPUTER NETWORK (TCS-083/TIT-084)

## UNIT I

**Network Design**: Design Principles - Determining Requirements - Analyzing the Existing Network - Preparing the Preliminary Design - Completing the Final Design Development -Deploying the Network - Monitoring and Redesigning – Maintaining - Design Documentation - Modular Network Design - Hierarchical Network Design - The Cisco Enterprise Composite Network Model.

## UNIT II

**Technologies - Switching Design**: Switching Types - Layer 2 and 3 Switching - Spanning-Tree Protocol - Redundancy in Layer 2 Switched Networks - STP Terminology and Operation – Virtual LANs – Trunks - Inter-VLAN Routing - Multilayer Switching - Cisco Express Forwarding - Switching Security - Switching Design Considerations - **IPv4 Routing Design**: IPv4 Address Design - Private and Public Addresses – NAT - Subnet Masks - Hierarchical IP Address Design - IPv4 Routing Protocols – Classification - Metrics - Routing Protocol Comparison - IPv4 Routing Protocol Selection.

#### UNIT III

**Network Security Design:** Hacking – Vulnerabilities - Design Issues - Human Issues -Implementation Issues – Threats - Reconnaissance Attacks - Access Attacks – Information Disclosure Attacks - Denial of Service Attacks - Threat Defense - Secure Communication -Network Security Best Practices - SAFE Campus Design.

#### UNIT IV

Wireless LAN Design: Wireless Technology Overview - Wireless Standards – Wireless Components - Wireless Security - Wireless Security Issues - Wireless Threat Mitigation – Wireless Management - Wireless Design Considerations - Site Survey - WLAN Roaming - Wireless IP Phones - Quality of Service Design - QoS Models – IntServ - DiffServ154 - QoS Tools – Policing and Shaping - Congestion Avoidance - Congestion Management - Link-Specific Tools1 – QoS Design Guidelines.

## UNIT V

**Network Management Design**: ISO Network Management Standard - Protocols and Tools – SNMP – MIB – RMON - Cisco NetFlow – Syslog – CiscoWorks - Network Management Strategy - SLCs and SLAs - IP Service-Level Agreements – Content Networking Design – Case Study – Venti Systems.

#### **TEXT BOOK**

Diane Tiare and Catherine Paquet, "Campus Network Design Fundamentals", Pearson Education, 2006.

#### REFERENCE

Craig Zacker, "The Complete Reference: Upgrading and Troubleshooting Networks", Tata McGraw-Hill, 2000.

# FAULT TOLERANT COMPUTING (TCS-084)

## UNIT-I

Introduction: Computer and Computation Distribution, System models and Fault models. Test generation for combinational circuits, sequential circuits and Fault simulation.

# UNIT-II

Fault Tolerance Concepts- Recovery in time, Fault detection techniques, Modeling Fault tolerant systems - Rollback modular redundancy and Exception Handling.

## UNIT-III

Fault Tolerant in Real time Systems - Architecture of Fault - tolerant computers general purpose commercial systems - High availability systems - Critical computations Fault Tolerant multiprocessor - Communication Architectures, Shared memory

## UNIT-IV

Interconnections, loop architectures, Tree Networks, Graph Network and in Binary cube interconnection.

## UNIT-V

Fault Tolerant Software - **Design** of fault Tolerant software - Reliability Models, Construction of acceptance tests, validation of Fault tolerant software.

## **TEXT BOOKS**

- 1. Israel & Krishnan, "Fault Tolerant Systems" Elsevier Publications, 2007.
- 2. D. K. Pradhan, "Fault Tolerant computing Theory and Techniques "Prentice Hall.Inc. 1986.

## **COMPUTER VISION (TCS-086)**

## UNIT-I

Introduction: Purpose, State of the art Image Formation: Projection, Sensing, Color

# UNIT-II

Image Processing: Filtering (low-pass and median), derivatives, and Edges

# UNIT-III

<u>Geometric Calibration</u>: Interior and Exterior Calibration, Rectification <u>Stereo</u>: Epipolar Geometry, Correspondence, Triangulation, Depth Estimation

## UNIT-V

<u>Motion</u>: Detection and Tracking of Point Features, Optical Flow <u>Object Tracking</u>: Kalman Filter, Condensation, Tracking Humans

#### **Books & References:**

- 1. E. Trucco and A. Verri, Introductory Techniques for 3-D Computer Vision, Prentice Hall, 1998
- 2. Ballard D., Brown C., Computer Vision, Prentice Hall
- 3. Sonka M., Hlavac V., Boyle R., Image Processing Analysis and Machine Design. PWS Publishers
- 4. http://www.cs.duke.edu/courses/fall07/cps296.1

## ADVANCED DBMS (TCS-087/TIT-089)

## UNIT-1

Distributed DBMS Concepts and design: Introduction, functions and architecture of a DDBMS, distributed relational database design, Transparencies in a DDBMS, Twelve rules for a DDBMS. Advanced concepts: Distributed transaction management, distributed concurrency control, distributed deadlock management, distributed database recovery, X/open distributed Transaction processing model, Replication servers, Distributed query optimization, Mobile databases.

# UNIT-2

Object-Oriented DBMS Introduction, advanced database applications, weakness of RDBMS, storing objects in a relational database, next-generation database systems. Concepts and design: OODBMS perspectives, persistence, issues in OODBMS, advantages and disadvantages of OODBMS, Object-oriented database design.

## UNIT-3

Standards and systems: object management group, object database standard ODMG 3.0 1999, Object store. Object relational DBMS: Introduction, third generation database manifestos, SQL8, Object oriented extensions in Oracle, Comparison of ORDBMS and OODBMS.

## UNIT-4

Web technology and DBMS Web as a database Application Platform: Requirements for web-DBMS integration, web-DBMS architecture, advantages and disadvantages of web-DBMS approach, approaches to integrating the web and DBMS, Oracle Internet Application Server (IAS).

## UNIT-5

Data Warehousing Concepts, OLAP and Data mining Evolution of data warehousing, data warehousing concepts, benefits and problems of data warehousing, comparison of OLTP systems and data warehousing, On-Line Processing, Introduction to data mining.

#### **Books:**

Adam, Nabil R., Bhargava, Bharat K., "Advanced Database Systems", Springer.
Carlo Zaniolo, Stefano Ceri, "Advanced Database Systems", Morgan Kaufmann, 1997

# **INTRUSION DETECTION SYSTEMS (TCS-088/TIT-088)**

## UNIT-I

Intruder types, intrusion methods, processes and detection, message integrity and authentication, honey pots. General IDS model,

## UNIT-II

Data mining based IDS, Denning model, data mining framework for constructing features and models for intrusion detection systems. Unsupervised anomaly detection, CV5 clustering, SVM,

# UNIT-III

probabilistic and statistical modeling, general IDS model and taxonomy, evaluation of IDS, cost sensitive IDS. NBAD, specification based and rate based DDOS, scans/probes, predicting attacks

## UNIT-IV

Network based anomaly detection, stealthy surveillance detection; Defending against DOS attacks in scout: signature-based solutions, snort rules.

Host-based anomaly detection, taxonomy of security flaws in software, self-modeling system calls for intrusion detection with dynamic window size.

## UNIT-V

Secure intrusion detection systems, network security, secure intrusion detection environment, secure policy manager, secure IDS sensor, alarm management, intrusion detection system signatures, sensor configuration, signature and intrusion detection configuration, IP blocking configuration, intrusion detection system architecture.

#### Books

- 1. Endorf, C., Schultz E. and Mellander J., "Intrusion Detection and Prevention," McGraw-Hill. 2003
- 2. Bhatnagar, K., "Cisco Security", Course Technology. 2002
- 3. Marchette, D. J., "Computer Intrusion Detection and Network Monitoring: A Statistical Viewpoint", Springer. 2001
- 4. Rash, M., Orebaugh, A. and Clark, G., "Intrusion Prevention and Active Response: Deploying Network and Host IPS", Syngress. 2005
- 5. Cooper, M., Northcutt, S., Fearnow, M. and Frederick, K., "Intrusion Signatures and Analysis", Sams.

# CRYPTOGRAPHY AND NETWORK SECURITY (TCS-089/TIT-802)

# Unit-I

Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption: Conventional encryption model, classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers.

Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

# Unit-II

Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffle-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption.

# Unit-III

Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA).

Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.

# Unit-IV

Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

## Unit-V

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management.

Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET).

System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

## **Books:**

- 1. William Stallings, "Cryptography and Network Security: Principals and Practice", Prentice Hall, New Jersy.
- 2. Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag
- 3. B. Forouzan, "Cryptography and Network Security, TMH

# PROJECT (PCS-857)

The project is intended to develop and test complete understanding of various ICT Technologies for practical real life applications. Proper project work is necessary for over all development of the student. Its need cannot be over emphasized for improving employability of the students.

Students must work for at least 100 hours to develop the project. Project topic must be decided within first two weeks of the start of the semester.

#### WEB TECHNOLOGY LAB (PCS-852)

At least following must be completed

- 3. Installation and configuration of Apache server
- 4. Development of static website of an online Departmental Store. The website should be user friendly and should have the following pages:
  - Home page
  - Registration and user login
  - User profile page
  - Items catalog
  - Shopping cart
  - Payment by credit card
  - Order confirmation
- 5. Add validations to the above site for registration, user login, user profile and payment by credit card using Java Script.
- 6. Installation and configuration of TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies.
- 7. Creation of a XML document of 20 students of UKTech. Add their roll numbers, marks obtained in 5 subjects, total and percentage and save this XML document at the server. Write a program that takes students' roll number as an input and returns the students marks, total and percentage by taking the students' information from the XML document.
- 8. Design a website using existing web services (Google map, weather forecast, market information etc.) using AJAX.

# UTTARAKHAND TECHNICAL UNIVERSITY SESSION 2009-10

#### LIST OF OPEN ELECTIVES-VII SEMESTER Effective from the session – 2009-10

[List of Open Elective of 7th Semester for B. Tech. Civil/Electrical/Electrical and Electronics/ Mechanical & Allied Courses/ Electronics and Communications & Allied Courses/ Instrumentation and Control & Allied Courses/Computer Science and Engineering & Allied Courses/ Information Technology & Allied Courses/ Biotechnology]

S.No	o. P.Code	Subject	Dept.
1.	TOE 01	Non-conventional Energy Resources	Electrical
2.	TOE 02	Reliability Engineering	Electrical
3.	TOE 03	Environment & Ecology	Civil
4.	TOE 04	Geographic Inf. System (GIS) Technology & its Applications	Civil
5.	TOE 05	Entrepreneurship Development Programme	Humanities
6.	TOE 06	Ancient Indian Culture	Humanities
7.	TOE 07	Human Values	Humanities
8.	<b>TOE 08</b>	Quality System & Management	Mechanical
8.	TOE 09	Condition Monitoring & Diagnostics	Mechanical
10.	TOE 10	Value Engineering	Mechanical
11.	TOE 11	Nanotechnology	Mechanical
12.	TOE 12	Solar Energy	Mechanical
13.	TOE 13	Human Resource Management	Mechanical
14.	TOE 14	Advance Material Science	Mechanical
15.	TOE 15	Industrial Instrumentation	Instrumentation &
Cont	rol		
16.	TOE 16	Biomedical Engineering	Instrumentation & Control
17.	TOE 17	Fundamentals of Coding Theory	Electronics &
Com	munication		
18. Com	TOE 18	Consumer Electronics	Electronics &
10		Artificial Neural Networks & Eugar Logia	Electrical
19.	TOE 19	Afuncial Neural Networks & Fuzzy Logic	Computer Science
20.	TOE 20		Lonputer Science
21.	TOE 21	1 1 in Business	Manufacturing Tashnalasu
22.	TOE 22		Manufacturing Technology
23.	TOE 23	Health, Hospital and Equipment Management	Biomedical Engineering
24.	TOE 24	Introduction to Medical Physics	Biomedical Engineering
25.	TOE 25	Modern Control System	Electrical
26.	TOE 26	Mechatronics	Electrical
27.	<b>TOE 27</b>	SCADA & Energy Management System	Electrical

# Note: The students will choose any one subject of the course of other than their Engineering Branch.

# **TOE-01 NON-CONVENTIONAL ENERGY RESOURCES**

#### Unit I:

**Introduction:** Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits.

# Unit II:

**Solar Cells**:Theory of solar cells. Solar cell materials, solar cell power plant, limitations. **Solar Thermal Energy:** Solar radiation flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

## Unit III:

**Geothermal Energy:** Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.

**Magneto-hydrodynamics (MHD):** Principle of working of MHD Power plant, performance and limitations.

## Unit IV:

**Fuel Cells:** Principle of working of various types of fuel cells and their working, performance and limitations.

**Thermo-electrical and thermionic Conversions:** Principle of working, performance and limitations.

**Wind Energy**: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems.

## Unit V:

Bio-mass: Availability of bio-mass and its conversion theory.

**Ocean Thermal Energy Conversion (OTEC):** Availability, theory and working principle, performance and limitations.

Wave and Tidal Wave: Principle of working, performance and limitations. Waste Recycling Plants

## **Books Recommended:**

- 1. Andra Gabdel, "A Handbook for Engineers and Economists".
- 2. A. Mani, "Handbook of Solar radiation Data for India".
- 3. Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.
- 4. F.R. the MITTRE, "Wind Machines" by Energy Resources and Environmental Series.
- 5. Frank Kreith, "Solar Energy Hand Book".
- 6. N. Chermisinogg and Thomes, C. Regin, "Principles and Application of Solar Energy".
- 7. N.G. Calvert, "Wind Power Principles".
- 8. W. Palz., P. Chartier and D.O. Hall," Energy from Biomass".

# **TOE – 02 RELIABILITY ENGINEERING**

#### Unit I:

**Introduction:** Definition of reliability, types of failures, definition and factors influencing, system effectiveness, various parameters of system effectiveness.

## Unit II:

**Reliability Mathematics:** Definition of probability, laws of probability, conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis procedures, empirical reliability calculations.

**Unit III: Reliability**Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.

## Unit IV:

**Reliability Improvements:** Methods of reliability improvement, component redundancy, system redundancy, types of redundancies series, parallel, series - parallel, stand by and hybrid, effect of maintenance.

## Unit V:

**Reliability Testing:** Life testing, requirements, methods, test planning, data reporting system, data reduction and analysis, reliability test standards.

#### **Books Recommended:**

- 1. R.Billintan & R.N. Allan," Reliability Evaluation of Engineering and Systems", Plenum Press.
- 1. K.C. Kapoor & L.R. Lamberson, "Reliability in Engineering and Design", John Wiley and Sons.
- 2. S.K. Sinha & B.K. Kale, "Life Testing and Reliability Estimation", Wiley Eastern Ltd.
- 3. M.L. Shooman, "Probabilistic Reliability, An Engineering Approach", McGraw Hill.
- 4. G.H.Sandler, "System Reliability Engineering", Prentice Hall.

# **TOE-03 ENVIRONMENT AND ECOLOGY**

#### Unit I:

**Environment:** Environment and its components, pollution of environment by human activity, kinds of pollution.

## Unit II:

Water Quality: Measure of water quality, water quality standards, water treatment; waste water transport and treatment, sludge treatment and disposal.

**Air Quality:** Sources and effects of air pollution, major air pollutants, air quality control, treatment of emissions, dispersion of air pollutants.

## Unit III:

**Solid waste:** Collection of refuse, removal and transport, disposal of refuse. **Noise Pollution:** Effect of noise on human health and its control.

#### Unit IV:

**Ecology:** Ecology and Ecosystems, concept of ecological imbalances, physical and climate factors, biotic components, energy and material flows in ecosystems, human influence on ecosystems.

Unit V:

**Conservation of Natural Resources:** Water resources, mineral resources, agricultural and forestry resources, agriculture soil and need of nutrients, fertilizers and pesticides. Brief introduction about environmental legislation and environmental audit.

#### **Books Recommended:**

1. Vesilind, "Introduction to Environmental Engineering," Thomson Asia Pvt. Ltd. Singapore.

# TOE-04 GEOGRAPHIC INFORMATION SYSTEMS (GIS) TECHNOLOGY AND ITS APPLICATIONS:

# Unit I

Definition of GIS, Cartography and GIS, GIS database: spatial and attribute date; Spatial models: Semantics, spatial information, temporal information, conceptual models of spatial information, representation of geographic information: point, line and area futures, topology,

## Unit II

Raster and vector data, raster to vector data conversion, map projection, analytical transformation, rubber sheet transformation, manual digitizing and semi-automatic line following digitizer; Remote sensing data as an input to GIS data;

## Unit III

Attribute database: scale and source of inaccuracy; GIS functionality; data storage and data retrieval through query, generalization, classification, containment search within a spatial region;

# Unit IV

Overlay: arithmetical, logical and conditional overlay, buffers, inter visibility, aggregation; Network analysis;

# Unit V

Applications of GIS in planning and management of utility lines and in the filed of environmental engineering, geotechnical engineering, transportation engineering and water resources engineering.

## **Books Recommended:**

- 1. Geographic Information Systems: A Management Perspective, by Stan Arnoff, WDL Publications.
- 2. Fundamentals of Spatial Information Systems by Robert laurini and Derek Thompson, Academic Press.
- 3. Geographical Information Systems, Vo. I and II edited by Paul Longely, M.F. Goodchild, et.al, John Wiley and Sons, Inc. 1999.

# **TOE-05 ENTREPRENEURSHIP DEVELOPMENT PROGRAMME**

## Unit I:

**Entrepreneur:** Definition. Growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control type. Government policy for small scale industry; stages in starting a small scale industry.

# Unit II:

**Project identification:** Assessment of viability, formulation, Evaluation, financing, fieldstudy and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

## Unit III:

**Accountancy:** Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control. Quality control. marketing, industrial relations. Sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

## Unit IV:

**Project Planning and control:** The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. Profit planning and programming, planning cash flow, capital expenditure and operations, control of financial flows, control and communication.

## Unit V:

**Laws concerning entrepreneur:** Partnership laws, business ownership, sales and income taxes and workman compensation act. Role of various national and state agencies which render assistance to small scale industries.

#### **Books Recommended:**

1. Joseph, L. Massod, "Essential of Management", Prentice Hall of India.

# **TOE-06 ANCIENT INDIAN CULTURE**

#### Unit I: Main features of Indian Culture

- (a) The orientlist view (b) The nationalist view
- (c) The Marxist view (d) Analysis and formulations

#### Principal Components – historical and archeo-ethic perspective

- (a) Indian Civilization (b) Vedic culture
- (c) Tribal and folk culture (d) Foreign elements

## Unit II: Impact of integrating, disintegrating and proliferating forces of History.

- (a) Eras of political unification (b) Foreign invasions
- (c) Regional conflicts (d) Religious movements
- (e) Trade and Dissemination

#### Unit III: Ideas and Institution

- a. Political b. Social
- c. Economic d. Religious

#### Unit IV: Achievements in Arts, Science and Technology

- (a) Literature (b) Art and Architecture
- (c) Music and Dance (d) Astronomy and Mathematics
- (e) Medicine

#### Unit V: Values and disvalues

- a. Humanism and spiritualism b. Ahinsa
- c. Altmism d Caste
- e. Unsociability f. Religious suicide and superstition
- g. Degradation of women and prostitution.

#### **Books Recommended:**

- 1. Ghose Aurobindo, Foundations of Indian culture.
- 2. Pande, G.C., Foundations of Indian culture, 2 Vols.
- 3. Coomarswami, dance of Siva
- 4. Thapar Ramila, Ancient Indian Social History
- 5. R.s. Sharma, (ed.), Indian Society Historical Probing, People's Publishing House, New Delhi, 1977.
- 6. Kossambi, Introduction to Indian History.
- 7. Altekar, A.S., State and Government in Ancient India.
- 8. Altekar, A.S., Position of Women in Hindu Civilization
- 9. Prakash, Om, conceptualization and History.
- 10. Bartam, A.I., Wonder that was India.

## **TOE 07 HUMAN VALUES**

#### **Unit I: Introduction**

- 1. Nature of value crisis in the contemporary Indian society and the larger human community.
- 2. Meaning and nature of values; holistic view of life and its value.
- 3. Conceptualizing 'good' life and its value dimensions.

#### Material and Societal value

- 1. Role of material values in promoting human well being.
- 2. Role of Science and technology; problems of material development.
- 3. Socio-political ideologies for promoting material wellbeing
- 4. Conceptualizing 'good' society and 'social goods'
- 5. Justice as a societal value.
- 6. Democracy and rule of law.
- 7. Values in the Indian Constitution.
- 8. Gandhian concepts of good society; gram swaraj, sarvodaya, antyodaya

#### Unit II: Psychological and Aesthetic Values

- 1. Humanistic psychology; meaning of 'personhood'
- 2. Maslow's hierarchy of human need; characteristics of 'self-actualizing' persons.
- 3. Mental health
- 4. Psycho-spiritual Indian concepts.
- 5. Areas and nature of aesthetic experiences.
- 6. Nature of beauty; aesthetic sensibilities.

#### Unit III : Ethical and Spiritual Values

- 1. Bases for moral judgments : customary morality, religious morality, reflective morality.
- 2. Some principles of ethics; ethical canons and their significance in modern life.
- 3. Virtue ethics; personal virtues for the modern times.
- 4. Ethics of duty and ethics of responsibility.
- 5. Factors to be considered in making ethical judgments: motives, means and consequences.
- 6. Spirituality and spiritual values : spiritual wisdom of the Upanishads; Buddha's view.
- 7. Science, materialism and spirituality.
- 8. Spirituality in the modern times.

## Unit IV : Human Values

1. Different meaning of human values: foundational human values - freedom, creativity, love and wisdom.

2. Nature of Human freedom; individual freedom, intellectual freedom, freedom of will, spiritual freedom.

- 3. Creativity: its meaning and nature; different kinds of creativity.
- 4. Creative problem solving.
- 5. Creative personality, creative environment.
- 6. Love as a foundational human value; different kinds of love.
- 7. Human wisdom; characteristics of a wise person.
- 8. Concepts & Principles of interdependence.

#### **Unit V : Work Ethics and Professional Ethics**

- 1. Different attitudes to work.
- 2. Demands of work-ethics, ethics at work place.
- 3. 'Good' organization and its values.
- 4. What is a profession?
- 5. Professional ethos and code of professional ethics.
- 6. IEEE Code of professional ethics.
- 7. Problems in practicing the code.

#### 8. Case studies.

#### **Books Recommended:**

- 1. Human Values By : Prof. A.N. Tripathi New Age International.
- 2. 7 Habits of Highly By : Dr. Stephen R. Covey Effective People Harper Publications.
- 3. Wisdom Leadership By: Prof. S.K. Chakraborthy Wheeler Publication.

UK Tech University, Dehradun

# **TOE-08 QUALITY SYSTEM & MANAGEMENT**

#### Introduction

Definition, need of quality systems, role of quality standards, stages of quality assurance systems. Quality charts, control charts for variables and attributes, acceptance sampling.

## **Quality Systems**

Overall responsibility for progress of quality systems. quality manuals, procedures and role of auditing, auditing for conformance versus quality for effectiveness, auditing a tool for quality improvement. ISO 9000 quality systems, British Standards BS5750/ISO 9000 origin of standards, requirements, issues associated with implementation.

# Registration

Registration and accreditation in quality system-certification, approval, registration of leading accessors.

## **Recommended Books:**

- 1. Mohamed Isiri, "Total Quality Management for Engineers".
- 2. Juran, J., " Quality Planning and Analysis, Mc -Graw Hill.
- 3. James R. Evans, & J.W. Dean," Total Quality-management, Organization and Strategy," Thomson Asia Pvt. Ltd., Singapore.

# **TOE – 09 CONDITION MONITORING & DIAGNOSTICS**

# Unit I

Productivity, Quality circle in Maintenance, Reliability, Reliability assurance, Maintainability vs. Reliability. Failure analysis, Equipment downtime analysis, breakdown analysis.

## Unit II

Maintenance type, Breakdown maintenance, Corrective maintenance, Opportunity maintenance, Routine maintenance, Preventive and predictive maintenance, Condition based maintenance systems, Design-out maintenance.

## Unit III

Equipment health monitoring, Signals, Online & off-line monitoring, Visual & temp. Monitoring, Leakage monitoring, Lubricant monitoring.

## Unit IV

Ferrography, Spectroscopy, Crack monitoring, Corrosion monitoring, thickness monitoring. Noise/sound monitoring, Smell/Odour monitoring, Thermography.

## Unit V

Vibration-characteristics, Vibration monitoring-causes, identification, measurement of machine vibration. C.M.of lubes and hydraulic systems, C.M. of pipe lines, Selection of C.M. Techniques, Advantages.

# **TOE – 10 VALUE ENGINEERING**

#### Unit I: An Overview

Definition, value engineering recommendations, programmes, advantages. Approach of function Evaluation of function, determining function, classifying function, evaluation of costs, evaluation of worth, determining worth, evaluation of value.

#### Unit II: VE Job Plan

Introduction, orientation, information phase, speculation phase, analysis phase. Selection of Evaluation of

#### **VE Projects**

Projects selection, Methods selection, value standards, application of VE methodology.

#### Unit III: Versatility of VE

VE operation in maintenance and repair activities, value engineering in non hardware projects.

**Initiating A VE Programme** Introduction, training plan, career development for VE specialties.

## **Unit IV: Fast Diagramming**

Cost models, life cycle costs

#### **Unit V: VE level of Effort**

VE team, Co-coordinator, designer, different services, definitions, construction management contracts, value engineering case studies.

#### **Recommended Books:**

- 1. Tufty Herald, G., "Compendium on Value Engineering" The Indo American Society, First Edition, 1983.
- 2. Miles, L.D., "Techniques of Value Engineering and Analysis:, McGraw Hill second Edition, 1972.
- 3. Khanna, O.P., Industrial Engineering and Management", Dhanpat Rai & Sons, 1993.

# **TOE-11 NANOTECHNOLOGY**

## Unit I: Introduction to Physics of Solid State

**Structure:** Size dependence of properties; crystal structures, face centered cubic nano particles; Tetrahedral bounded semiconductor structures; lattice vibrations. **Energy bounds:** Insulators, semiconductor and conductors; Reciprocal space; Energy bounds and gaps of semiconductors; effective masses; Fermi Surfaces. **Localized Particles:** Acceptors and deep taps; mobility; Eacitons.

#### **Unit II: Methods of Measuring Properties**

**Structure:** Atomic Structures; Crystallography; Particle size determination, surface structure. **Microscopy:** Transmission electron Microscopy; field ion microscopy Scanning Microscopy. **Spectroscopy:** Infrared and Raman Spectroscopy; Photoemission and X-ray Spectroscopy; Magnetic resonance, optical and vibrational Spectroscopy, Luminescence.

#### Unit III: Properties of Individual Nano particles

**Metal Nano clusters:** Magic Numbers; Theoretical Modelling of nano particles, Geometric Structure; Electronic Structure; Reactivity; Fluctuations Magnetic Clusters; Bulle to Nano structure.

Semi conducting Nanoparticles: Optical Properties; Photofragmentation; Columbic Explosion. Rare Gas & Molecular Clusters: Inert Gas Clusters; Superfluid Clusters molecular clusters. Method of Synthesis: RF Plasma; Chemical methods; thermolysis; pulsed laser methods.

#### **Unit IV: Carbon Nanoparticles**

Carbon Molecule: Nature of carbon bond; New carbon structures.

**Carbon Clusters:** Small carbon clusters; Discovery of 60 c ; Strictures of 60 c , Alkali doped 60 c; superconductivity in 60 c ; Large and smaller fullerenes; other buckyballs.

**Carbon Nano tubes:** Fabrication; structure, Electrical Properties; Vibrational properties, Mechanical Properties. Field emission & Shielding; Computers; Fuel cells, chemicals sensors; catalysis, Mechanical reinforcement.

#### **Balle Nanostructure materials:**

Solid Disordered Nanostructure, Nano structured Crystals, Nano structured Ferromagnetism Basics of Ferromagnetism; Effect of structuring of Magnetic properties, Dynamics of Nanomagnets; Nanopore containment of magnetic particles, Nanocarbon Ferromagnets, Giant & colossal magnetoresistance; Ferrofluids.

#### Unit V: Quantum Wells, Wires and Dots

Preparation of Quantum Nanostructure; Size and Dimensionality effect, Fermi gas; Potential wells; Partial confinement; Excitons; Single electron Tunneling, Infrared detectors; Quantum dot laser Superconductivity. Nano-machines & Nano-device, Microelectromechanical systems (MEMS) Nanoelectromechanical systems (NEMS), Fabrication, Nanodevices and Nanomachines. Molecular & Supermolecular switches Applications areas of Nanotechnology in Engineering.

#### **Recommended Books**

- 1. Introduction to Nanotechnology C.P.Poole Jr F.J. Owens
- 2. Introduction to S.S. Physics (7th Edn.) Wiley 1996.
- 3. Microcluster Physics S. Sugano & H. Koizuoni Springor 1998
- 4. Handbook of Nanostructured Materials & Nanotechnology vol.-5. Academic Press 2000

# **TOE 12 SOLAR ENERGY**

# Unit I:

Introduction, Energy alternative, Devices for thermal collection and storage, Thermal applications.

Solar radiation: Instruments for measuring solar radiation, Solar radiation geometry, Empirical equations for prediction the availability of solar radiation, Solar radiation on tilted surfaces.

# Unit II:

Liquid flat- Plate Collectors: General performance analysis, Transmissivity, absorptivity, product and overall loss coefficient and heat transfer correlations, Collector efficiency factor, Numerical, Analysis of collectors similar to the conventional collector. Testing procedures, Alternatives to the conventional collector, Numerical.

# Unit III:

Solar Air Heaters: Performance analysis of a conventional air heater, Other types of air heaters.

Concentrating Collectors: Flat plate collectors with plane reflectors, Cylindrical parabolic collector, Compound parabolic dish collector, Central receiver collector, Numerical.

# Unit IV:

Thermal energy storage: Sensible heat storage, Latent heat Storage, Thermochemical storage .Solar

distillation: Introduction, working principal of solar distillation, Thermal efficiency of distiller unit, External heat transfer, Top loss coefficient, Bottom and side loss coefficient, Internal heat transfer, Radioactive loss coefficient, connective loss coefficient, Evaporative loss coefficient, Overall heat Evaluation of distillation output, Passive solar stills, Conventional solar still, Basin construction, Thermal analysis of conventional solar still.

## Unit V:

Photovoltaic Systems: Introduction doping Fermi level, P-N junction characteristics, Photovoltaic effect, Photovoltaic material, Module, Cell temperature, Numerical. Economic analysis: Introduction, cost analysis.

## **Recommended Books**

- 1. Solar Energy: Thermal Processes, by Duffie John A, and Beckman W.A, john Wiley and Sons.
- 2. Solar Energy, by S.P Sukhatme, Tata Mc Graw Hill.
- 3. Treatise on Solar Energy, by H.P Garg, john Wiley and Sons.

# **TOE-13 HUMAN RESOURCE MANAGEMENT**

# Unit I

Scope and Importance of Human Resource management, Historical background of Evolution of HRM and HRD in 20th century, Outlining the contemporary role for HRM in organization. Goals of HRM. (Why behavioural approach?)

# Unit II

Manpower as a resource in job related behaviour and individual motivation in a work setting. Various theories of human motivation, Maslow' s hierarchy of needs. Needs for achievement, power and affiliation, other theories, group motivation and conflicts.

# Unit III

Manpower planning and recruitment, Testing procedures and their limitations. Reservations in jobs, pre-induction training.

# Unit IV

Wage and salary administration-pay roll and compensation. Job analysis and job specification, other pay plans, employment contracts, special compensation plans for example personnel, effect of Financial rewards on individual's performance. Goal setting and performance evaluation, promotion policy, employee satisfaction, turnover.

# Unit V

Assessment of training needs, forces promoting investment in HRD, Human resource development through individual and group efforts. Training analyses and training methods guidelines for individual development, job enlargement and job enrichment, job rotation, special assignment, Sponsored courses cost benefit exercise. Importance of unions, industrial petitions and conflict analysis and resolution . Relevant labour laws.

# **TOE-14 ADVANCED MATERIAL SCIENCE**

## **Unit I: Introduction**

**Solid Solution:** Properties of solid solutions and alloys, types binary alloys, Thermal Equilibrium Diagrams, Cooling curves, Eutectic and peritectic alloys, Intermetallic compounds. Heat Treatment Heat treatment principles and processes for Ferrous and non-ferrous metals and alloys, Effect on structures and Properties.

Unit II: Fatigue & Creep: Fatigue loading, Mechanisms of fatigue, fatigue curve, Fatigue tests. Design criteria in fatigue, Corrosion fatigue.

#### Unit III: Corrosion and its prevention

Mechanism of corrosion, Chemical Corrosion, Electro chemical corrosion, Anodic and Cathodic protection, Forms of metallic coatings. Anodizing, Phosphasting.

#### Unit IV: Selection of materials for hazardous/ saline environment

Selection of materials of saline/ hazardous environment - Boilers, Steam and Gas turbine and Diesel engine components, Pumping, Machinery, Piping, Engine seating, Propellers and Rudders, Composition strength value and other requirements for materials used. Material standards.

#### Unit V: Electrical and Electronics materials

Science and engineering of electrical and electronics materials such as semiconductor, super conductor, its devices and applications.

# **TOE-15 INDUSTRIAL INSTRUMENTATION**

# Unit I

Basic Measurement principles & Source of Errors, Units of pressure and vacuum, different type of manometer, diaphragm gauges, bellows and force balance type sensors, bourdon gauge, and piezoelectric, capacitive and inductive pressure pickups. Vacuum pressure measurements: McLeod gauge, pirani gauge, thermocouple gauge, Knudsen gauge ionization calibration procedures,

#### Unit II

Temperature Measurements: Standards and calibration, Thermal expansion methods, bimetallic thermometer, Liquid-in-gas (thermocouples) common thermocouples, Resistance thermometers, Bulk semiconductor sensors, Radiation thermometers, automatic null balance radiation thermometers. Optical parameters, Case studies of temperature controllers.

#### Unit III

Differential pressure flow meters: Bernoulli's theorem, pitot tube orifice, venturi, and flow nozzle. Hot wire and hot film anemometers, constant pressure drop, variable area meters (rotameter), Turbine meters. Electromagnetic flow meters, Ultrasonic flow meter. Measurement of level. Float type gauge, purge method, differential pressure method, conductive and capacitive method, and electromechanical method, use of radio scope for level measurement.

#### Unit IV

Measurement of weight: Load cell method, strain gauge, LVDT, piezoelectric, pneumatic and hydraulic load cell, null balance method. Density, Viscosity, pH and conductivity measurement.

#### Unit V

Measurement of moisture: Thermal dying method, Distillation Method, Chemical reaction Method, Electrical Method Recorders: Graphic Recorders , Strip Chart Recorders , Circular-chart –recorders, Multipoint Recorders and X-Y Recorders.

#### **Text Books:**

- 1. Doeblin / Measurements systems: Application and Design, 4th edition / Tata Mc Graw Hill.
- 2. S.K Singh,/ Industrial instrumentation and control/TMH 2nd edition
- 3. Eckman/Industrial Instrumentation / Wiley Eastern Ltd.

#### **Reference Books:**

- 1. Beckwith & Beck /Mechanical Measurements / NaronaPublishers, 1988
- 2. Nakara/Instrumentation: measurements & Analysis/ Tata Mc Graw Hill.
- 3. Douglas, D.Considine / Handbook of Instrumentation Measurement and Control Mc Graw Hill.

# **TOE-16 BIOMEDICAL ENGINEERING**

#### **Unit I: Introduction:**

Specifications of bio-medical instrumentation system, Man- Instrumentation system Components, Problems encountered in measuring a living system. Basics of Anatomy and Physiology of the body.

**Bioelectric potentials:** Resting and action potentials, propagation of action potential, The Physiological potentials – ECG, EEG, EMG, ERG, EOG and Evoked responses. **Electrodes and Transducers:** Electrode theory, Biopotential Electrodes – Surface electrodes, Needle electrodes, Microelectrodes. Biomedical Transducers.

#### Unit II: Cardiovascular Measurements:

Electrocardiography –ECG amplifiers, Electrodes and Leads, ECG recorders –Single channel, Three channel, Vector Cardiographs, ECG System for Stresses testing, Holter recording, Blood pressure measurement, Heart sound measurement. Pacemakers and Defibrillators.

Patient Care & Monitoring: Elements of intensive care monitoring, displays, diagnosis, Calibration & Reparability of patient monitoring equipment.

#### Unit III: Respiratory system Measurements:

Physiology of Respiratory system .Measurement of breathing mechanism – Spirometer. Respiratory Therapy equipments: Inhalators, Ventilators &Respirators, Humidifiers, and Nebulizers & Aspirators.

Nervous System Measurements: Physiology of nervous system, Neuronal communication, Neuronal firing measurements.

#### **Unit IV: Ophthalmology Instruments:**

Electroretinogram, Electro-oculogram, Ophthalmoscope, Tonometer for eye pressure measurement.

Diagnostic techniques: Ultrasonic diagnosis, Eco-cardiography, Ecoencephalography, Ophthalmic scans, X-ray &Radio-isotope diagnosis and therapy, CAT-Scan, Emission computerized tomography, MRI.

#### Unit V: Bio-telemetry:

The components of a Bio-telemetry system, Implantable units, Telemetry for ECG measurements during exercise, for Emergency patient monitoring.

**Prosthetic Devices and Therapies:** Hearing Aids, Myoelectric Arm, Dia-thermy, Laser applications in medicine.

#### **Text Books:**

- 1. Khandpur R.S.- Biomedical Instrumentation- TMH
- 2. Venkata Ram, S.K.-Bio-Medical Electronics & Instrumentation (Revised)- Galgotia.

#### **Reference Books:**

- 3. Cromwell- Biomedical Instrumentation and Measurements- PHI
- 4. Webster, J.G. -Bio- Instrumentation ,Wiley (2004)
- 5. Ananthi, S. -A Text Book of Medical Instruments-2005-New Age International
- 6. Carr & Brown Introduction to Biomedical Equipment Technology Pearson
- 7. Pandey & Kumar-Biomedical Electronics and Instrumentation. Kataria

# **TOE-17 FUNDAMENTALS OF CODING THEORY**

- **Unit I:** Purpose of encoding, separable binary codes, Shannon-fano encoding, noiseless coding. Shannon binary encoding, Huffman encoding, discrete coding in presence of noise.
- **Unit II:** Error detecting and error correcting codes, Hamming single error correcting code, Elias's iteration technique for coding.
- **Unit III:** Block codes, encoders and decoders for block codes, syndrome and syndrome decoding.
- **Unit IV:** Cyclic codes. Encoders and decoders for cyclic code, Golay code, BCH code, Reed soloman code.
- **Unit V:** Convolution coding, code generation, decoding of convolution code, sequential decoding, state and trellis diagram.

#### **Text Book:**

- 1. F. M. Reza, "An introduction to Information theory", Dover Publication Inc.
- 2. H. Taub and D. L. Schilling, "Principles of communication system" TMH 2nd Ed.

# **TOE-18 CONSUMER ELECTRONICS**

#### Unit I

Audio Systems: Microphones, Loudspeakers, Speaker baffle and enclosure, Acoustics, Mono, Stereo, Quad, Amplifying Systems, Equalizers and Mixers, Electronic Music Synthesizers, Commercial Sound, Theater Sound System

## Unit II

Video Systems and Displays: Monochrome TV, Colour TV standards and systems, TFT, Plasma, HDTV, Digital TV, Video Telephone and Video Conferencing

## Unit III

Domestic Appliances: Washing machines, Microwave ovens, Air- conditioners and Refrigerators, In car computers Office Systems: FAX, Xerox, Telephone Switching System, Mobile Radio System

## Unit IV

Recording and Reproduction Systems: Disc recording and reproduction, Magnetic recording and

reproduction, Video tape recording and reproduction, Video disc recording and play back, Distortion and Noise reduction in Audio and Video System

#### Unit V

Power Supplies and other systems: SMPS, UPS and Preventive Maintenance, Set Top Boxes, Remote controls, Bar codes, ATM

## **Text Books:**

1. S P Bali, Consumer Electronics; Pearson ed 2005

# **TOE-19 ARTIFICIAL NEURAL NETWORKS & FUZZY LOGIC**

#### **Unit I: Fundamental Concepts**

Introduction and history, human brain, biological neuron, models of neuron, network architecture, knowledge representation. Error correction learning, Hebbian learning, competitive learning, Boltzmann learning, learning with and without teacher. Artificial neurons. Neural networks and architectures

Introduction, neuron signal function, mathematical preliminaries, Feedforward & feedback architecture.

#### Unit II: Geometry of Binary threshold neurons and their networks

Pattern recognition, convex sets and convex hulls, space of Boolean functions, binary neurons for pattern classification, non linear separable problems, capacity of TLN, XOR solution. Perceptions and LMS, Learning objective of TLN, pattern space & weight space, perception learning algorithm, perception convergence theorem, pocket algorithm, a - LMS learning, MSE error surface, steepest descent search,  $\mu$  -LMS and application.

#### Unit III: Back propagation algorithm

Multilayered architecture, back propagation learning algorithm, practical considerations, structure growing algorithms, applications of FFNN. Statistical Pattern Recognition Bayes' theorem, classical decisions with bayes' theorem, probabilistic interpretation of neuron function, interpreting neuron signals as probabilities, multilayered networks & posterior probabilities, error functions for classification problems.

#### **Unit IV: Self Organizing Feature MAP**

Introduction, Maximal eigenvector filtering, principal component analysis, generalized learning laws, competitive learning, vector quantization, maxican hat networks, SOFM, applications of SOFM. Other Networks Generalized RBF networks. Stochastic Machines: simulated annealing, Boltzmann machine, ART.

#### **Unit V: Fuzzy Logic**

Introduction, classical & Fuzzy sets, classical & fuzzy relations, membership function, geometry & operations of fuzzy sets, fuzzy rules, rule composition & defuzzification, fuzzy engineering applications, Neural network & fuzzy logic. Fuzzy Neural Control

#### **Text Books**

1. Simon Haykin, "Neural Networks", Peal-son Education 2nd edition.

2. Satish Kumar, 'Neural Networks," Tata McGraw-HIII.

#### **Reference Books**

1. Jack M. Zurada, " Introduction to Artificial Neural System," Jaico Publishing House.

2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications," McGraw-Hill Inc.

# **TOE- 20 HUMAN COMPUTER INTERACTION**

# Unit I

User centered design of system & interfaces, anatomy and rational of WIMP (Window, Icon, Menus & Pointing Devices) interfaces.

# Unit II

Dialogue design, Presentation design, user documentation, evaluation / usability testing of user interface.

# Unit III

Ergonomics and Cognitive issues, hypertext and the World Wide Web.

# Unit IV

User centered design, human factors in user-centered design, development & evaluation, Interactive design rapid prototyping.

# Unit V

Designing for usability –effectiveness, learnability, flexibility, attitude and usability goals, criteria for acceptability.

# **Books Recommended:**

- 1. Sudifte AG, "Human Computer Interface Design", 2nd ed, Macmillan, 1995
- 2. Sheiderman B Desiging the user interface, "Strategies for Effective Human Computer Interaction", 2nd ed. Addison Wesley, 1992

# TOE – 21 IT IN BUSINESS

# Unit I

Business Drivers IT's Competitive Potential Strategic Alignment Strategic Management and Competitive Strategy

# Unit II

Rethinking Business through IT Developing a Competitive Strategy Interorganization Information Systems

Business-To-Business Systems Electronic Commerce and Market Systems

# Unit III

Forming a Corporate IT Strategy Developing an Information Architecture

# Unit IV

Incorporating Business Innovation into the Corporate IT Strategy The Changing Role of IT In International business The Changing Global IT Practices

# Unit V

The Impact and value of Information Technology in Competitive Strategy Changing the Focus of Strategy Trends: Beyond 2000

# **Books Recommended:**

- 1. Callon, Jack D., "Competitive Advantage Through Information Technology", McGraw Hill, 1996
- 2. Tapscott, Don, "The Digital Economy", McGraw-Hill, 1996. [DIGI]

# **TOE -22 ARTIFICIAL INTELLIGENCE IN MANUFACTURING**

#### **Unit I: Artificial Intelligence**

Definition - Components - Scope - Application Areas; Knowledge - Based Systems (Expert Systems) - Definition - Justification -Structure - Characterization

#### Unit II: Knowledge Sources

Expert - Knowledge Acquisition - Knowledge Representation - Knowledge Base - Interference Strategies - Forward and Backward Chaining

#### Unit III: Expert System Languages

ES Building Tools or Shells; Typical examples of Shells. Expert System software for manufacturing applications in CAD, CAPP, MRP, Adaptive control,

#### **Unit IV: Robotics**

Robotics, Process control, Fault diagnosis, Failure Analysis; Process Selection, GT etc. Linking expert systems to other software such as DBMS, MIS, MDB.

#### Unit V: Process control and Office automation

Process control and Office automation. Case studies of typical applications in tool selection, Process selection, Part classification, inventory control, Process Planning etc.

#### **Books Recommended:**

1. Jhon & Andrew Kusiak; Artificial Intelligent Hand book.

- 2. T. Barnold; Artificial Intelligent
- 3. Dan. W. Patterson; Introduction to Artificial Manufacturing Export system

## TOE 23 HEALTH, HOSPITAL AND EQUIPMENT MANAGEMENT

#### Unit I: HEALTH SYSTEM

Health organization of the country, the state, the cities and the region, Health Financing System, Organization of Technical Section.

#### Unit II: HOSPITAL ORGANIZATION AND MANAGEMENT

Management of Hospital organization, Nursing section Medical Sector, Central Services, Technical Department, Definition and Practice of Management by Objective, Transaction Analysis Human relation in Hospital, Importance to Team Work, Legal aspect in Hospital Management.

Unit III: REGULATORY REQUIREMENT AND HEALTH CARE CODES

FDA Regulation, joint commission of Accreditation for Hospitals, National Fire Protection Association Standard, IRPC.

#### **Unit IV: EQUIPMENT MAINTENANCE MANAGEMENT**

Organizing Maintenance Operations, Paper Work Control, Maintenance Job, Planning Maintenance Work, Measurement and Standards, Preventive Maintenance, Maintenance Budgeting and Forecasting, Maintenance Training, Contract Mainframe.

#### **Unit V: TRAINED TECHNICAL PERSONNEL**

Function of Clinical Engineer, Role to be performed in Hospital, Man power Market, Professional Registration, Structure in hospital.

#### **Books Recommended:**

- 1. Cesar A. Caceres and Albert Zara, The practice of Clinical Engineering, Academic Press, 1977.
- Webter, J.G. and Albert M. Cook, Clinical Engineering Principles and Practices, Prentice Hall Inc. Englewood Cliffs, 1979.
- 2. Anatomy Kelly, Maintenance planning and control, Butterworth's London, 1984.
- 3. Hans Pfeiff, Vera Dammann (Ed.) Hospital Engineering in Developing Countries, Z report Eschborn, 1986.
- 4. Jacob Kline, Handbook of Bio Medical Engineering, Academic Press, San Diego

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## **TOE 24 INTRODUCTION TO MEDICAL PHYSICS**

## **Unit I: ATOMIC PHYSICS**

Traditional definition of atom, periodic system of elements, mechanical properties of atom, emission of light and its frequencies. Electromagnetic spectra. Principles of Nuclear Physics — Natural radioactivity, Decay series, type of radiation and their applications, artificially produced isotopes and its application, accelerator principles; Radionuclide used in Medicine and technology.

# **Unit II: INTERACTION WITH LIVING CELLS**

Target theory, single hit and multi target theory, cellular effects of radiation, DNA damage, depression of Macro molecular synthesis, Chromosomal damage.

## **Unit III: SOMATIC EFFECT OF RADIATION**

Radio sensitivity protocol of different tissues in human, LD 50/30 effect of radiation on skin, blood forming organs, lenses of eye, embryo and Endocrinal glands.

# **Unit IV: GENETIC EFFECT OF RADIATION**

Threshold of linear dose effect, relationship, factors affecting frequency of radiation induced mutation, Gene controlled hereditary disease, biological effect of microwave and RF wave. Variation in dielectric constant and specific conductivity of tissues. Penetration and propagation of signals effects in various vital organs, Protection standards.

# **Unit V: PHOTO MEDICINE**

Synthesis of Vitamin D in early and late cataneous effects, Phototherapy, Photo hemotherapy, exposure level, hazards and maximum permissible exposure.

**LASER PHYSICS** — Characteristics of Laser radiation, Laser speckle, biological effects, laser safety

## **Books Recommended:**

- 1. Moselly, Non lonisingRadiation Adam Hilgar Brustol 1988.
- 2. Branski. S and Cherski. P 'Biological Effects of Microwave' -Hutchinson & ROSS Inc.

# **TOE – 25 MODERN CONTROL SYSTEM**

#### Unit I: Introduction to control systems

Introduction to control systems, properties of signals and systems. Convolution integral, Ordinary differential equation, Transfer function, Pole zero concepts, effect of pole location on performance specification.

#### Unit II: State Space analysis

State equations for dynamic systems, State equations using phase, physical and canonical variables, realization of transfer matrices, Solution of state equation, concepts of controllability, observability, Controllability and Observability tests.

#### Unit III: Discrete time control systems

Sampling theorem, Sampled-data systems, the sample and hold element, pulse transfer function, The Ztransform, stability analysis.

#### **Unit IV: Stability**

Liapunov's method, generation of Liapunov's function, Popov's criteria, design of state observers and controllers, adaptive control systems, model reference.

#### **Unit V: Optimal Control**

Introduction, formation of optimal control problems, calculus of variation, minimization of functions, constrained optimization, dynamic programming, performance index, optimality principles, Hamilton – Jacobian equation, linear quadratic problem, Ricatti II equation and its solution, solution of two point boundary value problem

#### **Text Books:**

- 1. K. Ogata, "Modern Control Engineering", Prentice Hall of India.
- 2. M. Gopal, "Modern Control System", Wiley Eastern.

#### **Reference Books:**

- 1. B.D.O. Anderson and IB. Moore, " Optimal Control System: Linear Quadratic Methods", Prenctice Hall International.
- 2. U. Itkis, "Control System of Variable Structure", John Wiley and Sons.
- 3. H. Kwakemaok and R. Sivan, "Linear Optimal Control System", Wiley Interscience.
# **TOE 26 MECHATRONICS**

## Unit I: Mechatronics and its scope

Sensors and transducers- Displacement, position & proximity, velocity, force, pressure and level. Signal conditioning amplification, filtering & data acquisition.

## Unit II: Pneumatic and Hydraulic actuation systems

Directional control valves, pressure control valves and cylinders. process control valves. Mechanical actuation system-kinematic chains, cams, geartrains. Ratchet & Pawl, dampers, bearings. Electrical actuation system. Mechanical switches- solenoid operated solid state switches, DC, AC & stepper motors.

Building blocks of Mechanical spring, mass and damper. Drives- Electrical Drives, Fluid systems, hydraulic, servo, closed loop controllers.

## Unit III: Elements of Microprocessors & Microcontrollers

Elements of Microprocessors & Microcontrollers Programmable logic controllers & Communication interface.

## Unit IV: Case Studies of Mechatronic Systems

Industrial Robot and its control Automobile Engine Control Electromechanical disc-control.

## Unit V: Veil suspension Control

Micro mechanical systems. Computer Printer, VCR, Fax Machine, NC Machine.

## **Books Recommended:**

- 1. Rolf Isennann, "Mechatronics Systems", Springer, 2005.
- 2. W. Bolten, "Mechatronics", Pearson Education 2003.

# TOE 27 SCADA & ENERGY MANAGEMENT SYSTEM

## Unit I: SCADA

Purpose and necessity, general structure, data acquisition, transmission & monitoring. general power system hierarchical Structure. Overview of the methods of data acquisition systems, commonly acquired data, transducers, RTUs, data concentrators, various communication channels- cables, telephone lines, power line carrier, microwaves, fiber optical channels and satellites.

## **Unit II: Supervisory and Control Functions**

Data acquisitions, status indications, majored values, energy values, monitoring alarm and event application processing. Control Function: ON/ OFF control of lines, transformers, capacitors and applications in process in industry - valve, opening, closing etc. Regulatory functions: Set points and feed back loops, time tagged data, disturbance data collection and analysis. Calculation and report preparation.

## **Unit III: MAN- Machine Communication**

Operator consoles and VDUs, displays, operator dialogues, alarm and event loggers, mimic diagrams, report and printing facilities.

## Unit IV: Data basis

SCADA, EMS and network data basis. SCADA system structure - local system, communication system and central system. Configuration- NON-redundant- single processor, redundant dual processor. multicontrol centers, system configuration. Performance considerations: real time operation system requirements, modularization of software programming languages.

## **Unit V: Energy Management Center**

Functions performed at a centralized management center, production control and load management economic dispatch, distributed centers and power pool management.

## **Books Recommended:**

- 1. Torsten Cergrell, "Power System Control Technology", Prentice Hall International.
- 2. George L Kusic "Computer Aided Power System Analysis",, Prentice Hall of India,
- 3. A. J. Wood and B. Woolenberg, "Power Generation Operation and Control", John Wiley & Sons.
- 4. Sunil S Rao, "Switchgear Protection & Control System" Khanna Publishers 11th Edition.