Faculty of Engineering & Technology

Syllabus

For

Bachelor of Technology (B. Tech.)

in

Computer Science & Engineering

(2016-17)

B.Tech. (CSE) Course Structure (2016-17)

Semester - I

THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BT 101	Engineering Physics-I	3	1	-	30	70	100	4
BT 102	Introduction to Computers Fundamental and IT*	3	-	-	30	70	100	3
BT 103	Applied Mathematics-I	3	1	-	30	70	100	4
BT 104	Introduction to Electrical & Electronic Engineering	3	-	-	30	70	100	3
BT 105	English & Communication Skills	3	-	-	30	70	100	3
BT 106	Engineering Chemistry	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessiona**	**Practical**	**Total**	**Credits**
BT 107	Electrical & Electronics Lab-I	-	-	2	30	20	50	1
BT 108	Engineering Physics Lab-I	-	-	2	30	20	50	1
BT 109	IT Fundamental Lab*	-	-	2	30	20	50	1
BT 110	Engineering Chemistry Lab	-	-	2	30	20	50	1
BT 111	Engineering Workshop	-	-	2	30	20	50	1
TOTAL		18	**2**	**10**	**330**	**520**	**850**	**25**

Semester - II

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BT 201	Engineering Physics-II	3	1	-	30	70	100	4
BT 202	Introduction to computer Programming *	3	-	-	30	70	100	3
BT 203	Engineering Mechanics*	3	1	-	30	70	100	4
BT 204	Digital Electronics	3	-	-	30	70	100	3
BT 205	Applied Mathematics-II	3	-	-	30	70	100	3
BT 206	Environmental Sciences	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BT 207	Electrical & Electronic Lab-II	-	-	2	30	20	50	1
BT 208	Engineering Physics Lab-II	-	-	2	30	20	50	1
BT 209	Computer Programming Lab*	-	-	2	30	20	50	1
BT 210	Engineering Drawing	-	-	2	30	20	50	1
BT 211	Communication Skill Lab*	-	-	2	30	20	50	1
TOTAL		**18**	**2**	**10**	**330**	**520**	**850**	**25**

COMPUTER SCIENCE ENGINEERING

SEMESTER - III

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 301	Applied Mathematics – III	3		-	30	70	100	3
BTCS 302	Core PHP	3	1	-	30	70	100	4
BTCS 303	Electronic Devices and Circuits	3		-	30	70	100	3
BTCS 304	Object Oriented Programming	3		-	30	70	100	3
BTCS 305	Data Structure & Algorithms	3	1	-	30	70	100	4
BTCS 306	Linux and Shell Programming	3		-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCS 307	Electronic Devices and Circuits Lab		-	2	30	20	50	1
BTCS 308	Data Structure & Algorithms Lab		-	2	30	20	50	1
BTCS 309	Object Oriented Programming Lab		-	2	30	20	50	1
BTCS 310	Core PHP Lab		-	2	30	20	50	1
BTCS 311	Unix Shell Programming Lab		-	2	30	20	50	1
							-	
TOTAL		18	**2**	**10**	**330**	**520**	**850**	25

Semester - IV

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 401	Micro Processors And Interfaces	3	1	-	30	70	100	4
BTCS 402	Discrete Mathematical Structures	3		-	30	70	100	3
BTCS 403	Statistics and Probability Theory	3	1	-	30	70	100	4
BTCS 404	Software Engineering	3		-	30	70	100	3
BTCS 405	Principles of Communication	3		-	30	70	100	3
BTCS 406	Principles of Programming Languages	3		-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCS 407	Micro Processor Lab	-	-	2	30	20	50	1
BTCS 408	Communication Lab	-	-	2	30	20	50	1
BTCS 409	Computer Aided Software Engineering Lab	-	-	2	30	20	50	1
BTCS 410	Business Entrepreneurship Development	-	-	2	30	20	50	1
BTCS 411	Discipline & Extra Curricular Activities	-	-	2	30	20	50	1
TOTAL		18	**2**	**10**	**330**	**520**	**850**	25

Semester - V

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 501	Computer Architecture	3	1	-	30	70	100	4
BTCS 502	Digital Logic Design	3	1	-	30	70	100	4
BTCS 503	Telecommunication Fundamentals	3	1	-	30	70	100	4
BTCS 504	Database Management Systems	3		-	30	70	100	3
BTCS 505	Operating Systems	3		-	30	70	100	3
ELECTIVE (ANY ONE)								
BTCS 506A	Advanced Data Structure	3	-	-	30	70	100	3
BTCS506B	Digital Signal Processing	3	-	-	30	70	100	3
BTCS 506C	Information Theory & Coding	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCS 507	Database Management Systems Lab	-	-	2	30	20	50	1
BTCS 508	System Design in UML Lab.	-	-	2	30	20	50	1
BTCS 509	Operating Systems Simulation Lab	-	-	2	30	20	50	1
BTCS 510	Digital Hardware Design Lab	-	-	2	30	20	50	1
BTCS 511	Discipline & Extra Curricular Activities	-	-			-	50	1
BTCS512	Seminar			2	30	20	50	1
TOTAL		**18**	**3**	**10**	**330**	**570**	**900**	**27**

Semester - VI

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	T	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 601	Computer Networks	3	1	-	30	70	100	4
BTCS 602	Design & Analysis of Algorithms	3		-	30	70	100	3
BTCS 603	Theory Of Computation	3	1	-	30	70	100	4
BTCS 604	Computer Graphics & Multimedia Techniques	3	1	-	30	70	100	4
BTCS 605	Embedded System Design	3	1	-	30	70	100	4
ELECTIVE (ANY ONE)								
BTCS 606A	Advance Topics in Operating Systems	3	-	-	30	70	100	3
BTCS 606B	Artificial Intelligence	3	-	-	30	70	100	3
BTCS 606C	Human Computer Interface	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCS 607	Java Programming Lab	-	-	2	30	20	50	1
BTCS 608	Computer Graphics & Multimedia Lab	-	-	2	30	20	50	1
BTCS 609	Design and Analysis of Algorithms Lab.	-	-	2	30	20	50	1
BTCS 610	Embedded System Design Lab.	-	-	2	30	20	50	1
BTCS 611	Humanities and Social Sciences	-	-	2	30	20	50	1
BTCS 612	Discipline & Extra Curricular Activities					50	50	1
TOTAL		**18**	**4**	**10**	**330**	**570**	**900**	**28**

Semester - VII

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 701	Cloud Computing	3	1	-	30	70	100	4
BTCS 702	Information System Security	3		-	30	70	100	3
BTCS 703	Data Mining & Warehouse	3	1	-	30	70	100	4
BTCS 704	Computer Aided Design for VLSI	3	1	-	30	70	100	4
BTCS 705	Compiler Construction	3	-	-	30	70	100	3
ELECTIVE(ANY ONE)								
BTCS 706A	Advance Data Base Management Systems	3	-	-	30	70	100	3
BTCS 706B	Robotics	3	-	-	30	70	100	3
BTCS 706C	Data Compression Techniques	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCS 707	Web Development Lab			2	30	20	50	1
BTCS 708	VLSI Physical Design Lab			2	30	20	50	1
BTCS 709	Compiler Design Lab			2	30	20	50	1
BTCS 710	Project-I			2	30	20	50	1
BTCS 711	Practical Training*			2	30	20	50	1
BTCS 712	Discipline & Extra Curricular Activities					50	50	1
TOTAL		**18**	**3**	**10**	**330**	**570**	**900**	**27**

Semester – VIII

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 801	Mobile Computing	3	1	-	30	70	100	4
BTCS 802	Digital Image Processing	3	1	-	30	70	100	4
BTCS 803	Distributed Systems	3	-	-	30	70	100	3
Elective(open) (any one)								
BTCS 804A	Hardware Testing & Fault Tolerance	3	-	-	30	70	100	3
BTCS 804B	Real Time Systems	3	-	-	30	70	100	3
BTCS 804C	Information Retrieval	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCS 805	Unix Network Programming & Simulation Lab	-	-	2	30	20	50	1
BTCS 806	FPGA Lab.	-	-	2	30	20	50	1
BTCS 807	Digital Image Processing lab	-	-	2	30	20	50	1
BTCS 808	Project-II			2	150	100	250	5
BTCS 809	Seminar			2	30	20	50	1
BTCS 810	Discipline & Extra Curricular Activities					50	50	1
TOTAL		**12**	**2**	**10**	**390**	**510**	**900**	**24**

JAGAN NATH UNIVERSITY

COMMON TO ALL BRANCHES

FIRST SEMESTER

THEORY PAPERS		**No. of Teaching Hour**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BT 101	Engineering Physics-I	3	1	-	30	70	100	4
BT 102	Introduction to Computers Fundamental and IT*	3	-	-	30	70	100	3
BT 103	Applied Mathematics-I	3	1	-	30	70	100	4
BT 104	Introduction to Electrical & Electronic Engineering	3	-	-	30	70	100	3
BT 105	English & Communication Skills	3	-	-	30	70	100	3
BT 106	Engineering Chemistry	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hour**			**Sessional**	**Practical**	**Total**	**Credits**
BT 107	Electrical & Electronics Lab-I	-	-	2	30	20	50	1
BT 108	Engineering Physics Lab-I	-	-	2	30	20	50	1
BT 109	IT Fundamental Lab*	-	-	2	30	20	50	1
BT 110	Engineering Chemistry Lab	-	-	2	30	20	50	1
BT 111	Engineering Workshop	-	-	2	30	20	50	1
TOTAL		18	**2**	**10**	**330**	**520**	**850**	**25**

Note:

1. Semester I and II common for all Branches of Engineering.
2. Half the students will study Environmental Science in 1st Semester and rest will study Engineering Chemistry and Chemistry Lab. The students shall interchange the subjects and vice-versa In 2nd Semester.

BT101: Engineering Physics I

UNIT-I

Atomic Structure and Solid State: Atomic energy levels and electronic configuration, Intermolecular forces and binding, phases of matter, crystal structure simple cubic , body centered cubic and face centered cubic structures, energy bands in solids , band structure of metals, semiconductors and insulators.

UNIT-II

Semiconductor Physics: Extrinsic and intrinsic semiconductors, Fermi levels of undoped and doped semiconductors, p-n junction, depletion region, forward and reverse biased p-n junction, volt-Ampere characteristics of a diode , effect of temperature on diode characteristics, Zener diode , tunnel diode, photodiode and LEDs , their structure and characteristics.

UNIT-III

Theory of Relativity : Absolute and relative frames of reference, Galilean transformations, importance of Michelson-Morley experiment, postulates of special theory of relativity, Lorentz transformations, time dilation and length contraction, velocity addition , mass-energy relationship, elementary ideas about general theory of relativity.

UNIT-IV

Elementary Quantum Mechanics: Wave particle duality, deBroglie waves, experimental evidence of wave nature of matter, Schrodinger wave equation in One dimension, eigen values and eigen functions, physical interpretation of wave function, Heisenberg uncertainty principle, tunneling phenomenon.

UNIT5-V

Oscillation & Waves : Simple harmonic oscillator with example, energy of oscillator, Damping oscillator,viscous & solid friction damping,Qualityfactor,Resonance standing waves,elastic waves,

Recommended reference books:

1.Conceptual Physics, P. Hewitt, Pearson, India

2. Physics for Scientists and Engineers, R. Serway

3. Fundamental University Physics, Alonso & Finn.

4. Physics Vol I and II, Resnick and Halliday

5. Berkley Physics Course Vol 1 & Vol. 3

6. Modern Physics , A . Beiser

BT102 - INTRODUCTION TO COMPUTER FUNDAMENTAL AND IT

UNIT-I

Computer System: Basics of computer systems, history, types and Generation of computer, capability and limitations of computer systems. Hardware organization: Anatomy of a digital computer, CPU.Internal architecture of CPU.Memory Units: Memory Hierarchy, Primary Memory, Secondary Memory, cache memory. Storage Devices, Input and Output Devices.

UNIT-II

Operating Systems: DOS Internal, External commands, Windows (2000 and NT) , Overview of architecture of Windows, tools and system utilities including registry , partitioning of hard disk , Overview of Linux architecture , File system , file and permissions , concept of user and group , installation of rpm and deb based packages.

UNIT-III

Number system & Conversions: decimal, binary, octal and hexadecimal number systems and their inter conversions, 1's and 2's complement representation, negative numbers and their representation, BCD, EBCDIC , ASCII and Unicode. Binary Arithmetic operations: addition, subtraction, multiplication, division.

UNIT-IV

Networking Basics - Uses of a Network and Common types of Networks, Network topologies and protocols, Network media and hardware, Overview of Database Management System.

UNIT-IV

Data Processing: Introduction to MS office, MS-Power Point and MS-Excel, Introduction to Electronic Spreadsheets, Applications of Electronic Spreadsheets, Types of Spreadsheets, Features of MS-Excel, Starting MS-Excel, Contents of the MS-Excel window, Cell Referencing, Ranges and Functions, Formatting Worksheets and Creating Charts, Data Forms and Printing

Introduction to MS-PowerPoint : Introduction to MS-PowerPoint, What is a Presentations?, Slides, Working with Slides, Slides Show and Printing Presentation

Text/Reference Books:

1. Peter Norton, Introduction to computers, Sixth Edition Tata McGraw Hill (2007).

2. Pradeep K. Sinha, PritiSinha, Computer Fundamentals, BPB Publications.
3. Andrews Jean, A+Guide to Managing & Maintaining Your PC, Cengage Publication 6/e
4. Anita Goel, Computer Fundamentals, Pearson Education.

BT103- Applied Mathematics I

UNIT-I

Functions of variables: Geometric representation, limit, continuity and differentiability of functions of several variables , partial and full derivatives, derivatives of composite functions, Euler's theorem on homogeneous functions, harmonic functions, directional derivatives, Taylor's formula, maxima and minima of functions, Lagrange's multipliers.

UNIT-II

Asymptotes and curvature: Rolle's Theorem, Cauchy's mean value theorem, Taylor and Maclaurin theorems, concavity and convexity of a curve, points of inflexion, asymptotes and curvature.

UNIT-III

Analytical functions: Limit, continuity and differentiability of analytic functions, Cauchy-Reimann equations, complex functions, line integrals, Cauchy's integral theorem, Cauchy's integral formula, power series, zeroes and singularity, residue theorem.

UNIT-IV

Integral calculus: Definite integral as limit of sum, properties of definite integrals, mean value theorem, fundamental theorem, evaluation of definite integrals, reduction formula.

UNIT-V

Differential equations: Order and degree of a differential equation, general and particular solutions, solution of differential equations by separation of variables method, integrating factor

method, homogeneous differential equations of first order and their solutions, solution of linear differential equation $dy/dx+f(x)y=Q(x)$ and their application in electrical, nuclear and mechanical systems.

Recommended reference books:

1. Kreszig, Advanced Engineering Mathematics, Wiley Eastern Ltd
2. Grewal B. S., Higher Engineering mathematics, Khanna Publishers
3. Sastri S S., Engineering Mathematics, Vol. 1 & 2, PHI
4. Gangadharan A, Engineering Mathematics Vol 1 & 2, PHI
5. Dass H.K., Advanced Engineering Mathematics, S. Chand, Delhi

BT104 : Introduction to Electrical and Electronic Engineering

UNIT-I

Basic Electrical Quantities: Electromotive force, Electric Power ,Charge, current, voltage, Energy,Electric potential and field, magnetic flux,resistance, capacitance and inductance. Ohm's law, Voltage and current sources.

UNIT-II

Network analysis: Circuit principles, Kirchoff's Laws, Node Voltage and Mesh Current Analysis;Delta-Star and Star-Delta Transformation, Source Conversion. Classification of Network Elements, Superposition Theorem, Thevenin's Theorem.Norton Theorem.,MaximumPower Transfer Theorems.

UNIT-III

AC circuits: Alternating Quanitities,Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor

Representation of Alternating Quantities, Single Phase RLC Circuits, Introduction to 3-Phase

AC System.Power in a circuit, reactive power, power factor, impedance in ac circuit, series and parallel resonance, Q factor, Introduction to 3-Phase

AC System.

UNIT-IV

Transformers: Faraday's Law of Electromagnetic Induction Basic principle of operation of transformer, construction, working, voltage and current relations, Phasor Diagram of Ideal Transformer.open circuit and short circuit test, transformer losses and efficiency, ferrite core transformers.**Electrical DC Machine:** Principle of DC Machines, Types, Different Parts ofDC Machines

UNIT-V

Power Supplies: Half wave, full wave and bridge rectifiers, ripple factor and reduction by use of inductor,capacitor, L and pie section filters, voltage regulation using Zener diode.

Recommended reference books:

1. Millman and Halkias; Integrated Electronics, Tata-McGraw Hill , New Delhi

2. E. Hughes; Electrical and Electronic Technology, Pearson Limited.

3. R.P. Punagin, Basic Electronics, Tata McGraw Hill.

4. J.Millman and C. Halkias: Electronic Devices and Circuits, Tata McGraw Hill Publishing Company Ltd., 2000.

5 .Donald A. Neamen, Semiconductor Physics and Devices, McGraw Hill, 1997.

6. Vicent Del Toro, Electrical Engineering Fundamentals, Prentice Hall India.

BT105- English and Communication Skills

UNIT –I

Grammar and Vocabulary: Basic sentence pattern, use of tense, modals, active and passive voice, Direct and Indirect Speech, One word substitution, Synonyms and Antonyms and Common Erros in English.

UNIT-II

Phonetics: IPA symbols, Correct pronunciation of commonly used words, sounds (vowel and consonants)

UNIT-III

Literature : Poetry : where the mind is without fear – Rabindra Nath Tagore, Mending wall – Robert Frost, Night of Scorpion – Nissim Ezekiel

Essays: of studies: Francis Bascon, what is science? George Orwell.

UNIT-IV

Writing skills : Paragraph writing, Letter writing, covering letter and C.V., Writing E-mails.

UNIT-V

Fundamentals of Communication: (A) Communication: definition and meaning of communication, functions of communication, process of communication.

(B) Types of communication: Verbal and Non verbal communication, Formal and informal communication.

(C) Barriers to communication, qualities of good communication, the art of listening.

Recommended reference books:

1. English for competitive examinations, Prof. R. P. Bhatnagar, Macmillan Publications.
2. "Current English Grammar and usage with composition" by R. P. Sinha, Oxford University Press (New Delhi).
3. Effective Technical Communication by M. Ashraf Rizvi Tata Mcgraw-Hill Companies, New Delhi.
4. Communication skills by Sanjay Kumar & Pushp Lata. Oxford University Press (New Delhi)

BT106- Engineering Chemistry

UNIT -I

Water: The sources of water, common Impurities, soft and hard water, Hardness of water, degrees of hardness and its effects, determination of hardness by various techniques, Municipal Water supply, requisites of drinking water, purification of water by sedimentation, filtration, reverse osmosis (RO), sterilization, chlorination. Water for boilers, corrosion, sludge and scale formation, caustic embitterment, treatment by preheating, lime-soda process, permutit de-ionizer or demineralization.

UNIT- II

Electrochemistry: Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells. Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion.

Analysis: Volumetric Analysis, Types of titrations, Theory of indicators.

Spectral Analysis: Electromagnetic radiation, Lambert-Beer's Law, UV-VIS, IR, NMR instrumentation & applications.

Thermal Methods of Analysis: principle, working and applications of Thermogravimetry, Differential thermal analysis and Differential scanning calorimetry.

UNIT- III

Fuels: The need of fuel, origin and classification of fuels, Solid fuels, coal and its constituents, calorific value and its determination, coke: carbonization process, various types of coke ovens.
Liquid Fuels: advantages, petroleum and its refining, synthetic petrol, reforming of gasoline, knocking, octane number and anti knocking agents, cracking. Gaseous Fuels advantages, composition and calorific value of coal gas and oil gas and its determination.

Lubricants: Need of Classification, types of lubricants, their properties and uses, lubricants, viscosity and viscosity index and flash points, cloud and pour point, emulsification

UNIT- IV

Phase Rule: Statement, definition of terms involved, application to one component system (water-sulphur system), two component systems (Ag-Pbsystems).

Polymers: Plastics, preparation, properties and uses of polyethylene, bakelite, terylene and nylon, Rubber; natural rubber, synthetic rubber such as butyl and neoprene rubbers, vulcanization process and its advantages.

Corrosion: its significance, theories of corrosion, Galvanic cell and concentration cell, pitting and stress corrosion, protection techniques.

UNIT-V

Explosives: Introduction, classification of explosives, preparation of commercially important explosives, blasting fuses, uses and abuses of explosives.

Cement: properties, Portland cement and its manufacture, chemistry of setting and hardening of cement, RCC structures.

Refractories: definition, classification, properties of silica and fireclay refractories, **Glass:** preparation, properties and uses.

Recommended reference books:

1. Morrison R.T & Boyn R. N ; Organic Chemistry; Prentice Hall of India 1999
2. Lee J. D. ; Inorganic Chemistry ;Blackwell Science
3. Gopalan R., Venkappayya D., Nagarajan S. "Engineering Chemistry" Vikas Publishing House Pvt Ltd 2000.
4. Jain & Jain " Engineering Chemistry" Dhanpat Rai publishing company
5. Dara S. S. , " A Text Book of Engineering Chemistry" S. Chand and Company Ltd, 2008
6. Keeler J and Wolhess P, Why Chemical Reaction Happen Oxford Press.

BT107- Electrical and Electronics Lab-I

List of Experiments

1. Identification, Study & Testing of various electronic components:

(a) Resistances-Various types, Colour coding (b) Capacitors-Various types, Coding, (c) Inductors

(d) Diodes (e) Transistors (f) SCRs (g) ICs (h) Photo diode (i) Photo transistor (j) LED (k) LDR

(l) Potentiometers.

2. Study of symbols for various Electrical & Electronic Components, Devices, Circuit functions etc.

3. Study of Analog & digital multi-meters.

4. Study of Function/ Signal generators.

5. Study of Regulated d. c. power supplies (constant voltage and constant current operations).

6. Study of analog CRO, measurement of time period, amplitude and frequency.

7. Perform half wave rectifier experiment and effect of filters on output.

8. Perform bridge rectifier experiment and measure the effect of filter output.

9. Application of diode as clipper and clamper.

10. Soldering & desoldering practice.

BT108- Engineering Physics Lab-I

List of Experiments

1. To study the charging of a condenser to plot a graph of voltage (V) across it against time (T) and to determine the time constant from this graph

2. To study the discharging of a condenser to plot a graph of voltage (V) across it against time (T) and to determine the time constant from this graph.

3. To determine the specific resistance of a material and difference between two small resistances using “Carey Foster’s Bridge “.
4. To determine band gap of a semiconductor- diode.
5. To study the Zener diode as a constant voltage regular.
6. To verify Malus Law (Cosine square law) for plane polarized light with the help of a Photo voltaic cell.
7. To determine the transmission coefficient by using Lummer Brodhum Photometer.
8. To determine minimum deviation angle for different light using prism and spectrometer.
9. To determine the profile of He -Ne Laser beam.
10. To study the variation of thermo e.m.f. of iron copper thermo couple with temperature.
11. To determine the wavelength of sodium light using Michelson Interferometer.
12. To determine the curie temperature of Monel metal
13. The determination of viscosity.

BT109 – IT FUNDAMENTAL LAB

LIST OF EXPERIMENTS

1. Dismantling a PC Part -1.
2. Dismantling a PC Part -2.
3. Internal and External commands of DOS.
4. System utilities of windows.
5. Understanding and Working knowledge of Linux/Unix OS.
6. Understanding of File system of Linux.
7. Creating user and group.

8. Understanding and Working knowledge of MS Office, Power Point and Excel: Editing and Reviewing, Drawing, Tables, Graphs, Templates.

BT110- Engineering Chemistry Lab

List of Experiments

1. To determine the strength of a given unknown copper sulphate solution (Iodometrically) with titrate Hypo (sodium thio sulphate) solution.
2. To determine the strength of a given unknown FAS solution with titrate potassium dichromate solution using N-phenyl anthranilic acid (internal indicator).
3. To determine the strength of a given unknown potassium dichromate solution (Iodometrically) with titrate Hypo (sodium thio sulphate) solution.
4. Determine the percentage of available chlorine in a given sample of bleaching powder.
5. Determine the amount of free chlorine in a given water sample.
6. To determine the viscosity and viscosity index of a given sample of lubricating oil using Redwood viscometer No.1
7. To determine the flash and fire point of a given sample of lubricating oil using Pensky Marten's apparatus.
8. Determine the cloud and pour point of a given sample of lubricating oil.
9. Determination of hardness of water by complexometric method (using EDTA).
10. Determine the pH of an acid (strength of an acid) pH – metrically.
11. Determine the strength of a given unknown HCl solution by titrating it against NaOH solution (Conductometric analysis).
12. To estimation the amount of sodium hydroxide and sodium carbonate in the given alkali mixture solution (or in water sample) by titrating against an intermediate hydrochloric acid using phenolphthalein and methyl orange indicator.
13.

BT111- (Engineering workshop)

FITTING AND SHEET METAL SHOP

1. Finishing of two sides of a square piece by filing and to cut a Square notch using hacksaw.
2. To drill three holes and Tapping on the given specimen.
3. Tin smithy for making mechanical joint and soldering of joint

WELDING SHOP

4. To prepare Lap Joint with the help of Arc welding
5. To prepare Butt Joint with the help of arc Welding
6. Gas welding practice by students on mild steel flat

MACHINE SHOP PRACTICE

7. Job on lathe M/C with centering and one step turning
8. Job on lathe M/C with grooving and chamfering operations

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BT 201	Engineering Physics-II	3	1	-	30	70	100	4
BT 202	Introduction to computer Programming *	3	-	-	30	70	100	3
BT 203	Engineering Mechanics*	3	1	-	30	70	100	4
BT 204	Digital Electronics	3	-	-	30	70	100	3
BT 205	Applied Mathematics-II	3	-	-	30	70	100	3
BT 206	Environmental Sciences	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BT 207	Electrical & Electronic Lab-II	-	-	2	30	20	50	1
BT 208	Engineering Physics Lab-II	-	-	2	30	20	50	1
BT 209	Computer Programming Lab*	-	-	2	30	20	50	1
BT 210	Engineering Drawing	-	-	2	30	20	50	1
BT 211	Communication Skill Lab*	-	-	2	30	20	50	1
TOTAL		**18**	**2**	**10**	**330**	**520**	**850**	**25**

Note:

1. Semester I and II common for all Branches of Engineering.
2. Half the students will study Environmental Science in 1st Semester and rest will study Engineering Chemistry and Chemistry Lab. The students shall interchange the subjects and vice-versa In 2nd Semester

BT201- Engineering Physics II

UNIT-I

Electric and Magnetic Fields :Coulomb's law, Gauss's law, electrostatic potential and field due to discrete and continuous charge distributions, dipole and quadrupole moments, dielectric polarization, electrostatic energy, conductors and capacitors, Biot-Savart law, Ampere's law, magnetic induction due to current carrying conductors, force on a charged particle in electric and magnetic field, Faraday's law of electromagnetic induction.

UNIT-II

Thermodynamics: Work- Thermodynamic definition of work, examples, displacement work, path dependence of displacement work, thermal equilibrium, Zeroth law , definition of temperature, heat/work interaction systems , First law and its consequences, isothermal and adiabatic processes, reversible, irreversible and quasi-static processes. Second law and entropy. Carnot engine and cycle. Absolute temperature scale.

UNIT-III

Optical phenomena : Principle of superposition, coherent and incoherent sources, temporal and spatial coherence, interference phenomena(Newton's ring and Michelson interferometer), diffraction of waves, diffraction from single and diffraction grating, polarization : types of polarization , Malus law, quarter and half wave plates, optical activity, specific rotation.

UNIT-IV

Lasers and Holography : Spontaneous and stimulated emission (Einstein A and B coefficients), population inversion, basic principles of operation of He-Ne, Ruby and semiconductor lasers. **Optical Fibers** : Types of optical fibers and their characteristics, characteristics of step, graded , mono mode and multi mode fibers, numerical aperture and its measurement, fiber optical communication. Principles and applications of holography

UNIT-V

Magnetic Materials: Magnetization- origin of magnetic moment, classification of magnetic materials- die, Para and ferromagnetism, hysteresis curve, soft and hard magnetic materials. Superconductivity: General properties of superconductors, Meissonier effect, penetration depth, type I and Type II superconductors, flux

quantization, magnetic levitation, high temperature superconductors, superconducting materials, Cooper pairs and postulates of BCS theory.

Recommended reference books:

1. Fundamental University Physics, Alonso & Finn.
2. Berkley Physics Course Vol 1 & Vol. 3
3. Thermodynamics and Statistical Physics by F. Reif.
4. Thermodynamics and Statistical Physics, S. Lokanathan and D.P. Khandelwal.
5. Optics by Ajoy Ghatak
6. Conceptual Physics, Paul Hewitt
7. Introduction to Electrodynamics, D.J.Griffiths
8. Modern Physics, A. Beiser
9. Physics for Scientists and Engineers, R. Serway

BT202- INTRODUCTION TO COMPUTER PROGRAMMING

UNIT I

Concept of algorithms, Flow Charts, Overview of the compiler (preferably GCC) , Assembler, linker and loader , Structure of a simple Hello World Program in C ,Overview of compilation and execution process in an IDE (preferably Code Block)

UNIT II

Programming using C: Preprocessor Directive, C primitive input output using get char and put char , simple I/O Function calls from library , data type in C including enumeration , arithmetic, relational and logical operations, conditional executing using if, else, switch and break .Concept of loops , for, while and do-while , Storage Classes: Auto, Register, Static and Extern

UNIT III

Arrays and Strings: Declaring an array, Initializing arrays, accessing the array elements, working with multidimensional arrays, declaring and initializing string variables, arithmetic operations on characters.

Pointers: Declaring and initializing pointers, pointer expressions, pointer increment and scale factor, pointers and arrays, pointers and strings.

UNIT IV

Functions: Defining functions, passing arguments to functions, returning values from functions, reference arguments, variables and storage classes, static functions, pointers and functions.

Structures: Declaring and initializing a structure, accessing the members of a structure, nested structures, array of structures, using structures in functions, pointers and structures.

UNIT V:

File Handling in C Using File Pointers, fopen( ), fclose( ), Input and Output using file pointers, Character Input and Output with Files , String Input / Output Functions , Formatted Input / Output Functions, Block Input / Output Functions, Sequential Vs Random Access Files , Positioning the File Pointer.

Text/ Reference Books:

1. Kernighan & Ritchie, "C Programming Language", The (Ansi C version), PHI, 2/e
2. Yashwant Kanetkar " Test your C Skills " , BPB Publications
3. Programming in ANSI C, E. Balagurusamy; Mc Graw Hill, 6th Edition.
4. Herbert Schildt, "C: The Complete Reference", OsbourneMcgraw Hill, 4th Edition, 2002.
5. Forouzan Behrouz A. "Computer Science: A Structured Programming Approach Using C, Cengage Learning 2/e
6. K.R Venugopal, "Mastering C ", TMH
7. R.S. Salaria "Application Programming in C " Khanna Publishers4/e

BT203- ENGINEERING MECHANICS

Unit I

Force System: Introduction, force, principle of transmissibility of force, resultant of a force system, resolution of a force, moment of force about a line. Varigon's theorem, couple, resolution of force into force and a couple, properties of couple and their application to engineering problems. Lami's theorem. Force body diagram.

Unit II

Centroid & Moment of Inertia: Location of centroid and center of gravity, Moment of inertia,

Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section, Polar

Moment of inertia, Lifting Machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines; System of Pulleys, Wheel and differential axle, differential pulley Block,

Unit III

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge,

Belt Friction. Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives.

Unit IV

Kinematics of Particles and Rigid Bodies: Velocity, Acceleration, Types of Motion, Equations of

Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular

Acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and

Inclined Plane, Relative Motion. Newton's laws, Equation of motion in rectangular

Coordinate, radial and transverse components, Equation of motion in plane for a rigid body,

D'Alembert principle.

Unit V

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency,

Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Nonconservative Force, Conservation of energy.

Impulse and Momentum: Linear and angular momentum, Linear and angular impulse, Principle

of momentum for a particle and rigid body, Principle of linear impulse and momentum for a

Particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular

Suggested Readings

1. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill.

2. Engineering Mechanics, Hibbeler, Pearson Education.

3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.

4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.

5. Engineering Mechanics, Shames, Pearson Education.

6. Engineering Mechanics, Boresi and Schmidt, CL-Engineering.

7. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning.

BT204- Digital Electronics

UNIT I

BASIC LOGIC GATES & BOOLEAN ALGEBRA: Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates,

their block diagrams and truth tables. Logic diagrams from Boolean expressions and vice-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion.

UNIT II

DIGITAL LOGIC GATE CHARACTERISTICS: TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET. Interfacing logic families to one another.

UNIT III

MINIMIZATION TECHNIQUES: Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-Mc Klusky minimization techniques.

UNIT IV

COMBINATIONAL SYSTEMS: Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, demultiplexer, encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.

UNIT V

SEQUENTIAL SYSTEMS: Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops. Counters : Asynchronous (ripple), synchronous and synchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications, Registers: buffer register, shift register.

Recommended Reference Books:

1. M. Morris Mano: Digital Logic and Computer Design, PHI, India

1. Malvino and Leach: Digital Principles
2. Tocci R.J., Digital Systems- Principles & Applications, PHI 1997
3. loyd, Digital Fundamentals, PHI, 1997
4. Salivahanan A, Digital Circuit and Design, TMH

BT205- Applied Mathematics II

UNIT I

Vector spaces, linear dependence of vectors, basis and linear transformations, scalar and vector fields, level surfaces, directional derivatives, gradient, divergence and curl of fields, Green, Gauss and Stokes theorems.

UNIT II

Matrix algebra, rank of a matrix, adjoint and inverse of a matrix, Solution of algebraic equations using matrix algebra , consistency conditions, eigenvalues and eigenvectors , Hermitian matrices.

UNIT III

Numerical solution of matrix equations using Gauss, Gauss-Seidel, LU decomposition and other iterative methods.

UNIT IV

Convergence of improper integrals, tests of convergence, elementary properties of beta and gamma functions, differentiation under integral sign, Leibnitz rule, integrals dependent on a parameter, trapezoidal and Simpson's integration rules, applications in engineering.

UNIT V

Numerical methods; round off and truncation errors, approximations, order of convergence, Newton's forward and backward interpolation formula, central difference interpolation, solutions of polynomial equations using bisection, Newton-Raphson and Regula-falsi methods.

Recommended Books:

1. H. K. Dass: Advanced Engineering Mathematics; S. Chand, Delhi
2. P. C. Bishwal: Numerical Analysis; PHI, India

BT206- Environmental Sciences

UNIT I

Ecosystem and Biodiversity: Components and types of ecosystem, Structure and functions of Ecosystem, Values, Type and levels of Biodiversity, Causes of extension, and Conservation methods of biodiversity.

UNIT II

Air Pollution: Definition, different types of Sources, effects on biotic and abiotic components and Control methods of air pollution.

UNIT III

Water pollution: Definition, different types of Sources, effects on biotic and abiotic components and treatment technologies of water pollution.

UNIT IV

Noise Pollution: Introduction of noise pollution, different Sources, effects on abiotic and biotic environment and Control measures.

UNIT V

Non Conventional energy sources: Introduction, Renewable Sources of Energy: Solar energy, wind energy, Energy from ocean, energy from biomass, geothermal energy and Nuclear Energy.

Recommended Reference Books:

1. Brunner R.C., Hazardous Waste Incineration, McGraw Hill Inc. 1989.

2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)

3. Cunningham, W.P, Cooper, T.H. Gorhani, E & Hepworth, M.T. , Environmental Encycolopedia, Jaico Publishing House, Mubmbi, 2001.

4. De. A.K., Environmental Chemistry, Wiley Eastern Ltd.

5. Down to Earth, Centre for Science and Environment (R)

6. Gleick, H.P. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press.

7. Gilpin, Alan. Environmental Impact Assessment (EIA), cutting egde for the 21th century. Cambridge university Press.

BT207- Electrical and Electronics Lab-II

List of Experiment:

1. To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR.
2. To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3. To realize an SOP and POS expression.
4. To realize adder and Subtractor using universal gates.
5. To verify the truth table of Encoder and decoder.
6. To verify the truth table of multiplexer and demultiplexer.
7. To study and perform Various types of Flip-Flops.
8. To study and perform various types of counters.
9. To study and perform various types of shift registers.
10. To study and perform various types of Multivibrators.
11. To study and perform Schmitt Trigger.

BT208- Engineering Physics Lab-II

List of Experiments:

1. Conversion of a Galvanometer in to an ammeter and calibrate it.
2. Conversion of a Galvanometer in to voltmeter and calibrate it.
3. To determine the value of "g" by using compound pendulum.
4. To determine Plank's constant using LED.
5. To measure the Numerical Aperture (NA) of an optical fiber.
6. To determine the profile of He-Ne Laser beam.
7. To determine the wavelength of different lights using diffraction grating and spectrometer.
8. To determine the wavelength of sodium light by Newton's ring method.
9. To determine the specific rotation of glucose using Polarimeter.
10. To determine minimum deviation angle for different light using prism and spectrometer.
11. To study of detergent on surface tension of water by observing capillary rise
12. To determine the speed of sound in air at room temperature using a resonance tube by two resonance position.

BT209- COMPUTER PROGRAMMING LAB

LIST OF EXPERIMENTS

1 Write a program to calculate the area & perimeter of rectangle.

2 Write a program to calculate the area and circumference of a circle for a given radius.

3 Write a program to calculate simple interest for a given principal/amount.

4 Write a program to convert temperature given in ◦C to temperature in ◦F.

5 Write a program to find profit and loss (in percentage) of a given cost price and selling price.

6 Write a program to find out the maximum among the three given numbers.

7 Write a program to calculate the factorial of a given number.

8 Write a program to print the list of first 100 odd number.

9 Write a program to calculate the sum of the digits of a number and display it in reverse order.

10 Write a program to generate a Fibonacci series.

11 Write a program to generate the following series:

```
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

12 Write a program to generate the following series:

```
0 1
0 1 0
0 1 0 1
0 1 0 1 0
```

13 Write a program using a function to check whether the given number is prime or not.

14 Write a program to check whether the given string is a palindrome or not.

15 Write a program to find the length of a string, reverse the string and copy one string to another by using library function.

16 Write a program to swap two variables a & b using pointers.

17 Write a program to enter a line of text from keyboard and store it in the file. User should enter file name.

18 Write a recursive program for tower of Hanoi problem

19 Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices

- Addition of two matrices
- Subtraction of two matrices
- Finding upper and lower triangular matrices
- Transpose of a matrix

- Product of two matrices.

20 Write a program to copy one file to other, use command line arguments.

21 Write a program to perform the following operators an Strings without using String functions

- To find the Length of String.
- To concatenate two string.
- To find Reverse of a string.
- To Copy one sting to another string.

22 Write a Program to store records of an student in student file. The data must be stored using Binary File.Read the record stored in "Student.txt" file in Binary code.Edit the record stored in Binary File.Append a record in the Student file.

23 Write a programmed to count the no of Lowercase, Uppercase numbers and special Characters presents in the contents of File.

BT210- Engineering Drawing

Engineering Drawing

Sheet 1 Orthographic Projections (3 Problems)

Sheet 2 Riveted joints: Lap joints, butt joints, chain riveting, zig-zag riveting

Sheet 3 Screw fasteners, different threads, Nuts & bolts locking devices, set screws,

Sheet 4 Scale, plain scales, diagonal scales, scale of chords

Sheet 5 Conic Sections: Construction of ellipse, parabola and hyperbola

Sheet 6 Engineering Curves: Cycloid, Epicycloids, Hypo-cycloid, Involutes, Archemedian and logarithmic spirals

Sheet 7 Projection of points and lines, True inclinations and true length of straight lines, Traces of straight lines

Sheet 8 Projection of planes and solids: Projection of planes, Projection of polyhedra, Pyramids.

BT211- Communication Skills Lab

1. Introducing yourself.

2. Role Plays.

3. Word Formation.

4. Listening and Speaking Skills.

5. Words often mis-spelt and Mis- Pronounced.

6. One word for many.

7. Synonyms and Antonyms.

8. Seminar Presentation.

9. Group Discussion.

10. Job Interview.

SEMESTER - III

COMPUTER SCIENCE ENGINEERING								
SEMESTER - III								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 301	Applied Mathematics – III	3		-	30	70	100	3
BTCS 302	Core PHP	3	1	-	30	70	100	4
BTCS 303	Electronic Devices and Circuits	3		-	30	70	100	3
BTCS 304	Object Oriented Programming	3		-	30	70	100	3
BTCS 305	Data Structure & Algorithms	3	1	-	30	70	100	4
BTCS 306	Linux and Shell Programming	3		-	30	70	100	3
PRACTICALS/VIVA-VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCS 307	Electronic Devices and Circuits Lab		-	2	30	20	50	1
BTCS 308	Data Structure & Algorithms Lab		-	2	30	20	50	1
BTCS 309	Object Oriented Programming Lab		-	2	30	20	50	1
BTCS 310	Core PHP Lab		-	2	30	20	50	1
BTCS 311	Unix Shell Programming Lab		-	2	30	20	50	1
							-	
TOTAL		18	**2**	**10**	**330**	**520**	**850**	25

BTCS 301 Applied Mathematics – III

Units I

Introduction: Engineering application of optimization, Statement and classification of optimization problem, single variable and multivariable optimization with and without constraints.

Units II

Linear Programming: Formulation of Linear Programming problem, Graphical Approach, General Linear Programming problem, Simplex Method. Duality in Linear Programming and Transportation Problems.

Units III

Elements of Number Theory: Divisibility and Euclid Algorithm, Primes and the Sieve of Eratosthenes, testing for primes, Prime Number Theorem, Euler's, Fermat's Little theorems, Congruences, Computing Inverse in Congruences, Legendre and Jacobi Symbols, Chinese Remainder Theorem, Algebraic Structures in Computing (Definitions, properties and Elementary Operations Only): Groups, subgroup, order of group, cyclic group, ring, field, division algorithm, polynomial over a field. Galois Field

Units IV

LAPLACE TRANSFORM: Laplace transform with its simple properties. Inverse Laplace transform, convolution theorem (without proof), solution of ordinary differential equation with constant coefficient, solution of partial differential equation having constant coefficient with special reference to diffusion, Heat conduction and wave equation. Boundary value problems

Units V

NUMERICAL ANALYSIS: Difference operators forward, backward, central, shift and average operators and relation between them. Newton's and Gauss forward and backward interpolation formula for equal interval, Stirling's formula for central difference. Lagrange's Interpolation formula and Inverse Interpolation.

Numerical differentiation by Newton's, Gauss and Sterling's formula. Numerical Integration by Simpson's one third and there eight rule. Numerical Integration of ordinary differential equation of first order by Picard's method, Euler's and modified Euler's method, Milne's method and Runga-Kutta fourth order method. Solution of difference equation.

Text/References:

1. Elementary Number Theory with applications: Thomas Koshy, 2nd Ed., Elsevier.
2. Operation Research By Kanti Swaroop, P. K. Gupta & Manmohan, Sultan chand & sons
3. Integral Transform By Dr. R.K. Gupta, A.R. Vashishtha, Krishna Prakashan Mandir Meerut

BTCS 302 CORE PHP

UNIT I Introduction of web applications. Introduction to web designing with HTML and Cascaded Style Sheets. Concept of Client Side Scripting and Server Side Scripting. Static website vs Dynamic website development. Web Servers: Local Servers and Remote Servers.

UNIT II Introduction to PHP, Installing Web servers, PHP configuration in IIS &Apache Web server. Data types in PHP, Variables, Constants, operators and Expressions. PHP Operator: Conditional Structure - if, switch case & Looping Structure - for, while, do while, foreach

UNIT III Introduction to Arrays: Initialization of an array, Iterating through an array, Sorting arrays, Array Functions, Functions: Defining and Calling Functions, Passing by Value and passing By references, Inbuilt Functions: String Function, Math Function, Date Function and Miscellaneous Function.

UNIT IV Working with Forms: Get and Post Methods, Query strings, HTML form controls and PHP, Maintaining User State: Cookies, Sessions and Application State. Working with Files: Opening and Closing Files, Reading and Writing to Files, Getting Information on Files

UNIT V PHP Database Connectivity: Introduction to MYSQL, Creating database and other operations on database, connecting to a database, Use a particular database, Sending query to database, Parsing of the query results, Checking data errors.

Text/ Reference Books:

1. Steven Holzner " PHP: The Complete Reference"
2. Tim Converse, Joyce Park "PHP Bible", 2nd Edition
3. Dave W. Mercer, Allan Kent, Steven D. Nowicki, David Mercer, Dan Squier, Wankyu Choi with Heow Eide-Goodman, Ed Lecky-Thompson, Clark Morgan "Beginning PHP5"

BTCS 303 Electronic Devices and Circuits

Units I

Mobility and conductivity, charge densities in a semiconductor, Fermi Dirac distribution, carrier concentrations and fermi levels in semiconductor, Generation and recombination of charges, diffusion and continuity equation, Mass action Law, Hall effect. Junction diodes, Diode as a ckt. element, load line concept, clipping and clamping circuits, Voltage multipliers.

Units II

Transistor characteristics, Current components, Current gains: alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE,CC and CB amplifiers. Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.

Units III

SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY : Analysis of BJT and FET, RC coupled amplifiers. Frequency response, midband gain, gains at low and high frequency. Miller's Theorem. Cascading Transistor amplifiers, Emitter follower. JFET, MOSFET, Equivalent circuits and biasing of JFET's & MOSFET's. Low frequency CS and CD JFET amplifiers. FET as a voltage variable resistor. Source follower.

Units IV

FEEDBACK AMPLIFIERS : Classification, Feedback concept, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Analysis of voltageseries, voltage-shunt, current- series and current-shunt feedback amplifier. Stability criterion.

Units V

OSCILLATORS : Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Astable, monostable and bistable multivibrators. Schmitt trigger.

Text/References:

1. Electronic devices & circuits theory By R.L. Boylestad, Louis Nashelsky ,Pearson education
2. Integrated Electronics By Millman Halkias, T.M.H
3. Electronic devices & circuits By David Bell, Oxford Publications
4. Grob's Basic Electronics By Schultz, T.M.H.

BTCS 304 Object Oriented Programming using C++

Units I

Introduction: Review of structures in C, accessing members of structures using structure variables, pointer to structures, passing structures to functions, structures as user defined data types.

Units II

Introduction to programming paradigms- (Process oriented and Object oriented). Concept of object, class, objects as variables of class data type, difference in structures and class in terms of access to members, private and public

Basics of C++: Structure of C++ programs, introduction to defining member functions within and outside a class, keyword *using*, declaring class, creating objects, constructors & destructor functions, Initializing member values with and without use of constructors, simple programs to access & manipulate data members, *cin* and *cout* functions. Dangers of returning reference to a private data member, constant objects and members function, composition of classes, friend functions and classes, using *this* pointer, creating and destroyingobjects dynamically using *new* and *delete* operators. Static class members, container classes and iterators, proxy classes. members of a class, data & function members. Characteristics of OOP- Data hiding, Encapsulation, data security.

Units III

Operator overloading: Fundamentals, Restrictions, operator functions as class members v/s as friend functions. Overloading stream function, binary operators and unary operators. Converting between types.

Units IV

Inheritance: Base classes and derived classes, protected members, relationship between base class and derived classes, constructors and destructors in derived classes, public, private and protected inheritance, relationship among objects in an inheritance hierarchy, abstract classes, virtual functions and dynamic binding, virtual destructors.

Units V

Multiple inheritance, virtual base classes, pointers to classes and class members, multiple class members. Templates, exception handling.

Text/ Reference Books:

1. E. Balagurusamy, Object Oriented programming, Tata McGraw Hill.
2. K R Venugopal, Rajkumar, T Ravishankar, Mastering C++, Tata McGraw Hill.
3. C. Thomas Wu, An Introduction to OOP with Java, McGraw Hill.
4. Timothy Wood, An Introduction to Object Oriented Programming, Addison Wesley.
5. John R. Hubbard, Programming with C++, McGraw Hill International.

BTCS 305 Data Structure & Algorithms

Units I

Definition & characteristics of algorithms, structures. Difficulties in estimating exact execution time of algorithms. Concept of complexity of program. Asymptotic notations: Big-Oh, theta, Omega- Definitions and examples, Determination of time and space complexity of simple algorithms without recursion. Representing a function in asymptotic notations viz 5n2-6n=_(n2)
Arrays: Array as storage element, Row major & column major form of arrays, computation of address of elements of n dimensional array.

Units II

Arrays as storage elements for representing polynomial of one or more degrees for addition & multiplication, sparse matrices for transposing & multiplication, stack, queue, dequeue, circular queue for insertion and deletion with condition for over and underflow, transposition of sparse matrices with algorithms of varying complexity (Includes algorithms for operations as mentioned).
Evaluation of Expression: Concept of precedence and associativity in expressions, difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion.

Units III

Linear linked lists: singly, doubly and circularly connected linear linked lists insertion, deletion at/ from beginning and any point in ordered or unordered lists. Comparison of arrays and linked lists as data structures. Linked implementation of stack, queue and dequeue. Algorithms for of insertion, deletion and traversal of stack, queue, dequeue implemented using linked structures. Polynomial representation using linked lists for addition, Concepts of Head Node in linked lists.
Searching: Sequential and binary search

Units IV

Non-Linear Structures: Trees definition, characteristics concept of child, sibling, parent child relationship etc, binary tree: different types of binary trees based on distribution of nodes, binary tree (threaded and unthreaded) as data structure, insertion, deletion and traversal of binary trees, constructing binary tree from traversal results. Threaded binary Tree. Time complexity of insertion, deletion and traversal in threaded and ordinary binary trees. AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion. Application of trees for representation of sets.

Units V

Graphs: Definition, Relation between tree & graph, directed and undirected graph, representation of graphs using adjacency matrix and list. Depth first and breadth first traversal of graphs, finding connected components and spanning tree. Single source single destination shortest path algorithms.

Sorting: Insertion, quick, heap, topological and bubble sorting algorithms for different characteristics of input data. Comparison of sorting algorithms in term of time complexity.

NOTE:
1. Algorithm for any operation mentioned with a data structure or required to implement the particular data structure is included in the curriculum.

TEXT/ Reference BOOKS:

- Schaum Series, "Introduction *to Data Structures*", TMH.
- R.B. Patel, "*Expert Data Structures with C*", Second Edition, Khanna Book publishing Co (P) Ltd.
- Tenenbaum, "*Data Structure using C++*", PHI.
- Chattopadhyay S., Dastidar d G.and Chattopadhyay Matangini., "*Data Structure through C language*", BPB publications.

BTCS 306 Linux and Shell Programming

Units I
Introduction: Logging in, changing password (*passwd* command only), *man, xman, info* commands to access on line help. Simple commands like *ls, cp, mv, grep, head, tail, sort, uniq, diff, echo, date, which, whereis, whatis, who, finger w* (option and variations included).
Directory commands, access permissions, changing access permissions for files and directories, hard & symbolic links. Environment and path setting.

Units II
vi editor: Creating and editing files, features of vi, insertion deletion, searching, substitution operations, yank, put, delete commands, reading & writing files, *exrc* file for setting parameters, advance editing techniques. vim(improved vi).
Programming utilities: Compiling & linking C, C++ programs, *make* utility, debugging C programs using *gdb*, system call.

Units III
Introduction to X-window system: x-window as client/ server system, concept of window manager, remote computing & local displays, *xinitrc* file, customize X work environment and applications, customizing the *fvwm* window manager.

Units IV
Shell: Meaning and purpose of shell, Introduction to types of shell. The command line, standard input and standard output, redirection, pipes, filters special characters for searching files and pathnames.
Bourne Again SHell: shell script-writing and executing, command separation & grouping, redirection, directory stack manipulation, processes, parameters & variables, keyword variables.

Units V
Shell Programming: Control structures, the *Here* document, expanding *NULL* or *USET* variables, Builtins, functions, history, aliases, job control, filename substitution. Source code management-RCS and CVS. *awk* utility.

TEXT/ Reference BOOKS:

1. Unix System Programming using C++, T.Chan, PHI.(UNIT III to UNIT VIII)
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
4. Linux System Programming, Robert Love, O'Reilly, SPD.
5. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
6. Unix Network Programming ,W.R.Stevens,PHI.
7. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.

BTCS 307 Electronic Devices and Circuits Lab

List of Experiments

1 Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.

2 Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.

3 Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.

4 Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of Idss & Vp.

5 Application of Diode as clipper & clamper

6 Plot gain- frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.

7 Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.

8 Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.

9 Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.

10 Plot and study the characteristics of small signal amplifier using FET.

11 Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency

12 Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.

13 To plot the characteristics of UJT and UJT as relaxation.

14 To plot the characteristics of MOSFET and CMOS.

BTCS 308 DATA STRUCTURES LAB

List of Experiments

1 Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays upto 4-dimensions.

2 Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.

3 Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.

4 Represent a sparse matrix using array. Implement addition and transposition operations using the representation.

5 Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.

6 Repeat exercises 2, 3 & 4 with linked structures.

7 Implementation of binary tree with operations like addition, deletion, traversal.

8 Depth first and breadth first traversal of graphs represented using adjacency matrix andlist.

9 Implementation of binary search in arrays and on linked Binary Search Tree.

10 Implementation of insertion, quick, heap, topological and bubble sorting algorithms.

BTCS 309 Object Oriented Programming using C++ Lab

List of Experiments

1 To write a simple program for understanding of C++ program structure without any CLASS declaration. Program may be based on simple input output, understanding of keyword using.

2 Write a C++ program to demonstrate concept of declaration of class with public & private member, constructors, object creation using constructors, access restrictions, defining member functions within and outside a class. Scope resolution operators, accessing an object's data members and functions through different type of object handle name of object, reference to object, pointer to object, assigning class objects to each other.

3 Program involving multiple classes (without inheritance) to accomplish a task. Demonstrate composition of class.

4 Demonstration Friend function friend classes and this pointer.

5 Demonstration dynamic memory management using new & delete & static class members.

6 Demonstration of restrictions an operator overloading, operator functions as member function and/ or friend function, overloading stream insertion and stream extraction, operators, overloading operators etc.

7 Demonstrator use of protected members, public & private protected classes, multi-level inheritance etc.

8 Demonstrating multiple inheritance, virtual functions, virtual base classes, abstract classes

BTCS 310 CORE PHP LAB

List of Experiments

Experiment 1: Design the following static web pages required for online book store.

a) **Home page: -** the static home page must contains three pages
b) **Top: -** logo and college name and links to homepage, login page, registration Page, catalogue page and cart page
c) **Left: -** at least four links for navigation which will display the catalogue of Respective links
d) **Right: -** the pages to links in the left frame must be loaded here initially it Contains the description of the website

Experiment 2: Create registration and cart page in the previous created web site.

Experiment 3: Write a java script to validate the following fields in a registration page

a) userName (should contains alphabets and the length should not be less than 6 characters)
b) userPassword (should not be less than 6 characters)
c) userEmail (should not contain invalid addresses)
d) userCity (should select city from drop down)
e) userGender (Should select gender)

Experiment 4: Implement CSS on the above create WebPages.

Experiment 5: Write an XML file which displays the book details that includes the following:

1) Title of book 2) Author name 3) Edition 4) Price Write a DTD to validate the above XML file and display the details in a table.

Experiment 6: Create a php program to demonstrate the different file handling methods.

Experiment 7: Create a php program to demonstrate the different loops in php.

Experiment 8: Create a php program to demonstrate the different predefined function in array, Math.

Experiment 9: Create a php program to demonstrate the different predefined function in Data & Regular Expression, date.

Experiment 10: Create a HTML form and process the HTML form in PHP.

Experiment 11: Create a php program to connect to MySQL Server.

Experiment 12: Create a php program to execute more SQL queries.

BTCS 311 Unix Shell Programming

List of Experiments

1. Use of Basic Unix Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.

2. Commands related to inode, I/O redirection and piping, process control commands, mails.

3. Shell Programming: Shell script exercises based on following

(i) Interactive shell scripts (ii) Positional parameters (iii) Arithmetic

(iv) if-then-fi, if-then-else-fi, nested if-else (v) Logical operators

(vi) else + if equals elif, case structure (vii) while, until, for loops, use of break

(viii) Metacharacters (ix) System administration: disk management and daily administration

4. Write a shell script to create a file in $USER /class/batch directory. Follow the instructions

(i) Input a page profile to yourself, copy it into other existing file;

(ii) Start printing file at certain line

(iii) Print all the difference between two file, copy the two files at $USER/CSC/2007 directory.

(iv) Print lines matching certain word pattern.

5. Write shell script for-

(i) Showing the count of users logged in,

(ii) Printing Column list of files in your home directory

(iii) Listing your job with below normal priority

(iv) Continue running your job after logging out.

6. Write a shell script to change data format .Show the time taken in execution of this script

7. Write a shell script to print files names in a directory showing date of creation & serial number of the file.

8. Write a shell script to count lines, words and characters in its input(do not use wc).

9. Write a shell script to print end of a Glossary file in reverse order using Array. (Use awk tail)

10. Write a shell script to check whether Ram logged in, Continue checking further after every 30 seconds till success.

Semester - IV

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 401	Micro Processors And Interfaces	3	1	-	30	70	100	4
BTCS 402	Discrete Mathematical Structures	3		-	30	70	100	3
BTCS 403	Statistics and Probability Theory	3	1	-	30	70	100	4
BTCS 404	Software Engineering	3		-	30	70	100	3
BTCS 405	Principles of Communication	3		-	30	70	100	3
BTCS 406	Principles of Programming Languages	3		-	30	70	100	3
PRACTICALS/VIVA-VOCE					**Sessional**	**Practical**	**Total**	**Credits**
BTCS 407	Micro Processor Lab	-	-	2	30	20	50	1
BTCS 408	Communication Lab	-	-	2	30	20	50	1
BTCS 409	Computer Aided Software Engineering Lab	-	-	2	30	20	50	1
BTCS 410	Business Entrepreneurship Development	-	-	2	30	20	50	1
BTCS 411	Discipline & Extra Curricular Activities	-	-	2	30	20	50	1
TOTAL		18	**2**	**10**	**330**	**520**	**850**	25

BTCS 401 Micro Processors And Interfaces

Units I
Introduction to Microprocessors, microcontroller; 8085 Microprocessor Architecture, pin description, Bus concept and organization; concept of multiplexing and demultiplexing of buses; concept of static and dynamic RAM, type of ROM, memory map.

Units II
Software architecture registers and signals, Classification of instruction, Instruction set, addressing modes, Assembly Language Programming and Debugging, Programming Technique, instruction Format and timing.

Units III
Advance Assembly Language Programming, Counter and time delay; types of Interrupt and their uses, RST instructions and their uses, 8259 programmable interrupt controller; Macros, subroutine; Stack- implementation and uses with examples; Memory interfacing.

Units IV
8085 Microprocessor interfacing:, 8255 Programmable Peripheral Interface, 8254 programmable interval timer, interfacing of Input/output device, 8279 Key board/Display interface.

Units V
Microprocessor Application: Interfacing scanned multiplexed display and liquid crystal display, Interfacing and Matrix Keyboard, MPU Design; USART 8251, RS232C and RS422A, Parallel interface- Centronics and IEEE 488 .

Text/ Reference Books:

1. Ramesh.S.Gaonkar "Microprocessor architecture, programming & applications with 8085.

2.Kenneth J.Ayala "The 8051 Microcontroller Architecture, Programming & Applications"-Penram International publishing.

3.D.V.Hall "Microprocessor and Digital system"-McGraw Hill Publishing Company.

4 .Ajit Pal "Microprocessor Principles and Applications"-Tata McGraw Hill.

5.Kenneth "Microprocessor and programmed logic" PHI.

BTCS 402 Discrete Mathematical Structures

Units I

Sets: Definition and types, Set operations, Partition of set, Cardinality (Inclusion- Exclusion & Addition Principles), Recursive definition of set. Functions: Concept, Some Special Functions (Polynomial, Exponential & Logarithmic, Abslute Value, Floor & Ceiling, Mod & Div Functions), Properties of Functions, Cardinality of Infinite Set, Countable & Uncountable Sets, The Pigeonhole & Generalized Pigeonhole Principles, Composition of Functions.

Units II

Relations: Boolean Matrices, Binary Relation, Adjacency Matrix of Relation, Properties of Relations, Operations on Relations, The Connectivity Relations, Transitive Closure- Warshall's Algorithm, Equivalence relations- Congruence Relations, Equivalence Class, Number of Partitions of a Finite Set, Partial & Total Orderings.

Units III

Proof Methods: Vacuous, Trivial, Direct, Indirect by Contrapositive and Contradiction, Constructive & Non-constructive proof, Counter example. The Division Algorithm, Divisibilty Properties (Prime Numbers & Composite Numbers), Principle of Mathematical Induction, The Second Principle of Mathematical Induction, Fundamental Theorem of Arithmetic. Algorithm Correctness: Partial Correctness, Loop Invariant. Testing the partial correctness of linear & binary search, bubble & selection sorting.

Units IV

Graph Theory: Graphs – Directed, Undirected, Simple,. Adjacency & Incidence, Degre of Vertex, Subgraph, Complete graph, Cycle & Wheel Graph, Bipartite & Complete Bipartite Graph, Weighed Graph, Union of Simple Graphs. Complete Graphs. Isomorphic Graphs, Path, Cycles & Circuits Euclerian & Hamiltonian Graphs. Planar Graph: Kuratowski's Two Graphs, Euler's Formula, Kuratowski's Theorem. Trees: Spanning trees- Kruskal's Algo, Finding Spanning Tree using Depth First Search, Breadth First Search, Complexity of Graph, Minimal Spanning Tree.

Units V

Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Inverse & Contrpositive, Biconditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments.

Text / Reference Books:

- Norman L. Biggs**, "**Discrete Mathematics", Oxford, second edition.
- Keneth H. Rosen, "Discrete Mathematics and Its Applications", TMH, seventh edition.

- Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI, 1996.
- C.L. Liu, "Elements of Discrete Mathematics", TMH, 2000.
- J. P. Trembly& P. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill, 1997.

BTCS 403 Statistics and Probability Theory

Units I

Introduction & Discrete random variables Sample space, events, algebra of events, Bernoulli's trials, Probability & Baye's theorem. Random variable & their event space, probability generating function, expectations, moments, computations of mean time to failure, Bernoulli & Poisson processes.

Units II

Discrete & continuous distributions Probability distribution & probability densities: Binomial, Poisson, normal rectangular and exponential distribution & their PDF's, moments and MGF's for above distributions.

Units III

Correlation & Regression Correlation & regression: Linear regression, Rank correlation, Method of least squares Fitting of straight lines & second degree parabola. Linear regression and correlation analysis.

Units IV

Queuing Theory Pure birth, pure death and birth-death processes. Mathematical models for M/M/1, M/M/N, M/M/S and M/M/S/N queues.

Units V

Discrete Parameter Markov chains: M/G/1 Queuing model, Discrete parameter birth-death process.

Text/References:

1. Probability, Statistics & Random Process By T. Veerajan, TMH
2. Fundamental of Mathematical Statistics By S.C.Gupta and V.K. Kapoor, Sultanchand & Sons.
3. Statistics and Probability Theory By jain & rawat, CBC
4. Statistics and Probability Theory By Schaum's, TMH

BTCS 404 Software Engineering

Units I

System Analysis: Characteristics, Problems in system Development, System Level project Planning, System Development Life cycle (SDLC), computer system engineering & system analysis, modeling the architecture, system specification.

Units II

Software & its characteristics: Software Development, Process Model, Prescriptive model, The water fall model, Incremental Process Modes, Evolutionary process model, specialized process model.

Units III

Requirement Analysis: Requirement analysis tasks, Analysis principles, Software prototyping and specification data dictionary finite state machine (FSM) models.
Structured Analysis: Data and control flow diagrams, control and process specification behavioral modeling, extension for data intensive applications.

Units IV

Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation, coding – Programming style, Program quality, quantifying program quality, complete programming example

Units V

Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling Object Oriented Design: OOD concepts and methods class and object definitions, refining operations, Class and object relationships, object modularization, Introduction to Unified Modeling Language

Text/ Reference Books:

1. R. S. Pressman, "Software Engineering – A practitioner's approach", McGraw Hill Int. Ed.
2. I. Sommerville, "Software Engineering", Addison Wesley, 2004
3. Rajib Mall, "Fundamental of Software Engineering", 3rd Edition, PHI Learning Private Limited
4. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers

5. K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed., New Age International, 2005.
6. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons.
7. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa, 3rd Ed., 2005.

BTCS 405 Principles of Communication

Units I

ANALOG MODULATION: Concept of frequency translation. Amplitude Modulation: Description of full AM, DSBSC, SSB and VSB in time and frequency domains, methods of generation & demodulation, frequency division multiplexing (FDM). Angle Modulation: Phase and frequency modulation. Descriptions of FM signal in time and frequency domains, methods of generation & demodulation, pre- emphasis & deemphasis, PLL.

Units II

PULSE ANALOG MODULATION: Ideal sampling, Sampling theorem, aliasing, interpolation, natural and flat top sampling in time and frequency domains. Introduction to PAM, PWM, PPM modulation schemes. Time division multiplexing (TDM)

Units III

PCM & DELTA MODULATION SYSTEMS: Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Matched filter detection. Error probability in PCM system.

Units IV

DIGITAL MODULATION: Baseband transmission: Line coding (RZ, NRZ), inter symbol interference (ISI), pulse shaping, Nyquist criterion for distortion free base band transmission, raised cosine spectrum. Pass band transmission: Geometric interpretation of signals, orthogonalization. ASK, PSK, FSK, QPSK and MSK modulation techniques, coherent detection and calculation of error probabilities.

Units V

SPREAD-SPECTRUM MODULATION: Introduction, Pseudo-Noise sequences, directsequence spread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hop spread spectrum (FHSS). Application of spread spectrum: CDMA.

Text/Reference Books:

1. Principles of communication systems by Taub Schilling, T.M.H.
2. Fundamentals of communication systems by Proakis&Salehi, Pearson Education.
3. Communication Systems by Simon Haykin, Johan Wiley

BTCS 406 Principles of Programming Languages

Units I

Programming Language: Definition, History, Features. Issues in Language Design: Structure and Operation of computer, Programming Paradigms. Efficiency, Regularity. Issues in Language Translation: Syntax and Semantics.

Units II

Specifications and Implementation of Elementary and Structured Data Types. Type equivalence, checking and conversion. Vectors and Arrays, Lists, Structures, Sets, Files.

Units III

Sequence control with Expressions, Conditional Statements, Loops, Exception handling. Subprogram definition and activation, simple and recursive subprogram, subprogram environment.

Units IV

Scope – Static and Dynamic, Block structures, Local Data and Shared Data, Parameters and Parameter Transmission. Local and Common Environments, Tasks and Shared Data.

Units V

Abstract Data type, information hiding, encapsulation, type definition. Static and Stack- Based Storage management. Fixed and Variable size heap storage management, Garbage Collection.

Text/ Reference Books:

1. Concepts of Programming Languages Robert .W. Sebesta 8/e, Pearson Education,2008.

2. Programming Language Design Concepts, D. A. Watt, Wiley dreamtech,rp-2007.

3. Programming Languages, 2nd Edition, A.B. Tucker, R.E. Noonan, TMH.

4. Programming Languages, K. C.Louden, 2nd Edition, Thomson,2003.

BTCS 407 Micro Processor Lab

List of Experiments

1 Add the contents of memory locations XX00 &XX01 & place the result in memory location XX02.

2 Add the 16 bit numbers stored in memory location & store the result in another memory location.

3 Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverse order.

4 Write a program to Swap two blocks of data stored in memory.

5 Write a program to find the square of a number.

6 Write a main program & a conversion subroutine to convert Binary to its equivalent BCD.

7 Write a program to find largest & smallest number from a given array.

8 Write a program to Sort an array in ascending & descending order.

9 Write a program to multiply two 8 bit numbers whose result is 16 bit.

10 Write a program of division of two 8 bit numbers.

11 Generate square wave from SOD pin of 8085 & observe on CRO.

12 Write a program to perform traffic light control operation.

13 Write a program to control the speed of a motor.

BTCS 408 Communication Lab

List of Experiments

1 Harmonic analysis of a square wave of modulated waveform
Observe the amplitude modulated waveform and measures modulation index.
Demodulation of the AM signal

2 To modulate a high frequency carrier with sinusoidal signal to obtain FM signal.
Demodulation of the FM signal

3 To observe the following in a transmission line demonstrator kit :
i. The propagation of pulse in non-reflecting Transmission line.
ii. The effect of losses in Transmission line.
iii. The resonance characteristics of al half wavelength long x-mission line.

4 To study and observe the operation of a super heterodyne receiver

5 To modulate a pulse carrier with sinusoidal signal to obtain PWM signal and demodulate it.

6 To modulate a pulse carrier with sinusoidal signal to obtain PPM signal and demodulate it.

7 To observe pulse amplitude modulated waveform and its demodulation.

8 To observe the operation of a PCM encoder and decoder. To consider reason for using digital signal x-missions of analog signals.

9 Produce ASK signals, with and without carrier suppression. Examine the different processes required for demodulation in the two cases

10 To observe the FSK wave forms and demodulate the FSK signals based on the properties of (a) tuned circuits (b) on PI.L.

11 To study & observe the amplitude response of automatic gain controller (AGC).

BTCS 409 Computer Aided Software Engineering Lab

For the instructor: Assign any two projects two a group of exactly two students covering all of the experiments from given experiment list. Each group is required to prepare the following documents for projects assigned to them and develop the software using software engineering methodology.

1. Problem Analysis and Project Planning Thorough study of the problem- identify project scope, infrastructure.

2. Software Requirement Analysis- Describe the individual Phases/modules of the project deliverables.

3. Data Modeling Use work products – data dictionary, use case diagrams and activity diagrams, build and test lass diagrams, sequence diagrams and add interface to class diagrams.

4. Software Developments and Debugging.

5. Software Testing – Prepare test plan, perform validation testing coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor.

6. Describe: Relevance of CASE tools, high – end and low – end CASE tools, automated support for data dictionaries, DFD, ER diagrams.

S. No.	List of Experiments	Software Recommended:
1	Course Registration System	Case Tools: Rational Suite, Win runner, Empirix Languages: C/C++/JDK, JSDK, INTERNET EXPLORER UML Front End: VB, VC++, Developer 2000, .NET Back End: Oracle, MS – Access, SQL Note: Open Source tools will be preferred.
2	Quiz System	
3	Online ticket reservation system	
4	Remote computer monitoring	
5	Students marks analyzing system	
6	Expert system to prescribe the medicines for the given symptoms	
7	Platform assignment system for the trains in a railway station	
8	Stock maintenance	
9	Student Marks Analyzing System	
10	Online Ticket Reservation System	
11	Payroll System	
12	Export System	

BTCS 410 Business Entrepreneurship Development

1. Introduction to Entrepreneurship- Concept and need, Entrepreneurship and innovation, Entrepreneurship and economic growth.

2. Entrepreneurial competencies, Leadership, Decision making, Motivation, Risk taking.

3. Business Enterprise Planning- Identification of business opportunity, Idea generation, Demand estimation, Preparation of project report, Feasibility analysis.

4. Intellectual Property rights, Patents, Taxation- Central excise & Sales tax, VAT.

5. Government Policies for Entrepreneurs, Entrepreneurial career opportunities for Engineers, case studies.

Semester - V

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 501	Computer Architecture	3	1	-	30	70	100	4
BTCS 502	Digital Logic Design	3	1	-	30	70	100	4
BTCS 503	Telecommunication Fundamentals	3	1	-	30	70	100	4
BTCS 504	Database Management Systems	3		-	30	70	100	3
BTCS 505	Operating Systems	3		-	30	70	100	3
ELECTIVE (ANY ONE)								
BTCS 506A	Advanced Data Structure	3	-	-	30	70	100	3
BTCS506B	Digital Signal Processing	3	-	-	30	70	100	3
BTCS 506C	Information Theory & Coding	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE					**Sessional**	**Practical**	**Total**	**Credits**
BTCS 507	Database Management Systems Lab	-	-	2	30	20	50	1
BTCS 508	System Design in UML Lab.	-	-	2	30	20	50	1
BTCS 509	Operating Systems Simulation Lab	-	-	2	30	20	50	1
BTCS 510	Digital Hardware Design Lab	-	-	2	30	20	50	1
BTCS 511	Discipline & Extra Curricular Activities	-	-			-	50	1
BTCS512	Seminar			2	30	20	50	1

TOTAL	**18**	**3**	**10**	**330**	**570**	**900**	**27**

BTCS 501 Computer Architecture

Units I

Introduction to Computer Architecture and Organization. Von Neuman Architecture, Flynn Classification. Register Transfer and Micro operations: Register transfer language, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Bus and memory transfers. Computer Organization and Design: Instruction cycle, computer registers, common bus system, computer instructions, addressing modes, design of a basic computer.

Units II

Central Processing Unit: General register organization, stack organization, Instruction formats, Data transfer and manipulation, program control. RISC, CISC characteristics.
Pipeline and Vector processing: Pipeline structure, speedup, efficiency, throughput and bottlenecks. Arithmetic pipeline and Instruction pipeline.

Units III

Computer Arithmetic: Adder, Ripple carry Adder, carry look Ahead Adder, Multiplication: Add and Shift, Array multiplier and Booth Multiplier, Division: restoring and Non-restoring Techniques. Floating Point Arithmetic: Floating point representation, Add, Subtract, Multiplication, Division.

Units IV

Memory Organization: RAM, ROM, Memory Hierarchy, Organization, Associative memory, Cache memory, and Virtual memory: Paging and Segmentation.

Units V

Input-Output Organization: Input-Output Interface, Modes of Transfer, Priority Interrupt, DMA, IOP processor.

Text/References:

1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)
2. Computer Organization and Architecture -John P. Hayes (McGraw -Hill)
3. Computer Organization -V. Carl. Hamacher (McGraw-Hill)

BTCS 502 Digital Logic Design

Units I
Hardware Description Languages and their use in digital logic design. VHDL: Modelling Concepts, Lexical Elements & Syntax Descriptions, Scalar Data types & Operations, Sequential Statements, Composite Data Types & Operations, Basic Modelling Constructs.
Case Study: VHDL Simulation of Ripple Carry, & Look Ahead carry Adders.

Units II
VHDL: Subprograms, Packages & Use Clauses, Aliases, Resolved Signals, Components & Configurations, Generate Statements, Concurrent Statements. Use of VHDL in simulation and synthesis.

Units III
Clocked Sequential circuits. Design steps for synchronous sequential circuits. Design of a sequence detector. Moore and Mealy Machines. Design using JK flip-flops and D flip-flops. State reduction, State assignment, Algorithmic State Charts, converting ASM charts to hardware, one-hot state assignment. Considerations of clock skew, set-up time, hold-time and other flip-flop parameters, timing constraints. Programmable Logic Devices. Read-only memory. Boolean function implementation through ROM. PLD, PGA, PLA, PAL, FPGA.

Units IV
Event-driven Circuits. Design procedure for asynchronous circuits, stable and unstable states, races, race-free assignments. State reduction of incompletely specified machines. Compatibility and state reduction procedure. Hazards in combinational networks. Dynamic hazards, Function Hazards, and Essential Hazards. Eliminating hazards.

Units V
Field Programmable Gate Arrays: Introduction, Logic Elements & programmability, Interconnect structures & programmability, Extended Logic Elements, SRAM, Flash Memory & Antifuse Configuration, Case Studies of Altera Stratix & Xilinx Virtex-II pro.
Technology Mapping for FPGAs: Logic Synthesis, Lookup Table Technology Mapping.

Text Book:
1. Brian Holdsworth and Clive Woods. Digital Logic Design. Newnes (Elsevier). [Available in Indian Edition].
2. Ashenden, The Designer's Guide to VHDL, Elsevier.
3. Stephen D. Brown, et.al., Field Programmable Gate Arrays, Kluwer Academic Publishers.

4. Scott Hauck, André DeHon , Reconfigurable computing: the theory and practice of FPGA based computation, Morgan Kauffman
5. Zvi Kohavi: Switching and Finite Automata Theory. TMH.
6. Parag K. Lala, Practical Digital Logic Design and Testing. PHI
7. Stephen H. Unger, The essence of logic circuits. Wiatrowski & House.

BTCS 503 Telecommunication Fundamentals

Units I

Data Transmission: Terminology, Frequency, spectrum, bandwidth, analog and digital transmission, Transmission impairments, channel capacity, Transmission Media.
Wireless Transmission: Antenna and antenna gain. Network Reference Models (OSI/ISO and TCP/IP) Physical Layer: Line Encoding Schemes. Concept of bit period, effect of clock skew, Synchronous and Asynchronous communication. Data Link Layer: Functions of data link layer and design issues Flow Control: Flow control in loss less and lossy channels using stop-and-wait, sliding window protocols. Performance of protocols used for flow control.

Units II

Error Control Coding: Error Detection, Two Dimensional Parity Checks, and Internet Checksum. Polynomial Codes, Standardized polynomial codes, error detecting capability of a polynomial codes. Linear codes, performance of linear codes, error detection & correction using linear codes. Data Link Control: HDLC & PPP including frame structures. MAC sublayer: Channel Allocation Problem, Pure and slotted Aloha, CSMA,
CSMA/CD, collision free multiple access. Throughput analysis of pure and slotted Aloha. Ethernet Performance.

Units III

Wireless LAN: Hidden node and Exposed node Problems, RTS/CTS based protocol, 802.11 Architecture, protocol stack, Physical layer, MAC Sublayer. Bluetooth Architecture and Protocol Stack Data Link Layer Switching: Bridges (Transparent, Learning and Spanning Tree), Virtual LANs

Units IV

Multiplexing: Frequency division, time division (Synchronous and statistical) multiplexing. ADSL, DS1 and DS3 carriers. Multiple Accesses: TDMA frame structure, TDMA Burst Structure, TDMA Frame efficiency, TDMA Superframe structure, Frame acquisition and synchronization, Slip rate in digital terrestrial networks. Switching: Qualitative description of Space division, time division and space-timespace division switching.

Units V

Spread Spectrum Techniques: Direct sequence(DSSS) & frequency hopping(FHSS); Performance consideration in DSSS & FHSS; Code division Multiple access (CDMA): frequency & channel specifications, forward & reverse CDMA channel, pseudo noise(PN) sequences, m-sequence, gold sequence, orthogonal code, gold sequences, Walsh codes, synchronization, power control, handoff, capacity of CDMA system, IMT-2000, WCDM

Text/References:

1. Stallings, Data and computer communication, 8th ed. Pearson
2. Tri.T.Ha, Digital Satellite Communications, 2/e, Tata McGraw Hill
3. Alberto Leon-Garcia, Indra Widjaja, COMMUNICATION NETWORKS, 2nd ed., TMH
4. Wireless Communications, 2/e, Rappaport, PHI
5. Analysis of Computer and Communication Networks, ISBN: 0387744363, Fayez Gebali, 2008, Springer-verlag, 1st Ed.

BTCS 504 Database Management Systems

Units I

INTRODUCTION TO DATABASE SYSTEMS: Overview and History of DBMS. File System v/s DBMS .Advantage of DBMS Describing and Storing Data in a DBMS. Queries in DBMS. Structure of a DBMS.

Units II

ENTITY RELATIONSHIP MODEL: Overview of Data Design Entities, Attributes and Entity Sets, Relationship and Relationship Sets. Features of the ER Model- Key Constraints, Participation Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Data Base, Design with ER Model-Entity v/s Attribute, Entity vs Relationship Binary vs Ternary Relationship and Aggregation v/s ternary Relationship Conceptual Design for a Large Enterprise.

Units III

RELATIONSHIP ALGEBRA AND CALCULUS: Relationship Algebra Selection and Projection, Set Operations, Renaming, Joints, Division, Relation Calculus, Expressive Power of Algebra and Calculus.

Units IV

SQL QUERIES PROGRAMMING AND TRIGGERS: The Forms of a Basic SQL Query, Union, Intersection and Except, Nested Queries ,Correlated Nested Queries, Set-Comparison Operations, Aggregate Operators, Null Values and Embedded SQL, Dynamic SQL, ODBC and JDBC, Triggers and Active Databases.

Units V

SCHEMA REFINEMENT AND NORMAL FORMS: Introductions to Schema Refinement, Functional Dependencies, Boyce-Codd Normal Forms, Third Normal Form, Normalization-Decomposition into BCNF Decomposition into 3-NF.

References:

1. H.f. Korth and Silberschatz: Database Systems Concepts, McGraw Hill
2. Almasri and S.B. Navathe: Fundamentals of Database Systems,
3. C.J. Date: Data Base Design, Addison Wesley
4. Hansen and Hansen : DBM and Design, PHI

BTCS 505 Operating Systems

Units I

Introduction and need of operating system, layered architecture/logical structure of operating system, Type of OS, operating system as resource manager and virtual machine, OS services, BIOS, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader. Process management- Process model, creation, termination, states & transitions, hierarchy, context switching, process implementation, process control block, Basic System calls- Linux & Windows. Threads- processes versus threads, threading, concepts, models, kernel & user level threads, thread usage, benefits, multithreading models.

Units II

Interprocess communication- Introduction to message passing, Race condition, critical section problem, mutual exclusion with busy waiting- disabling interrupts, lock variables, strict alteration, Peterson's solution, TSL instructions, busy waiting, sleep and wakeup calls, semaphore, monitors, classical IPC problems.

Process scheduling- Basic concepts, classification, CPU and I/O bound, CPU scheduler short, medium, long-term, dispatcher, scheduling:- preemptive and non-preemptive, Static and Dynamic Priority, Co-operative & Non-cooperative, Criteria/Goals/Performance Metrics, scheduling algorithms- FCFS, SJFS, shortest remaining time, Round robin, Priority scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, Fair share scheduling.

Units III

Deadlock- System model, resource types, deadlock problem, deadlock characterization, methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Memory management- concepts, functions, logical and physical address space, address binding, degree of multiprogramming, swapping, static & dynamic loading- creating a load module, loading, static & dynamic linking, shared libraries, memory allocation schemes first fit, next fit, best fit, worst fit, quick fit. Free space management- bitmap, link list/free list, buddy's system, memory protection and sharing, relocation and address translation.

Units IV

Virtual Memory- concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, demand paging, pre-paging, working set model, page fault frequency, thrashing, page replacement algorithms- optimal, NRU, FIFO, second chance, LRU, LRU approximation clock, WS clock; Belady's anomaly, distance string; design issues for paging system- local versus global allocation policies, load control, page size, separate instruction and data spaces,

shared pages, cleaning policy, TLB (translation look aside buffer) reach, inverted page table, I/O interlock, program structure, page fault handling, Basic idea of MM in Linux & windows.

Units V

File System- concepts, naming, attributes, operations, types, structure, file organization & access(Sequential, Direct ,Index Sequential) methods, memory mapped files, directory structures- one level, two level, hierarchical/tree, acyclic graph, general graph, file system mounting, file sharing, path name, directory operations, overview of file system in Linux & windows.

Input/Output subsystems- concepts, functions/goals, input/output devices- block and character, spooling, disk structure & operation, disk attachment, disk storage capacity, disk scheduling algorithm- FCFS, SSTF, scan scheduling, C-scan schedule.

Text/Reference Books:

1. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall. 4. DM Dhamdhere: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
5. Charles Crowly: Operating System A Design – Oriented Approach, Tata McGraw Hill

BTCS 506A Advanced Data Structure

Units I

ADVANCED TREES: Definitions, Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees. Dynamic Order Statistics,Interval Tree; Dictionaries.

Units II

MERGEABLE HEAPS: Mergeable Heap Operations, Binomial Trees, Implementing Binomial Heaps and its Operations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap, Implementing Fibonacci Heap.

Units III

GRAPH THEORY DEFINITIONS: Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut- Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs.

GRAPH THEORY ALGORITHMS: Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.

Units IV

SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting and merging network sorter. Priority Queues and Concatenable Queues using 2-3 Trees. Operations on Disjoint sets and its union-find problem, Implementing Sets.

Units V

NUMBER THEORITIC ALGORITHM: Number theoretic notions, Division theorem, GCD, recursion, Modular arithmetic, Solving Modular Linear equation, Chinese Remainder Theorem, power of an element, Computation of Discrete Logarithms, primality Testing and Integer Factorization.

Text/References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.
2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley
4. Brassard : Fundamental of Algorithmics, PHI.

BTCS506B Digital Signal Processing

Units I

INTRODUCTION : Discrete time signals and systems, properties of discrete time systems, Linear time invariant systems - discrete time. Properties of LTI systems and their block diagrams. Convolution, Discrete time systems described by difference equations.

Units II

Fourier Transform: Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. Z-transform: The region of convergence for the Ztransform. The Inverse Z-transform. Properties of Z transform.

Units III

SAMPLING: Mathematical theory of sampling. Sampling theorem. Ideal & Practical sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq. domain. Sampling of discrete time signals.

Units IV

THE DISCRETE FOURIER TRANSFORMS (DFT): Properties of the DFT, Linear Convolution using DFT. Efficient computation of the DFT: Decimation–in-Time and Decimation-in frequency FFT Algorithms.

Units V

FILTER DESIGN TECHNIQUES: Structures for discrete-time systems- Block diagram and signal flow graph representation of LCCD (LCCD – Linear Constant Coefficient Difference) equations, Basic structures for IIR and FIR systems, Transposed forms. Introduction to filter Design: Butterworth & Chebyshev.IIR filter design by impulse invariance & Bilinear transformation. Design of FIR filters by Windowing: Rectangular, Hamming & Kaiser.

Text/References:

1. Oppenheim, Discrete-Time Signal Processing, 2/e, Pearson Education
2. Proakis, Digital Signal Processing, 4/e, Pearson Education
3. S.K.Mitra, Digital Signal Processing, 2/e, Tata McGraw Hill

BTCS 506C Information Theory & Coding

Units I

Introduction to information theory. Uncertainty, Information and Entropy, Information measures for continuous random variables, source coding theorem. Discrete Memory less channels, Mutual information, Conditional entropy.

Units II

Source coding schemes for data compaction: Prefix code, Huffman code, Shanon-Fane code & Hempel-Ziv coding channel capacity. Channel coding theorem. Shannon limit.

Units III

Linear Block Code: Introduction to error connecting codes, coding & decoding of linear block code, minimum distance consideration, conversion of nonsystematic form of matrices into systematic form.

Units IV

Cyclic Code: Code Algebra, Basic properties of Galois fields (GF) polynomial operations over Galois fields, generating cyclic code by generating polynomial, parity check polynomial. Encoder & decoder for cyclic codes.

Units V

Convolutional Code: Convolutional encoders of different rates. Code Tree, Trllis and state diagram. Maximum likelihood decoding of convolutional code: The viterbi Algorithm fee distance of a convolutional code.

Text/References

1. Digital Communication, Simon Haykin, Wiley.

BTCS 507 Database Management Systems Lab

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Stating a database design & application problem.
2. Preparing ER diagram
3. Finding the data fields to be used in the database.
4. Selecting fields for keys.
5. Normalizing the database including analysis of functional dependencies.
6. Installing and configuring the database server and the front end tools.
7. Designing database and writing applications for manipulation of data for a stand alone and shared data base including concepts like concurrency control, transaction roll back, logging, report generation etc.
8. Get acquainted with SQL.

In order to achieve the above objectives, it is expected that each students will chose one problem. The implementation shall being with the statement of the objectives to be achieved, preparing ER diagram, designing of database, normalization and finally manipulation of the database including generation of reports, views etc. The problem may first be implemented for a standalone system to be used by a single user.

All the above steps may then be followed for development of a database application to be used by multiple users in a client server environment with access control. The application shall NOT use web techniques.

One exercise may be assigned on creation of table, manipulation of data and report generation using SQL.

Suggested Tool:
For standalone environment, Visual FoxPro or any similar database having both the database and manipulation language may be used.
For multi-user application, MYSql is suggested. However, any other database may also be used.
For front end, VB.Net, Java, VB Script or any other convenient but currently used by industry may be chosen.

Indicative List of exercise:

1. Student information system for your college.
2. Student grievance registration and redressal system.

3. A video library management system for a shop.
4. Inventory management system for a hardware/ sanitary item shop.
5. Inventory management system for your college.
6. Guarantee management system for the equipments in your college.

BTCS 508 System Design in UML Lab.

Objectives:

1. The students shall be able to use following modules of UML for system description, implementation and finally for product development.

- Capture a business process model.
- The User Interaction or Use Case Model - describes the boundary and interaction between the system and users. Corresponds in some respects to a requirements model.
- The Interaction or Communication Model - describes how objects in the system will interact with each other to get work done.
- The State or Dynamic Model - State charts describe the states or conditions that classes assume over time. Activity graphs describe the workflows the system will implement.
- The Logical or Class Model - describes the classes and objects that will make up the system.
- The Physical Component Model - describes the software (and sometimes hardware components) that make up the system.
- The Physical Deployment Model - describes the physical architecture and the deployment of components on that hardware architecture.

The students are expected to use the UML models, prepare necessary documents using UML and implement a system. Some hardware products like digital clock, digital camera, washing machine controller, air conditioner controller, an electronic fan regulator, an elementary mobile phone etc. may also be chosen.

The students shall be assigned one problem on software based systems and another involving software as well as hardware.

BTCS 509 Operating Systems Simulation Lab

Objectives:
Understand the basic functions of operating systems.

In depth knowledge of the algorithms used for implementing the tasks performed by the operating systems.

Understand & simulate strategies used in Linux & Windows operating systems.

Develop aptitude for carrying out research in the area of operating system.

Suggested Tools:

Operating system simulator- MOSS preferably on Linux platform (Available for free download from http://www.ontko.com/moss/).

Recommended Exercises:

A. Exercises shall be given on simulation of algorithms used for the tasks performed by the operating systems. Following modules of the simulator may be used:

- Scheduling
- Deadlock
- Memory Management Systems
- File system simulator

Algorithms described in the text may be assigned. The simulation results such as average latency, hit & Miss Ratios or other performance parameters may be computed.

B. One exercise shall be on simulation of algorithms reported in the recent conferences/ journals and reproducing the results reported therein.

BTCS 510 Digital Hardware Design Lab

Objectives:

At the end of course, the students shall be able to

- Should be able to design datapath for digital systems
- Create a digital system using discrete digital ICs
- Design a hard wired / micro-programmed control circuit
- Simulate a digital datapath in Hardware Description Language
- Understand IC descriptions and select proper IC in a given circuit based on its timing characteristics

Suggested Methodology and tools: Hardware description language like Verilog /VHDL can be used for simulation.

The exercise shall involve design of datapath, its simulation and finally realization on breadboard. Library of digital ICs have to be built. Similarly, manuals of Digital IC families have to be placed in the laboratories for reference by students.

Suggested Exercises

- Create a microprocessor from ALU 74181. For this, the students may design a small instruction set and attach necessary registers and suitable control unit to realize a microprocessor.
- Simulate and realize a Cordic calculator.
- Simulate & realize a Four bit Adder
  - o Design and simulation of a 4-bit Adder
  - o VHDL/Verilog HDL (Hardware description language)
  - o Interfacing 7-segment decoder
- Combinational Multiplier
  - o 4x4-bit multiplier
  - o Binary-to-BCD conversion
  - o Timing Constraints
- CRC checksum generator & verifier
- Realizing a carry look ahead adder

Semester - VI

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	T	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 601	Computer Networks	3	1	-	30	70	100	4
BTCS 602	Design & Analysis of Algorithms	3		-	30	70	100	3
BTCS 603	Theory Of Computation	3	1	-	30	70	100	4
BTCS 604	Computer Graphics & Multimedia Techniques	3	1	-	30	70	100	4
BTCS 605	Embedded System Design	3	1	-	30	70	100	4
ELECTIVE (ANY ONE)								
BTCS 606A	Advance Topics in Operating Systems	3	-	-	30	70	100	3
BTCS 606B	Artificial Intelligence	3	-	-	30	70	100	3
BTCS 606C	Human Computer Interface	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE					**Sessional**	**Practical**	**Total**	**Credits**
BTCS 607	Java Programming Lab	-	-	2	30	20	50	1
BTCS 608	Computer Graphics & Multimedia Lab	-	-	2	30	20	50	1
BTCS 609	Design and Analysis of Algorithms Lab.	-	-	2	30	20	50	1
BTCS 610	Embedded System Design Lab.	-	-	2	30	20	50	1

BTCS 611	Humanities and Social Sciences	-	-	2	30	20	50	1
BTCS 612	Discipline & Extra Curricular Activities					50	50	1
TOTAL		**18**	**4**	**10**	**330**	**570**	**900**	**28**

BTCS 601 Computer Network

Unit I

Network layer-design issue, routing algorithms: Distance vector, link state, hierarchical, Broadcast routing. Congestion control: congestion prevention policies, congestion control in Datagram subnets, load shedding, jitter control, Leaky bucket and token bucket algorithms.

Unit II

Internetworking: Differences in networks, Tunneling, Internetwork routing, Fragmentation Network layer in the Internet: IPv4 classful and classless addressing, subnetting Network layer protocols(only working and purpose; packet headers etc. not included), Differences in IPV6 over IPV4. Routing to Mobile Hosts and Mobile IP

Unit III

Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and demultiplexing, crash recovery, introduction to UDP protocol. Principles of Reliable Data Transfer: Reliable data transfer over a perfectly reliable channel, Channel with bit errors and Lossy Channel with bit errors.

Unit IV

Transport Layer in the Internet: Introduction to TCP, TCP service Model, TCP Header and segment structure, TCP connection establishment and release, transmission policy, timer management, Transactional TCP. Mobile TCP TCP Congestion Control: Fairness, TCP delay modeling.

Unit V

Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security. P2P File Sharing: Centralized Directory, Query flooding, exploiting heterogeneity.

Text/References:

1. Tanenbaum; Computer Network, 4th Ed., Pearson.
2. Kurose; Computer Networking, 3rd Ed., Pearson.
3. Peterson, Davie; Computer Networks, 4rd Ed., ELSEVIER

BTCS 602 Design and Analysis of Algorithms

Unit I

BACKGROUND: Review of Algorithm Complexity, Order Notations: definitions and calculating complexity. DIVIDE AND CONQUER METHOD: Binary Search, Merge Sort, Quick sort and Strassen's matrix multiplication algorithms. GREEDY METHOD: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees.

Unit II

DYNAMIC PROGRAMMING: Matrix Chain Multiplication. Longest Common Subsequence and 0/1 Knapsack Problem. BRANCH AND BOUND: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem.

Unit III

PATTERN MATCHING ALGORITHMS: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms. ASSIGNMENT PROBLEMS: Formulation of Assignment and Quadratic Assignment Problem.

Unit IV

RANDOMIZED ALGORITHMS. Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2- SAT. Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity assignment problems.

Unit V

PROBLEM CLASSES NP, NP-HARD AND NP-COMPLETE: Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Cook's Theorem. Proving NP-Complete Problems -

Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover and Set Cover Problem.

Text/References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.

Units Contents of the subject

2. Horowitz and Sahani: Fundamental of Computer algorithms.

3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley

BTCS 603 THEORY OF COMPUTATION

Unit I

Finite Automata & Regular Expression: Basic Concepts of finite state system, Deterministic and non-deterministic finite automation and designing regular expressions, relationship between regular expression & Finite automata minimization of finite automation mealy & Moore Machines.

Unit II

Regular Sets of Regular Grammars: Basic Definition of Formal Language and Grammars. Regular Sets and Regular Grammars, closure proportion of regular sets, Pumping lemma for regular sets, decision Algorithms for regular sets, Myhell_Nerod Theory & Organization of Finite Automata.

Unit III

Context Free Languages& Pushdown Automata: Context Free Grammars – Derivations and Languages – Relationship between derivation and derivation trees – ambiguity – simplification of CEG – Greiback Normal form – Chomsky normal forms – Problems related to CNF and GNF Pushdown Automata: Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Pushdown automata and CFL - pumping lemma for CFL - Applications of pumping Lemma.

Unit IV

Turing Machines: Turing machines – Computable Languages and functions – Turing Machine constructions – Storage in finite control – multiple tracks – checking of symbols – subroutines – two way infinite tape. Undecidability: Properties of recursive and Recursively

enumerable languages – Universal Turing Machines as an undecidable problem – Universal Languages – Rice's Theorems.

Unit V

Linear bounded Automata Context Sensitive Language: Chomsky Hierarchy of Languages and automata, Basic Definition & descriptions of Theory & Organization of Linear bounded Automata Properties of context-sensitive languages

Text/References

1. Aho, Hopcroft and Ullman, Introduction to Automata Theory, Formal Languages and Computation, Narosa
2. Cohen, Introduction to Computer Theory, Addison Wesley.
3. Papadimitriou, Introduction to Theory of Computing, Prentice Hall.

BTCS 604 Computer Graphics and Multimedia Techniques

Unit I

Introduction to Raster scan displays, Storage tube displays, refreshing, flicking, interlacing, color monitors, display processors, resolution, Introduction to Interactive. Computer Graphics: Picture analysis, Overview of programmer's model of interactive graphics, Fundamental problems in geometry. Scan Conversion: point, line, circle, ellipse polygon, Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm).

Unit II

2D & 3D Co-ordinate system: Homogeneous Co-ordinates, Translation, Rotation, Scaling, Reflection, Inverse transformation, Composite transformation. Polygon Representation, Flood Filling, Boundary filling. Point Clipping, Cohen-Sutherland Line Clipping Algorithm, Polygon Clipping algorithms.

Unit III

Hidden Lines & Surfaces: Image and Object space, Depth Buffer Methods, Hidden Facets removal, Scan line algorithm, Area based algorithms.Curves and Splines: Parametric and Non parametric Representations, Bezier curve, BSpline Curves.

Unit IV

Rendering: Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV

Unit V

Multimedia components, Multimedia Input/Output Technologies: Storage and retrieval technologies, Architectural and telecommunication considerations.Animation: Introduction, Rules, problems and Animation techniques.

Text/References:

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Pearson
2. Hearn and Baker: Computer Graphics, PHI
3. Multimedia Systems Design, Prabhat Andleigh and Thakkar, PHI.
4. Multimedia Information Networking, N.K.Sharda, PHI..

BTCS 605 Embedded System Design

Unit I

Introduction to embedded systems hardware needs; typical and advanced, timing diagrams, memories (RAM, ROM, EPROM). Tristate devices, Buses, DMA, UART and PLD's. Built-ins on the microprocessor.

Unit II

Interrupts basics, ISR;Context saving, shared data problem. Atomic and critical section, Interrupt latency. Survey of software architectures, Round Robin, Function queue scheduling architecture, Use of real time operating system.

Unit III

RTOS, Tasks, Scheduler, Shared data reentrancy, priority inversion, mutex binary semaphore and counting semaphore. Inter task communication, message queue, mailboxes and pipes, timer functions, events. Interrupt routines in an RTOS environment.

Unit IV

Embedded system software design using an RTOS. Hard real-time and soft real time system principles, Task division, need of interrupt routines, shared data.

Unit V

Embedded Software development tools. Host and target systems, cross compilers, linkers, locators for embedded systems. Getting embedded software in to the target system. Debugging techniques. Testing on host machine, Instruction set emulators, logic analysers. In-circuit emulators and monitors. Regional

Text/References:

1. John Davies MSP430, microcontroller basics Elsevier, 2008
2. Andrew Sloss et. Al. ARM System Developer's Guide - 1st Edition – Elsevier
3. Muhammad Ali Mazidi et.al. The microcontroller and embedded system pdf pearson
4. Embedded System Design: A Unified Hardware/Software Introduction, Frank Vahid and Tony Givargis *John Wiley*& Sons

BTCS 606A Advance Topics in Operating Systems

Unit I

ADVANCED TREES: Definitions, Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees. Dynamic Order Statistics, Interval Tree; Dictionaries.

Unit II

MERGEABLE HEAPS: Mergeable Heap Operations, Binomial Trees, Implementing Binomial Heaps and its Operations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap, Implementing Fibonacci Heap.

Unit III

GRAPH THEORY DEFINITIONS: Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut- Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs. GRAPH THEORY ALGORITHMS: Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph, Breadth First and Depth First Search,

Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.

Unit IV

SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting and merging network sorter. Priority Queues and Concatenable Queues using 2-3 Trees. Operations on Disjoint sets and its union-find problem, Implementing Sets.

Unit V

NUMBER THEORITIC ALGORITHM: Number theoretic notions, Division theorem, GCD, recursion, Modular arithmetic, Solving Modular Linear equation, Chinese Remainder Theorem, power of an element, Computation of Discrete Logarithms, primality Testing and Integer Factorization.

Text/References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.
2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley 4. Brassard : Fundamental of Algorithmics, PHI.

BTCS 606B Artificial Intelligence

Unit I

Meaning and definition of artificial intelligence, Various types of production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithms etc, and various types of control strategies.

Unit II

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and nonmonotonic reasoning.

Unit III

Probabilistic reasoning, Baye's theorem, semantic networks scripts schemas, frames, conceptual dependency and fuzzy logic, forward and backward reasoning.

Unit IV

Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding and natural languages processing.

Unit V

Introduction to learning, Various techniques used in learning, introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

Text/Reference Books :

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw
2. Introduction to AI & Expert System: Dan W. Patterson,
3. Artificial Intelligence by Luger (Pearson Education)
4. Russel & Norvig, Artificial Intelligence: A Modern Approach, Prentice-Hall

BTCS 606C Human Computer Interface

Unit I

The Human: input-output channels, Human memory, thinking, emotions, individual differences, psychology and the design of interactive systems.The Computer: Text entry devices with focus on the design of key boards, positioning, pointing and drawing, display devices. The Interaction: Models of interaction, ergonomics, interaction styles, elements of WIMP interfaces, interactivity, experience, engagement and fun. Paradigms for Interaction.

Unit II

Design Process: The process of design, user focus, scenarios, navigation design screen design and layout, iteration & prototyping. Usability Engineering Design rules: Principles to support usability, standards, guidelines, rules and heuristics, HCI patterns.

Unit III

Evaluation Techniques: Definition and goals of evaluation, evaluation through expert analysis and user participation, choosing an evaluation method.User support, requirement, approaches, adaptive help systems, designing user support systems

Unit IV

Cognitive methods: Goals and task hierarchies, linguistic models, challenges of display based systems, physical and device models, cognitive architectures.

Unit V

Communications and collaborations models: Face to Face communication, conversations, Text based communication, group working.Task Analysis: Differences between task analysis and other techniques, task decomposition, knowledge based analysis, ER based analysis, sources of information and data collection, use of task analysis.

Text/Reference Books :

1. Human Computer Interaction; Alan Dix et.al, 3rd ed., Pearson

BTCS 607 Java Programming Lab

1. Develop an in depth understanding of programming in Java: data types, variables, operators, operator precedence, Decision and control statements, arrays, switch statement, Iteration Statements, Jump Statements, Using break, Using continue, return.

2. Write Object Oriented programs in Java: Objects, Classes constructors, returning and passing objects as parameter, Inheritance, Access Control, Using super, final with inheritance Overloading and overriding methods, Abstract classes, Extended classes.

3. Develop understanding to developing packages & Interfaces in Java: Package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces.

4. Develop understanding to developing Strings and exception handling: String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class. Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally.

5. Develop applications involving file handling: I/O streams, File I/O.

6. Develop applications involving concurrency: Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, and Synchronization.

7. Develop applications involving Applet: Applet Fundamentals, using paint method and drawing polygons.

BTCS 608 Computer Graphics & Multimedia Lab

1 Implementation of Line, Circle and ellipse attributes

2 Two Dimensional transformations – Translation, Rotation, Scaling, Reflection, Shear

3 Composite 2D Transformations

4 Cohen Sutherland 2D line clipping and Windowing

5 Sutherland – Hodgeman Polygon clipping Algorithm

6 Three dimensional transformations – Translation, Rotation, Scaling

7 Composite 3D transformations

8 Drawing three dimensional objects and Scenes

9 Generating Fractal images

10 To plot a point (pixel) on the screen

11 To draw a straight line using DDA Algorithm

12 Implementation of mid-point circle generating Algorithm

13 Implementation of ellipse generating Algorithm

14 To translate an object with translation parameters in X and Y directions

15 To scale an object with scaling factors along X and Y directions

16 To rotate an object with a certain angle about origin

17 Perform the rotation of an object with certain angle about an arbitrary point

BTCS 609 Design and Analysis of Algorithms Lab.

Objectives: Upon successful completion of this course, students should be able to:

• Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains;

• Apply the algorithms and design techniques to solve problems;

• Analyze the complexities of various problems in different domains.

Suggested Tools: For implementation and estimation of running time on various sizes of input(s) or output(s) as the case may be, Linux platform is suggested.

Suggested Exercises:

A. It is expected that teachers will assign algorithms to the students for estimation of time & space complexity. Algorithms reported in various research journals may be chosen by the teachers.

B. Problem on designing algorithms to meet complexity constraints may be assigned. For example, a problem on design, analysis and implementation for transposing a sparse matrix requiring not more than one pass from the original matrix may be assigned.

C. A guide to such problems is given below:

1. Exploring a Binary Heap: Consider a binary heap containing n numbers (the root stores the greatest number). You are given a positive integer $k < n$ and a number x. You have to determine whether the kth largest element of the heap is greater than x or not. Your algorithm must take O(k) time. You may use O(k) extra storage.

2. Merging two search trees: You are given two height balanced binary search trees T and T', storing m and n elements respectively. Every element of tree T is smaller than every element of

tree T'. Every node u also stores height of the subtree rooted at it. Using this extra information how can you merge the two trees in time O(log m + log n) (preserving both the height balance and the order)?

3. Complete binary tree as an efficient data-structure: You are given an array of size n (n being a power of two). All the entries of the array are initialized to zero. You have to perform a sequence of the following online operations :

(i) Add(i,x) which adds x to the entry A[i].

(ii) Report sum(i,j) = sum of the entries in the array from indices i to j for any $0 < i < j <= n$.

It can be seen easily that we can perform the first operation in O(1) time whereas the second operation may cost O(n) in worst case. Your objective is to perform these operations efficiently. Give a data- structure which will guarantee O(log n) time per operation.

4. Problems on Amortized Analysis a. Delete-min in constant time!!! Consider a binary heap of size n, the root storing the smallest element. We know that the cost of insertion of an element in the heap is O(log n) and the cost of deleting the smallest element is also O(log n). Suggest a valid potential function so that the amortized cost of insertion is O(log n) whereas amortized cost of deleting the smallest element is O(1). b. Implementing a queue by two stack c. Show how to implement a queue with two ordinary stacks so that the amortized cost of each Enqueue and each Dequeue operation is O(1).

5. Computing a spanning tree having smallest value of largest edge weight: Describe an efficient algorithm that, given an undirected graph G, determines a spanning tree of G whose largest edge weight is minimum over all spanning trees of G.

6. Shortest Path Problems: i. From a subset of vertices to another subset of vertices a. Given a directed graph G(V,E), where edges have nonnegative weights. S and D are two disjoint subsets of the set of vertices. Give an O(|V| log |V| + |E|) time algorithm to find the shortest path among the set of paths possible from any node in S to any node in D. ii. Paths in Directed Acyclic Graph a. Counting the number of paths Given two nodes u,v in a directed acyclic graph G(V,E). Give an O(|E|) time algorithm to count all the paths from u to v.

b. Path passing through a subset of nodes Given two nodes u,v and a set of vertices w1, w2,...,wk in a directed acyclic graph G(V,E). Give an O(|E|) time algorithm to output a path(if exists) from u to v which passes through each of the nodes w1,...,wk. If there is no such path then your algorithm must report that "no such path exists".

7.Searching for a friend: You are standing at a crossing from where there emerge four roads extending to infinity. Your friend is somewhere on one of the four roads. You do not know on which road he is and howf ar hei sf rom you. You have to walk to your friend and the total distance traveled by you must be at most a constant times the actual distance of your friend from you. In terminology of algorithms, you should traverse O(d) distance, where d is the distance of your friend from you.

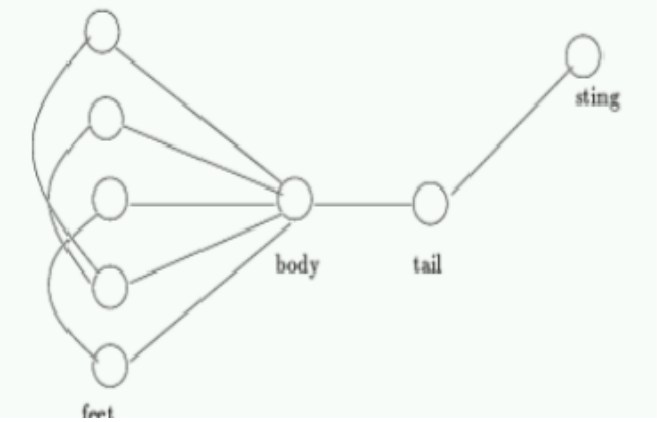
8.A simple problem on sorted array: Design an O(n)-time algorithm that, given a real number x and a sorted array S of n numbers, determines whether or not there exist two elements in S whose sum is exactly x .

9. Finding the decimal dominant in linear time: You are given n real numbers in an array. A number in the array is called a decimal dominant if it occurs more than n/10 times in the array. Give an O(n) time algorithm to determine if the given array has a decimal dominant.

10. Finding the first one: You are given an array of infinite length containing zeros followed by ones. How fast can you locate the first one in the array?

11. Searching for the Celebrity: Celebrity is a person whom everybody knows but he knows nobody. You have gone to a party. There are total n persons in the party. Your job is to find the celebrity in the party. You can ask questions of the form Does Mr. X know Mr. Y ?. You will get a binary answer for each such question asked. Find the celebrity by asking only O(n) questions.

12. Checking the Scorpion: An n-vertex graph is a scorpion if it has a vertex of degree 1(the sting) connected to a vertex of degree two (the tail) connected to a vertex of degree n-2 (the body) connected to the other n-3 (the feet). Some of the feet may be connected to other feet. Design an algorithm that decides whether a given adjacency matrix represents a scorpion by examining only O(n) entries.



13.Endless list: You are having a pointer to the head of singly linked list. The list either terminates at null pointer or it loops back to some previous location(not necessarily to the head of the list). You have to determine whether the list loops back or ends at a null location in time proportional to the length of the list. You can use at most a constant amount of extra storage.

14. Nearest Common Ancestor: Given a rooted tree of size n. You receive a series of online queries: "Give nearest common ancestor of u, v ". Your objective is to preprocess the tree in O(n) time to get a data structure of size O(n) so that you can answer any such query in O(log n) time.

BTCS 610 Embedded System Design Lab.

Course Objectives Upon successful completion of the course, students will be able to design simple embedded systems and develop related software. Students also learn to work in a team environment and communicate the results as written reports and oral presentations.
Suggested Microcontroller Platform: Texas Instruments MSP430, ARM 9, 68HC12, 8051.

It is assumed that there are 14 weeks in the semester and about 5 to 6 experiments will be carried out. More experiments are provided to bring in variation.

1. Get familiar with the microcontroller kit and the development software. Try the sample programs that are supplied to get familiar with the Microcontroller.
2.

a) Blink an LED which is connected to your microcontroller using the built-in timer in the microcontroller. Assume that the LED should be on for x milliseconds and off for y milliseconds; assume that these values are stored in memory locations X and Y. We should be able to change the value of x and y and rerun the program.

b) Consider an alternate way to program this application. Here, the microcontroller turns the LED on and waits in a busy loop to implement a delay of x milliseconds. Then it turns the LED off and waits in a busy loop to implement a delay of y milliseconds. How do you compare these two solutions?

3. Assume that in Experiment #1, the values of x and y have been chosen to be 200 and 500 respectively. When the LED blinking program runs, pressing a key on the keyboard should generate an interrupt to the microcontroller. If the key that has been pressed is a numeric key, the value of x and y must be interchanged by the interrupt service routine. If the key that has been pressed is not a numeric key, then the LED must be turned off for 2 seconds before resuming the blinking.
4. If your microcontroller kit has an LCD interface, write a program to display a character string on the LCD. Assume that the string is stored at a location
5. STRING and consists of alphanumeric characters. The string is null- terminated. Modify your program to scroll the displayed string from left to right.
6. Modern microcontrollers usually have an in-built Digital-to-Analog and Analog- to-Digital converter. Use the built-in DAC to generate voltage waveforms such as (a) pulse train (b) triangular waveform (c) sinusoidal waveform. Observe these waveforms on an oscilloscope.
7. Your microcontroller may have a built-in temperature sensor. If not, interface an external temperature sensor to the microcontroller. Write a program to take several measurements of temperature at regular intervals and display the average temperature on the LCD display. Test if the readings change when the ambient temperature changes.
8. Your microcontroller may have a built-in ADC. Build a voltmeter that can measure stable voltages in a certain range. The measured value must be displayed on the LCD display. Measure the same voltage using a multimeter and record the error in measurement. Tabulate the error for several values of the voltage.
9. Build a simple security device based on the microcontroller kit. Interface an external motion sensor to the microcontroller. An alarm must be generated if motion is sensed in a

specified region. There must be a provision to record the time at which the intrusion was detected. Similarly, there must be a provision to turn the alarm off by pressing a key.

10. A voltage waveform v(t) is available as an input to the microcontroller. We must continuously check the waveform and record the maximum value of the waveform and display the maximum value on the LCD display. Test the program by using a DC supply to generate v(t) and varying the DC value.

BTCS 611 Humanities and Social Sciences

1. India-brief history of Indian constitution ,framing-features fundamental rights,duties,directive principles of states,History of Indian National movement,Socio economic growth after independence.
2. Society-Social groups-concepts and types,socialization-concept theory,social control:concept,social problem in contempory India,status and role.
3. The fundamental of Economics-meaning,definition animportance of economics,Logic of choice,central economic problems,positive and normative approaches,economic systemssocialism and capitalism.
4. Microeconomics-Law of demand and supply,utility approach,indifferencecurves,elasticity of demand & supply and applications,consumer surplus,Law of returns to factors and returns to scale.
5. Macroeconomics- concept relating to National product-National income and its measurement,simple Keynesian theory,simple multiplier, money and

banking.Meaning,concept of international trade,determination of exchange rate,Balance of payments.

References: 1. Economics-Lipsey & Chrystal, Oxford Univ.Press,2010 Nordhaus, William, Samuelson,Paul-2009-10

Semester - VII

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 701	Cloud Computing	3	1	-	30	70	100	4
BTCS 702	Information System Security	3		-	30	70	100	3
BTCS 703	Data Mining & Warehouse	3	1	-	30	70	100	4
BTCS 704	Computer Aided Design for VLSI	3	1	-	30	70	100	4
BTCS 705	Compiler Construction	3	-	-	30	70	100	3
ELECTIVE(ANY ONE)								
BTCS 706A	Advance Data Base Management Systems	3	-	-	30	70	100	3
BTCS 706B	Robotics	3	-	-	30	70	100	3
BTCS 706C	Data Compression Techniques	3	-	-	30	70	100	3

PRACTICALS/VIVA-VOCE					Sessional	Practical	Total	Credits
BTCS 707	Web Development Lab			2	30	20	50	1
BTCS 708	VLSI Physical Design Lab			2	30	20	50	1
BTCS 709	Compiler Design Lab			2	30	20	50	1
BTCS 710	Project-I			2	30	20	50	1
BTCS 711	Practical Training*			2	30	20	50	1
BTCS 712	Discipline & Extra Curricular Activities					50	50	1
TOTAL		**18**	**3**	**10**	**330**	**570**	**900**	**27**

BTCS 701 Cloud Computing

Unit I

Introduction Cloud Computing: Nutshell of cloud computing, Enabling Technology, Historical development, Vision, feature Characteristics and components of Cloud Computing. Challenges, Risks and Approaches of Migration into Cloud. Ethical Issue in Cloud Computing, Evaluating the Cloud's Business Impact and economics, Future of the cloud. Networking Support for Cloud Computing. Ubiquitous Cloud and the Internet of Things.

Unit II

Cloud Computing Architecture: Cloud Reference Model, Layer and Types of Clouds, Services models, Data center Design and interconnection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Fractures of cloud programming, Parallel and distributed programming paradigms-MapReduce, Hadoop , High level Language for Cloud. Programming of Google App engine.

Unit III

Virtualization Technology: Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms , Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server , Desktop, Network, and Virtualization of data-center.

Unit IV

Securing the Cloud : Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture . Legal issues in cloud Computing.
Data Security in Cloud: Business Continuity and Disaster Recovery , Risk Mitigation , Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management.

Unit V
Cloud Platforms in Industry: Amazon web services , Google AppEngine, Microsoft Azure Design, Aneka: Cloud Application Platform -Integration of Private and Public Clouds
Cloud applications: Protein structure prediction, Data Analysis, Satellite Image Processing, CRM and ERP ,Social networking . Cloud Application- Scientific Application, Business Application. *Advance Topic in Cloud Computing:* Federated Cloud/InterCloud, Third Party Cloud Services.

Text/ Reference Books:

- " Distributed and Cloud Computing " By Kai Hawang , Geofrey C.Fox, Jack J. Dongarra Pub: Elservier
- Cloud Computing ,Principal and Paradigms, Edited By Rajkumar Buyya, Jemes Broberg, A. Goscinski,
- Pub.- Wiley
- Kumar Saurabh, "Cloud Computing" , Wiley Pub
- Krutz , Vines, "Cloud Security " , Wiley Pub
- Velte, "Cloud Computing- A Practical Approach" ,TMH Pub

BTCS 702 Information System Security

UNIT I
Introduction to security attacks, services and mechanism, classical encryption techniques-substitution ciphers and transposition ciphers, cryptanalysis, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), differential and linear cryptanalysis of DES, block cipher modes of operations, triple DES.

UNIT II
AES, RC6, random number generation. S-box theory: Boolean Function, S-box design criteria, Bent functions, Propagation and nonlinearity, construction of balanced functions, S-box design.

UNIT III
Public Key Cryptosystems: Principles of Public Key Cryptosystems, RSA Algorithm, security analysis of RSA, Exponentiation in Modular Arithmetic. Key Management in Public Key Cryptosystems: Distribution of Public Keys, Distribution of Secret keys using Public Key Cryptosystems. X.509 Discrete Logarithms, Diffie-Hellman Key Exchange.

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

Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm. Remote user Authentication using symmetric and Asymmetric Authentication.

UNIT V

Pretty Good Privacy. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload in Transport and Tunnel mode with multiple security associations (Key Management not Included). Strong Password Protocols: Lamport's Hash, Encrypted Key Exchange.

Text/ Reference Books:

- Stalling Williams: Cryptography and Network Security: Principles and Practices, 4th Edition,
  Pearson Education, 2006.
- Kaufman Charlie et.al; Network Security: Private Communication in a Public World, 2nd Ed., PHI/Pearson.
- Pieprzyk Josef and et.al; Fundamentals of Computer Security, Springer-Verlag, 2008.
- Trappe & Washington, Introduction to Cryptography, 2nd Ed. Pearson.

BTCS 703 Data Mining & Ware Housing

UNIT I

Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

UNIT II

Concept Description: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases.

UNIT III

What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward

Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis.

UNIT IV

Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.

UNIT V

Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

Text/ Reference Books:

- Data Warehousing in the Real World – Anahory and Murray, Pearson Education.
- 2. Data Mining – Concepts and Techniques – Jiawai Han and Micheline Kamber.
- Building the Data Warehouse – WH Inmon, Wiley.

BTCS 704 Computer Aided Design for VLSI

UNIT I

Complexity in microelectronic circuit design and Moore's Law, design styles -Fullcustom design, standard-cell design, Programmable Logic Devices, Field Programmable Gate Arrays, Design Stages, Computer-Aided Synthesis and Optimizations, design flow and related problems.

UNIT II

Boolean functions and its representations – co-factor, unite, derivatives, consensus and smoothing; tabular representations and Binary Decision Diagram (BDD), OBDD, ROBDD and Bryant's reduction algorithm and ITE algorithm. Hardware abstract models – structures and logic networks, State diagram, data-flow and sequencing graphs, hierarchical sequencing graphs. Compilation and behavioral optimizations.

UNIT III

Architectural Synthesis – Circuit description and problem definition, temporal and spatial domain scheduling, synchronization problem. Scheduling algorithms – ASAP and ALAP scheduling algorithms, scheduling under constraints, relative scheduling, list scheduling heuristic. Scheduling in pipelined circuits.

UNIT IV

Resource Sharing & Binding in sequencing graphs for resource dominated circuits, sharing of registers and busses; binding variables to registers. Two-level logic optimization principles – definitions and exact logic minimizations. Positional cube notations, functions with multi-valued logic. List-oriented manipulations.

UNIT V

Physical Design. Floor planning – goals and objectives. Channel definition, I/O and power planning. Clock Planning. Placement – goals and objectives. Placement algorithms. Iterative improvement algorithms. Simulated Annealing. Timing-driven Placement. Global routing – goals and objectives. Global routing methods. Timingdriven global routing. Detailed Routing – goals and objectives. Left-edge algorithm. Constraints and routing graphs. Channel routing algorithms. Via minimization. Clock routing, power routing, circuit extraction and Design Rule Checking.

Text/ Reference Books:

- S.H. Gerez. Algorithms VLSI Design Automation. Wiley India. (Indian edition available.)
- Michael John Sebastian Smith. Application-Specific Integrated Circuits. Addison-Wesley.
- (Low-priced edition is available.)
- G.D. Micheli, Synthesis and optimization of digital circuits, TMH.
- http://www.fie-conference.org/fie98/papers/1002.pdf
- S. Sait and H. Youssef. VLSI Physical Design Automation: Theory and Practice.

BTCS 705 Compiler Construction

UNIT I

Compiler, Translator, Interpreter definition, Phase of compiler introduction to one pass & Multipass compilers, Bootstrapping, Review of Finite automata lexical analyzer, Input, buffering, Recognition of tokens, Idea about LEX: A lexical analyzer generator, Error handling.

UNIT II

Review of CFG Ambiguity of grammars, Introduction to parsing. Bottom up parsing, Top down parsing techniques, Shift reduce parsing, Operator precedence parsing, Recursive descent parsing predictive parsers. LL grammars & passers error handling of LL parser. LR parsers, Construction of SLR, Conical LR & LALR parsing tables, parsing with ambiguous grammar. Introduction of automatic parser generator: YACC error handling in LR parsers.

UNIT III

Syntax directed definitions; Construction of syntax trees, L-attributed definitions, Top down translation. Specification of a type checker, Intermediate code forms using postfix notation and three address code, Representing TAC using triples and quadruples, Translation of assignment statement. Boolean e xpression and control structures.

UNIT IV

Storage organization, Storage allocation, Strategies, Activation records, Accessing local and non local names in a block structured language, Parameters passing, Symbol table organization, Data structures used in symbol tables.

UNIT V
Definition of basic block control flow graphs, DAG representation of basic block, Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code generation from DAG.

Text/ Reference Books:

- Aho, Ullman and Sethi: Compilers, Addison Wesley.
- Holub, Compiler Design in C, PHI.

BTCS 706A Advance DataBase Management Systems

UNIT I
Query Processing and Optimization: Overview of Relational Query Optimization, System Catalog in a Relational DBMS, Alternative Plans, Translating SQL, Queries into Algebra, Estimating the Cost of a Plan, Relational Algebra Equivalences, Enumeration of Alternative Plans. [2]

UNIT II
Object Database Systems: Motivating Examples, Structured Data Types, Operations On Structured Data, Encapsulation and ADT's, Inheritance, Objects, OIDs and Reference Types, Database Design for an ORDBMS, ORDBMS Implementation Challenges, ORDBMS, Comparing RDBMS, OODBMS, and ORDBMS.

UNIT III
Parallel and Distributed Databases: Architectures for Parallel, Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Parallel Query Optimization, Distributed DBMS Architectures, Storing Data in a Distributed DBMS, Distributed Catalog Management, Distributed Query Processing, Updating Distributed Data, Introduction to Distributed Transactions, Distributed Concurrency Control, Distributed Recovery. [2]

UNIT IV

Database Security and Authorization: Introduction to Database Security, Access Control, Discretionary Access Control- Grant and Revoke on Views and Integrity Constraints, Mandatory Access Control- Multilevel Relations and Polyinstantiation, Covert Channels, DoD Security Levels, Additional Issues Related to Security- Role of the Database Administrator, Security in Statistical Databases, Encryption. [2]

UNIT V

POSTGES: POSTGRES user interfaces, sql variations and extensions, Transaction Management, Storage and Indexing, Query processing and optimizations, System Architectures. XML: Motivation, Structure of XML data, XML Document Schema, Querying and Transformation, Application Program Interface to XML, Storage of XML Data, XML applications. [2]

Text/ Reference Books:

- Elmasri R and Navathe SB, Fundamentals of Database Systems, 3rd Edition, Addison Wesley,2000.
- Connolly T, Begg C and Strachan A, Database Systems, 2nd Edition, Addison Wesley, 1999
- Ceri Pelagatti , Distributed Database: Principles and System - (McGraw Hill)
- Simon AR, Strategic Database Technology: Management for the Year 2000, Morgan Kaufmann, 1995
- A. Silversatz, H. Korth and S. Sudarsan: Database Cocepts 5th edition, Mc-Graw Hills 2005.

BTCS 706B Robotics

UNIT I

Introduction -- brief history, types, classification and usage, Science and Technology of robots, Some useful websites, textbooks and research journals.

UNIT II

Elements of robots -- joints, links, actuators, and sensors Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors

UNIT III

Introduction, Direct and inverse kinematics problems, Examples of kinematics of common serial manipulators, workspace of a serial robot, Inverse kinematics of constrained and redundant robots, Tractrix based approach for fixed and free robots and multi-body systems, simulations and experiments, Solution procedures using theory of elimination, Inverse kinematics solution for the general 6R serial manipulator.

UNIT IV

Degrees-of-freedom of parallel mechanisms and manipulators, Active and passive joints, Constraint andloop-closure equations, Direct kinematics problem, Mobility of parallel manipulators, Closed-from and numerical solution, Inverse kinematics of parallel manipulators and mechanisms, Direct kinematics of Gough-Stewart platform.

UNIT V

Linear and angular velocity of links, Velocity propagation, Manipulator Jacobians for serial and parallel manipulators, Velocity ellipse and ellipsoids, Singularity analysis for serial and parallel manipulators, Loss and gain of degree of freedom, Statics of serial and parallel manipulators, Statics and force transformation matrix of a Gough-Stewart platform, Singularity analysis and statics.

Text/ Reference Books:

- Mittal and Nagrath, Robotics and Control, Tata McGraw-Hill Education, 2003.
- Fred G. Martin, Robotic Explorations: A Hands On Introduction to Engineering, Pearson Education, 2001.

BTCS 706C Data Compression Techniques

UNIT I

Compression Techniques: Lossless, lossy, measure of performance, modeling & coding. Lossless compression: Derivation of average information, data models, uniquely decodable codes with tests, prefix codes, Kraft-Mc Millan inequality. Huffman coding: Algorithms, minimum variance Huffman codes, optimality, length extended codes, adaptive coding, Rice codes, using Huffman codes for lossless image compression.

UNIT II

Arithmetic coding with application to lossless compression. Dictionary Techniques: LZ77, LZ78, LZW Predictive coding: Burrows-Wheeler Transform and move-to-front coding, JPEG-LS Facsimile Encoding: Run length, T.4 and T.6

UNIT III

Lossy coding- Mathematical preliminaries: Distortion criteria, conditional entropy, average mutual information, differential entropy, rate distortion theory, probability and linear system models. Scalar quantization: The quantization problem, uniform quantizer, Forward adaptive quantization, non-uniform quantization-Formal adopting quantization, companded Quantization Vector quantization: Introduction, advantages, The Linde-Ruzo-Grey algorithm, lattice vector quantization.

UNIT IV

Differential encoding – Introduction, Basic algorithm, Adaptive DPCM, Delta modulation, speech and image coding using delta modulation. Sampling in frequency and time domain, z-transform, DCT, DST, DWHT, quantization and coding of transform coefficient.

UNIT V

Sub band coding: Introduction, Filters, Basic algorithm, Design of Filter banks, G.722, MPEG. Wavelet based compression: Introduction, wavelets multi-resolution analysis and the scaling function implementation using filters.

Text/ Reference Books:

- Sayood K: Introduction to Data Compression: ELSEVIER 2005.

BTCS 707 Web Development Lab

1. Creation of HTML Files
2. Working with Client Side Scripting : VBScript, JavaScript
3. Configuration of web servers: Apache Web Server, Internet Information Server (IIS)
4. Working with ActiveX Controls in web documents
5. Experiments in Java Server Pages: Implementing MVC Architecture using Servlets, Data Access
6. Programming (using ADO), Session and Application objects, File System Management
7. Working with other Server Side Scripting: Active Server Pages, Java Servlets, PHP
8. Experiments in Ajax Programming
9. Developing Web Services
10. Developing any E-commerce application (Mini Project)
11. Application Development in cloud computing Environment
12. Experiment Using Open Source Tool e.g. ANEKA

BTCS 708 VLSI Physical Design Lab

VLSI Physical Design Automation is essentially the research, development and productization of algorithms and data structures related to the physical design process. The objective is to investigate optimal arrangements of devices on a plane (or in three dimensions) and efficient interconnection schemes between these devices to obtain the desired functionality and performance. Since space on a wafer is very expensive real estate, algorithms must use the space very efficiently to lower costs and improve yield. In addition, the arrangement of devices plays a key role in determining the performance of a chip. Algorithms for physical design must also ensure that the layout generated abides by all the rules required by the fabrication process. Fabrication rules establish the tolerance limits of the fabrication process. Finally, algorithms must be efficient and should be able to handle very large designs. Efficient algorithms not only lead to fast turn-around time, but also permit designers to make iterative improvements to the layouts. The VLSI physical design process manipulates very simple geometric objects, such as polygons and lines. As a result, physical design algorithms tend to be very intuitive in nature, and have significant overlap with graph algorithms and combinatorial optimization algorithms. In view of this observation, many consider physical design automation the study of graph theoretic and combinatorial algorithms for manipulation of geometric objects in two and three dimensions. However, a pure geometric point of view ignores the electrical (both digital and analog) aspect of the physical design problem. In a VLSI circuit, polygons and lines have inter-related electrical properties, which exhibit a very complex behavior and depend on a host of variables. Therefore, it is necessary to keep the electrical aspects of the geometric objects in

perspective while developing algorithms for VLSI physical design automation. With the introduction of Very Deep Sub-Micron (VDSM), which provides very small features and allows dramatic increases in the clock frequency, the effect of electrical parameters on physical design will play a more dominant role in the design and development of new algorithms.

(Source: Algorithms For VLSI Physical Design Automation, by Naveed A. Sherwani).

The exercise should be such that the above objectives are met.
Automation tools such as Synopsis/ Cadence are available in the area. However, to begin, the students shall be assigned exercises on route optimization, placement & floor planning. Small circuits may be taken & algorithms implemented. At a later stage, the students may use tools and design more complex circuits.

BTCS 709 Compiler Design Lab

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Develop an in depth understanding of system programming concept. Lexical analysis, syntax analysis, semantics analysis, code optimization, code generation. Language specification and processing
2. Develop an Understanding of Scanning by using concept of Finite state automaton. Parse tree and syntax tree, Top down parsing (recursive decent parsing, LL (1) parser) Bottom up parsing (operator precedence parsing) .Managing symbol table, opcode table, literal table, pool table
3. Develop an Understanding of Intermediate code form: Three address code, Polish notation (Postfix strings)
4. Develop an Understanding of Allocation data structure. Heaps
5. Develop an Understanding about Language processor development tools: LEX, YACC.

Language processing activities (Program generation and execution)

It is expected that each laboratory assignments to given to the students with an aim to In order to

achieve the above objectives

Indicative List of exercises:

1. Write grammar for a fictitious language and create a lexical analyzer for the same.
2. Develop a lexical analyzer to recognize a few patterns in PASCAL and C (ex: identifiers, constants, comments, operators etc.)
3. Write a program to parse using Brute force technique of Top down parsing
4. Develop on LL (1) parser (Construct parse table also).
5. Develop an operator precedence parser (Construct parse table also)
6. Develop a recursive descent parser
7. Write a program for generating for various intermediate code forms

i) Three address code ii) Polish notation

8. Write a program to simulate Heap storage allocation strategy
9. Generate Lexical analyzer using LEX
10. Generate YACC specification for a few syntactic categories
11. Given any intermediate code form implement code optimization techniques

Reference

V.V Das, Compiler Design using FLEX and YACC, PHI

Semester – VIII

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCS 801	Mobile Computing	3	1	-	30	70	100	4
BTCS 802	Digital Image Processing	3	1	-	30	70	100	4
BTCS 803	Distributed Systems	3	-	-	30	70	100	3
Elective(open) (any one)								
BTCS 804A	Hardware Testing & Fault Tolerance	3	-	-	30	70	100	3
BTCS 804B	Real Time Systems	3	-	-	30	70	100	3
BTCS 804C	Information Retrieval	3	-	-	30	70	100	3

PRACTICALS/VIVA-VOCE					Sessional	Practical	Total	Credits
BTCS 805	Unix Network Programming & Simulation Lab	-	-	2	30	20	50	1
BTCS 806	FPGA Lab.	-	-	2	30	20	50	1
BTCS 807	Digital Image Processing lab	-	-	2	30	20	50	1
BTCS 808	Project-II			2	150	100	250	5
BTCS 809	Seminar			2	30	20	50	1
BTCS 810	Discipline & Extra Curricular Activities					50	50	1
TOTAL		**12**	**2**	**10**	**390**	**510**	**900**	**24**

BTCS 801 Mobile Computing

UNIT-I

Mobile computing: Definitions, adaptability issues (transparency, Environmental Constraints, application aware adaptation), mechanisms for adaptation and incorporating adaptations. Mobility management: mobility management, location management principle and techniques, PCS location management Scheme.

UNIT-II

Data dissemination and management: challenges, Data dissemination, bandwidth allocation for publishing, broadcast disk scheduling, mobile cache maintenance schemes, Mobile Web Caching. Introduction to mobile middleware.

UNIT-III

Middleware for application development: adaptation, Mobile agents. Service Discovery Middleware: Service Discovery & standardization Methods (universally Unique Identifiers,

Textual Description & using interfaces), unicast Discovery, Multicast Discovery & advertisement, service catalogs, Garbage Collection, Eventing.

UNIT-IV

Mobile IP, Mobile TCP, Database systems in mobile environments, World Wide Web and mobility

UNIT-V

Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Text/References:

1. Frank Adelstein, Sandeep Gupta, Golden Richard III, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, TMH.

2. Principles of mobile computing Hansmann & Merk., Springer

3. Mobile communications Jochen Schiller , Pearson

4. 802.11 wireless networks Matthew S.Gast, O'REILLY.

5. Wireless LANs: Davis & McGuffin, McGraw Hill

6. Mobile Communications Handbook by Jerry D. Gybson

7. Mobile Communications Handbook by R

BTCS 802 Digital Image Processing

UNIT-I

Introduction to Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation

UNIT-II

Image Transformation & Filtering: Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms

UNIT-III

Image Restoration: Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering

UNIT-IV

Image Compression: Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression

UNIT-V

Image Segmentation & Representation: Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors, Regional

References:

1. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992. Boyle and Thomas: Computer Vision - A First Gurse 2nd Edition, ISBN 0-632-028-67X, Blackwell Science 1995.

2. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.

3. Pakhera Malay K: Digital Image Processing and Pattern Recogination, PHI.

4. Trucco&Verri: Introductory Techniques for 3-D Computer Vision, Prentice Hall, Latest Edition

5. Low: Introductory Computer Vision and Image Processing, McGraw-Hill 1991, ISBN 0-07-707403-3

BTCS 803 Distributed Systems

UNIT-I

Distributed Systems: Features of distributed systems, nodes of a distributed system, Distributed computation paradigms, Model of distributed systems, Types of Operating systems: Centralized Operating System, Network Operating Systems, Distributed Operating Systems and Cooperative Autonomous Systems, design issues in distributed operating systems. Systems Concepts and Architectures: Goals, Transparency, Services, Architecture Models, Distributed Computing Environment (DCE).Theoretical issues in distributed systems: Notions of time and state, states and events in a distributed system, time, clocks and event precedence, recording the state of distributed systems.

UNIT-II

Concurrent Processes and Programming: Processes and Threads, Graph Models for Process Representation, Client/Server Model, Time Services, Language Mechanisms for Synchronization, Object Model Resource Servers, Characteristics of Concurrent Programming Languages (Language not included).Inter-process Communication and Coordination: Message Passing, Request/Reply and Transaction Communication, Name and Directory services, RPC and RMI case studies.

UNIT-III

Distributed Process Scheduling: A System Performance Model, Static Process Scheduling with Communication, Dynamic Load Sharing and Balancing, Distributed Process Implementation.Distributed File Systems: Transparencies and Characteristics of DFS, DFS Design and implementation, Transaction Service and Concurrency Control, Data and File Replication. Case studies: Sun network file systems, General Parallel file System and Window's file systems. Andrew and Coda File Systems

UNIT-IV

Distributed Shared Memory: Non-Uniform Memory Access Architectures, Memory Consistency Models, Multiprocessor Cache Systems, Distributed Shared Memory, Implementation of DSM systems. Models of Distributed Computation: Preliminaries, Causality, Distributed Snapshots, Modeling a Distributed Computation, Failures in a Distributed System, Distributed Mutual Exclusion, Election, Distributed Deadlock handling, Distributed termination detection.

UNIT-V

Distributed Agreement: Concept of Faults, failure and recovery, Byzantine Faults, Adversaries, Byzantine Agreement, Impossibility of Consensus and Randomized Distributed Agreement. Replicated Data Management: concepts and issues, Database Techniques, Atomic Multicast, and Update Propagation. CORBA case study: Introduction, Architecture, CORBA RMI, CORBA Services.

Text Books:

1. Distributed operating systems and algorithm analysis by Randy Chow and T. Johnson, Pearson

2. Operating Systems A concept based approach by DM Dhamdhere, TMH

3. Distributed Systems- concepts and Design, Coulouris G., Dollimore J, and Kindberg T., Pearson

BTCS 804A Hardware Testing and Fault Tolerance

UNIT-I

Overview of hardware testing. Reliability and Testing, Difference between Verification and Testing, Concepts of fault models, test pattern generation and fault coverage. Types of tests – exhaustive testing, pseudo-exhaustive testing, pseudo-random testing, and deterministic testing. Test Application. Design for Test. Testing Economics. Defects, Failures and Faults. How are physical defects modeled as faults. Stuck-at faults, Single stuck-at-faults multiple stuck-at faults, bridging faults, delay faults, transient faults

UNIT-II

Relation between VLSI Design and Testing. a) Design Representation for the purpose of testing – Representation in the form of mathematical equations, tabular format, graphs, Binary Decision Diagrams, Netlists, or HDL descriptions. b) Recap of VLSI Design Flow and where testing fits in the flow. Importance of Simulation and Fault Simulation. Compiled and event-driven simulation. Parallel and deductive fault simulation. Using fault simulation to estimate fault coverage and building a fault dictionary

UNIT-III

Combinational Test Pattern Generation. D-algorithm. Critical Path Tracking. PODEM algorithm for test generation. Testing sequential circuits. Functional and deterministic ATPG for sequential circuits and the associated challenges. Motivation for Design for Testability. Test Points, Partitioning for Testability. Scan Testing. Scan Architectures. Cost of Scan Testing. Boundary Scan Testing. Board-level testing. Boundary-scan Architecture and various modes of operation

UNIT-IV

a) Built-in Self Test. Pseudo-random test generation. Response Compaction. Random pattern-resistant faults. BIST architectures – Circular BIST, BILBO, STUMPS. b) Testing of Memories – Fault models, Functional tests for memories, Memory BIST. c) Testing of microprocessors.

UNIT-V

Hardware fault tolerance. Failure Rate, Reliability, Mean Time to Failure. Different kinds of redundancy schemes for fault-tolerance (Space, Time, and Information Redundancy). Nmodular Redundancy. Watch Dog Processors, Byzantine Failures. Information Redundancy – parity codes, checksums, m-of-n codes. RAID architectures for disk storage systems. Fault tolerance in interconnection networks. Fault-tolerant routing techniques.

Text Book:

1. Samiha Mourad and Yervant Zorian. Principles of Electronic Systems. Wiley Student Editon. [Available in Indian Edition].

2. Koren and C. Mani Krishna. Fault-Tolerant Systems. Elsevier. (Indian Edition Available.)

Text/References:

1. Abramovici, M., Breuer, M. A. and Friedman, A. D. Digital systems testing and testable design. IEEE press (Indian edition available through Jayco Publishing house), 2001.

2. Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits by Bushnell and Agrawal, Springer, 2000.

BTCS 804B Real Time System

UNIT-I

Introduction: Definition, Typical Real Time Applications, concept of tasks, types of tasks and real time systems, block diagram of RTS, and tasks parameters -Release Times, execution time, period, Deadlines, and Timing Constraints etc. RTS requirements.

UNIT-II

Reference Models for Real Time Systems: processors and Resources, Temporal Parameters of Real-Time Workload, Periodic and Aperiodic Task Model, Precedence Constrains and Data Dependency, Other Types of Dependencies, Functional Parameters, Resource Parameters. Real Time Scheduling: classification of Real Time Scheduling, scheduling criteria, performance metrics, schedulability analysis, Introduction to Clock Driven scheduling, Weighted Round Robin Approach and Priority Driven Approach. Dynamic Versus Static systems, Offline Versus Online Scheduling.

UNIT-III

Periodic tasks scheduling: Clock Driven Scheduling – definition, notations and assumption, scheduler concepts, general scheduling structure, cyclic executives. Priority Driven Scheduling; notations and assumption, fixed priority verses dynamic priority, fixed priority scheduling algorithms (RM and DM) and their schedulability analysis, concept of schedulability tests – Inexact and exact schedulability tests for RM and DM, Optimality of the RM and DM algorithms, practical factors.

UNIT-IV

Aperiodic task scheduling; assumption and approaches, server based and non-server based fixed priority scheduling algorithms – polling server, deferrable server , simple sporadic server, priority exchange, extended priority exchange, slack stealing. Introduction to scheduling of flexible computations –flexible applications, imprecise computation model and firm deadline model.

UNIT-V

Resources Access Control: Assumptions on Resources and their usage, Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, priority inversion problem, need of new resource synchronization primitives/protocols for RTS, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority- Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in MultipleUnit Resources, Controlling Concurrent Accesses to Data Objects

Text & References:

1. J.W.S.Liu: Real-Time Systems, Pearson Education Asia

2. P.D.Laurence, K.Mauch: Real-time Microcomputer System Design, An Introduction, McGraw Hill

3. C.M. Krisna & K. G. Shim- Real time systems- TMH

BTCS 804C Information Retrieval

UNIT-I

Knowledge Representation: Knowledge representation, Basics of Prepositional logic, Predicate logic, reasoning using first order logic, unification, forward chaining, backward chaining, resolution Production rules, frames, semantic networks scripts.

UNIT-II

Ontology Development: Description logic-taxonomies, Topic maps Ontology, Definition expressing ontology, logically ontology representations, – XML, RDF, RDFS, OWL, OIL, ontology development for specific domain, ontology engineering, Semantic web services.

UNIT-III

Information Retrieval Modeling: Information retrieval, taxonomy, formal characterization, classic information retrieval, set theoretic model, algebraic model, probabilistic model, structured text, retrieval models, models for browsing, retrieval performance evaluation, keyword based querying, pattern matching, structural queries, query operations.

UNIT-IV

Text and Multimedia Languages and Properties: Introduction, metadata, markup languages, multimedia. Text operations: document preprocessing, document clustering text Compressionbasic concepts - statistical methods. Indexing and searching: inverted files, suffix trees, signature file, Boolean queries, sequential searching, pattern matching.

UNIT-V

Recent Trends in IR: Parallel and distributed IR, multimedia IR, data modeling, query languages, A generic Multimedia indexing Approach, one dimensional time series, two dimensional color images, Automatic feature extraction. Web Searching, Characterizing the Web, Search Engines, Browsing, Meta searchers, Searching using hyperlinks

TEXT BOOKS :

1. Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education, Second edition, 2003. (UNIT I)

2. Michael C. Daconta, Leo J. Obart and Kevin J. Smith,”Semantic Web – A Guide to the Future of XML, Web Services and Knowledge Management”, Wiley Publishers, 2003 (UNIT II)

3. Ricardo Baeza-Yates, BerthierRibeiro-Neto, “Modern Information Retrieval”, Addison Wesley, 1999. (UNITs III, IV & V)

REFERENCES

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, Third edition, 2003

2. Christopher D. Manning, PrabhakarRaghavan and HinrichSchutze, “Introduction to Information Retrieval”, Cambridge University Press, 2008.

BTCS 805 Unix Network Programming & Simulation Lab

Objectives: At the end of course, the students should be able to

- Understand various distributions of Unix viz. BSD, POSIX etc.
- Write client/server applications involving unix sockets involving TCP or UDP involving iterative or concurrent server.
- Understand IPV4 & IPV6 interoperability issues
- Use fork( ) system call.
- Understand the network simulator NS2 and Simulate routing algorithm on NS2 (Available on http://www.isi.edu/nsnam/ns/).

Suggested Platform: For Socket Programming- Linux, For NS2 Any of Microsoft Windows or Linux (In case of Microsoft, Virtual environment cygwin will also be required).

Suggested Exercises

1. Write two programs in C: hello_client and hello_server

- The server listens for, and accepts, a single TCP connection; it reads all the data it can from that connection, and prints it to the screen; then it closes the connection
- The client connects to the server, sends the string “Hello, world!”, then closes the connection

2. Write an Echo_Client and Echo_server using TCP to estimate the round trip time from client to the server. The server should be such that it can accept multiple connections at any given time.

3. Repeat Exercises 1 & 2 for UDP.

4. Repeat Exercise 2 with multiplexed I/O operations

5. Simulate Bellman-Ford Routing algorithm in NS2

References:

• Stevens, Unix Network Programming, Vol-I

BTCS 806 FPGA Lab

S.No.	List of Experiments
1	Fundamental Theory • Introduction to DSP architectures and programming • Sampling Theory, Analog-to-Digital Converter (ADC), Digital-toAnalog Converter (DAC), and Quantization; • Decimation, Interpolation, Convolution, Simple Moving Average; • Periodic Signals and harmonics; • Fourier Transform (DFT/FFT), Spectral Analysis, and time/spectrum representations; • FIR and IIR Filters;
2	Design (Simulation) using MATLAB/ Simulink Simulate the lab exercises using MATLAB/Simulink
3	Implementation using pure DSP, pure FPGA and Hybrid DSP/FPGA platforms • Digital Communications: On-Off- Keying (OOK), BPSK modulation, and a simple transceiver design • Adaptive Filtering: Echo/Noise Cancellation, Least Mean Square (LMS) algorithm (2 weeks) Wireless Communications: Channel coding/decoding, Equalization, Simple Detection Algorithm, OFDM • Speech Processing: Prediction Algorithms, Speech Classification and Synthesis

BTCS 807 Digital Image Processing lab

List of Experiment

1 Color image segmentation algorithm development

2 Wavelet/vector quantization compression

3 Deformable templates applied to skin tumor border finding

4 Helicopter image enhancement

5 High-speed film image enhancement

6 Computer vision for skin tumor image evaluation

7 New Border Images