B. Tech. (CS): Syllabus Revision in 2017-18.

S.No	Course Code	Session 2016-17	Session 2017-18	Remark Syllabus Change/ new course
	BT 101	**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	BT 101: ENGINEERING MATHEMATICS-I Unit-I Differential Calculus: Asymptotes (Cartesian coordinates only), concavity, convexity and point of inflection, Curve tracing (Cartesian and standard Polar curves- Cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral only). Unit-II Limit, continuity and differentiability of functions of two variables, Partial differentiation, Euler's theorem on homogeneous functions, change of variables, chain rule. Unit-III Taylor's theorem (two variables), approximate calculations, Jacobian, maxima & minima of two and more independent variables, Lagrange's method of multipliers. Unit-IV Integral Calculus: Double integral, change of order of integration, Double integral by changing into Polar form, Applications of Double integrals for evaluating areas & volumes, triple integral; Beta function and Gamma function (simple properties). Unit-V Vector Calculus: Scalar and vector field, differentiation & integration of vector functions: Gradient, Directional derivative, Tangent planes and Normals. Divergence, Curl and Differential Operator; Line, Surface and Volume integrals; Green's theorem in a plane, Gauss's and Stoke's theorem (without proof) and their applications.	**Syllabus change** **Title Change** **Code Change**

		function, Heisenberg uncertainty principle, tunneling phenomenon. UNIT-V Oscillation & Waves : Simple harmonic oscillator with example, energy of oscillator, Damping oscillator, viscous & solid friction damping, Qualityfactor, Resonance standing waves, elastic waves.		
	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	BT 102: COMMUNICATION SKILLS Unit-I Communication: Meaning, Importance and Cycle of Communication, Media and Types of Communication, Formal and Informal Channels of Communication, Barriers to Communication, Division of Human Communication and Methods to Improve Interpersonal Communication, Qualities of Good Communication. Unit-II Grammar: Passive Voice, Indirect Speech, Conditional Sentences, Modal Verbs, Linking Words. Unit-III Composition: Curriculum Vitae Writing, Business Letter Writing, Job Application Writing, Paragraph Writing, Report Writing. Unit-IV Short Stories: 'The Luncheon' by Somerset Maugham, 'How much Land does a Man Need?' by Leo Tolstoy, 'The Night Train at Deoli' by Ruskin Bond. Unit-V Poems: 'No Men are Foreign' by James Kirkup, 'If' by Rudyard Kipling, 'Where the Mind is without Fear' by Rabindranath Tagore.	**Syllabus change** **Title change** **Code change**

		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		
	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	BT 103: ENGINEERING PHYSICS Unit-I Interference of light: Michelson's Interferometer: Production of circular & straight line fringes; Determination of wavelength of light; Determination of wavelength separation of two nearby wavelengths. Optical technology: Elementary idea of anti-reflection coating and interference filters. Unit-II	**Syllabus change** **Code change**

		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.	Diffraction and Polarization of light: Fraunhofer Diffraction at Single Slit. Diffraction grating: Construction, theory and spectrum; Determination of wavelength of light. Resolving power: Raleigh criterion; Resolving power of diffraction grating and telescope. Plane, circularly and elliptically polarized light on the basis of electric (light) vector: Malus law; Double Refraction; Phase retardation plates and their use in production and detection of circularly and elliptically polarized light; Optical activity and laws of optical rotation; specific rotation and its measurement using half-shade device. Unit-III Elements of Material Science: Bonding in solids; covalent bonding and Metallic bonding; Classification of solids as Insulators, Semiconductors and Conductors; X-Ray diffraction and Bragg's Law. Hall Effect: Theory, Hall Coefficient and applications. Unit-IV Quantum Mechanics: Compton effect & quantum nature of light; Derivation of time dependent and time independent Schrodinger's Wave Equation; Physical interpretation of wave function and its properties; boundary conditions; Particle in one dimensional box. Unit-V Coherence and Optical Fibers: Spatial and temporal coherence; Coherence length; Coherence time and 'Q' factor for light; Visibility as a measure of Coherence and spectral purity; Optical fiber as optical wave guide; Numerical aperture; Maximum angle of acceptance and applications of optical fiber. Laser and Holography: Theory of laser action; Einstein's coefficients; Components of laser; Threshold conditions for laser action; Theory, Design and applications of He-Ne and semiconductor lasers; Holography versus photography, Basic theory of holography; basic requirement of a Holographic laboratory; Applications of Holography in microscopy and interferometry.	
	BT104	**Introduction to Electrical and Electronic**	**BT 104: COMPUTER PROGRAMMING-I**	**Syllabus change**

		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	**Unit-I** **Computer Fundamentals:** Flow chart, pseudocode. binary, octal and hexadecimal number system. ASCII, EBCDIC and UNICODE. boolean operations, **Unit-II** primary and secondary memory. Difference among low-level & high-level languages. **Unit-III** **C Programming:** Structure of a 'C' program, Data types, enumerated, assignment statements, input output statements, **Unit-IV** If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement. Datatype conversion. **Unit-V** Functions & program structure (function call and return), scope of variables, parameter passing methods, recursion v/s iteration.	**Title change** **Code change**

		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.		
	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.	BT 105: ENVIRONMENTAL ENGINEERING AND DISASTER MANAGEMENT Unit-I Basics of Environment: Environmental Pollution, Environmental Acts and Regulations, Ecosystem, Hydrological and chemical cycles, Energy flow in ecosystems. Biodiversity, population dynamics. Unit-II Water Pollution: Water pollutants, effects of oxygen demand, water quality in lakes, reservoirs and groundwater, contaminant transport, self cleaning capacity of streams and water bodies, water quality standards, Waste water management, Treatment & disposal of wastewater. Rain water harvesting: Reuse and saving in use of water, methods of rain water harvesting. Unit-III Solid Waste Management: Classification of solid waste, Collection, transportation, treatment, and disposal of solid waste. Economic recovery of solid waste. Sanitary landfill, on site sanitation. Energy interaction from solid waste. Unit-IV Air and Noise Pollution: Primary and Secondary air pollutants, Air Pollution, Harmful effects of Air Pollution, Control of Air Pollution. Noise Pollution, Harmful effects of noise pollution, control of noise pollution, Global warming, Acid rain, Ozone depletion, Green House effect Unit-V Natural Disasters: Hydro-meteorological Based Disasters like Flood, Flash Flood,	New Course

		(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.	Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions. Man made Disasters: Chemical Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards, Nuclear Accidents. Disaster profile of Indian continent. Study of recent major disasters. Disaster Management Cycle and its components. Disaster Management: Understanding Disasters and Hazards and related issues social and environmental. Risk and Vulnerability. Types of Disasters, their occurrence/ causes, technical terminology involved, impact and preventive measures.	
	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.		
	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.	BT 107: COMMUNICATION SKILLS LAB 1. Phonetic Symbols and Transcriptions 2. Extempore 3. Group Discussion 4. Dialogue Writing 5. Listening Comprehension 6. Word Formation 7. Synonyms and Antonyms 8. Affixes (Note: Wherever appropriate, Language Lab Software is to be used to improve listening comprehension and speaking skills.)	Syllabus change Title change Code change

		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.	BT 108: ENGINEERING PHYSICS LAB 1. To determine the wave length of monochromatic light with the help of Michelson's interferometer. 2. To determine the wave length of sodium light by Newton's Ring. 3. To determine the specific rotation of glucose (sugar) solution using polarimeter. 4. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer. 5. To study the variation of a semiconductor resistance with temperature and hence determine the band gap of the semi conductor in the form of reverse baised P-N junction diode. 6. To determine the height of water tank with the help of sextant. 7. To determine the dispersive power of material of a prim for violet and yellow colour's of mercury light with the help of spectrometer. 8. To study the charge and discharge of a condenser and hence determine the same constant (both current and voltage graphs are to be plotted. 9. To verify the expression for the resolving power of a Telescope. 10. To determine the coherence length and coherence time of laser using He – Ne laser. 11. To determine the specific resistance of the material of a wire by Carey Froster's bridge.	**Syllabus change**

		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.	BT 109: COMPUTER PROGRAMMING LAB The programs shall be developed in C language related with the following concepts: 1. Eight programs using input output statements, if statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement, datatype conversion etc. 2. Check a number- palindrome, prime, etc. 3. Eight programs using functions. 4. Two programs using recursion and Iteration.	**Syllabus change** **Code change**
	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	BT 110: COMPUTER AIDED ENGINEERING GRAPHICS 1.Projections of Point & Lines: Positions of Point, Notation system, systematic Approach for projections of points, Front view & Top view of point, Positions of straight lines, line parallel to Both the RPs, Line perpendicular to either of the RPs, Line inclined to one RP and parallel to the other, Line Inclined to Both the RPs, Traces of a line (One drawing sheet, one assignment in sketch book) 2.Projections of planes: Positions of planes, Terms used in projections of	

		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.	planes, plane parallel to RP, plane inclined to one RP and perpendicular to the other RP, plane perpendicular to Both the RPs, plane Inclined to Both RPs, True shape of the plane, Distance of a point from plane, Angle between two planes (no drawing sheet required, only assignment in sketch book) 3.Projection of solids: Basic solids, Frustums and truncated solids, Positions of the solids, solid with Axis perpendicular to an RP, solid with axis inclined to one RP and parallel to the other solid with axis Inclined to Both the RPs Solid with Axis parallel to Both the RPs (One drawing sheet, one assignment in sketch book) 4.Section of solids: Theory of sectioning, section of prisms and cubes, sections of pyramids and Tetrahedron section of Cylinders, Section of cones, Section of spheres (One drawing sheet, one assignment in sketch book) 5.Development of surfaces: Methods of development, parallel line developments, Radial line Development, Anti-Development (One drawing sheet, one assignment in sketch book) 6.Isometric Projection: Principle of Isometric Projection Isometric scale, Isometric projections and Isometric Views, Isometric Views of standard shapes, Isometric views of standard solids (One drawing sheet, one assignment in sketch book) 7.Computer Aided Drafting: Introduction to CAD, Advantages of CAD software's, Auto CAD, Auto CAD Commands and tool bars, Creating the Drawing, Charging properties, Dimensioning other object, Text editing, Isometric drawing (Four assignments on the computer)	

	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	BT 111: MECHANICAL WORKSHOP PRACTICE 1.Carpentry Shop: 1. T – Lap joint 2. Bridle joint 2. Foundry Shop: 1. Mould of any pattern 2. Casting of any simple pattern 3.Welding Shop: 1. Lap joint by gas welding 2. Butt joint by arc welding 3. Lap joint by arc welding 4. Demonstration of brazing, soldering & gas cutting 4.Machine Shop Practice: 1. Demonstration of various machine tools such as Lathe, Shaper, Milling, Grinding and Drilling 5.Fitting Shop 1. Finishing of two sides of a square piece by filing 2. Making mechanical joint and soldering of joint on sheet metal 3. To cut a square notch using hacksaw and to drill a hole and tapping 6.Sheet Metal Shop Making of Funnel using sheet metal	
	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,	BT:201 ENGINEERING MATHEMATICS-II Unit-I Linear Algebra: Rank of a matrix, Normal forms, consistency of systems of linear simultaneous equations and its solutions, Linear dependence and independence of vectors, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof), orthogonal matrices, diagonalization of matrix.	**Syllabus change** **Title change** **Code change**

		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**	Unit-II Fourier Series: Orthogonal functions, periodic functions, Fourier series of periodic functions, Euler formula, change of intervals, Even and Odd functions, half range Fourier sine and cosine series; Harmonic analysis. Unit-III Differential Equations: Linear differential equations of first order, Reducible to linear form, Exact differential equations, reducible to exact form; Linear Differential Equations of Higher order with constant coefficients, Simultaneous linear differential equations. Unit-IV Second order linear ODE with variables coefficients, Homogenous and exact forms, Change of dependent and independent variables; Variation of parameters, Method of Undetermined coefficients, Euler-Cauchy equations. Unit-V Partial Differential Equations: Order and Degree, Formation; Linear partial differential equations of first order: Lagrange's form, Standard forms, Charpit's method. Solutions of PDE of Second order using separation of variable method.	

		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.		
	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	BT-202 HUMAN VALUES Unit-I Course Introduction - Need, Basic Guidelines, Content and Process for Value Education Understanding the need, basic guidelines, content and process for Value Education Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfill the above human aspirations: understanding and living in harmony at various levels Unit-II Understanding Harmony in the Human Being - Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the	New course

		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.	material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Swasthya Unit-III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship Understanding harmony in the Family- the basic unit of human interaction Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship Understanding the meaning of Vishwas; Difference between intention and competence Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family! Unit-IV Understanding Harmony in the Nature and Existence - Whole existence as Co- existence Understanding the harmony in the Nature Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation innature Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all- pervasive space Holistic perception of harmony at all levels of existence Implications of the above Holistic Understanding of Harmony on Professional Ethics Natural acceptance of human values Definitiveness of Ethical	

			Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Unit-V Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists andmanagers	
	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	BT-203 ENGINEERING CHEMISTRY Unit-I Water: Common natural impurities, hardness, determination of hardness by complexometric (EDTA method), degree of hardness. Municipal water supply, requisite of drinking water, purification of water, sedimentation, filtration, sterilization, breakpoint chlorination. Water for steam making and boiler troubles, formation of solids (Scale and Sludge formation), carryover (Foaming and Priming), boiler corrosion and caustic embrittlement, Methods of boiler water treatment(water softening) preliminary treatments, preheating, Lime-Soda process, Zeolite (Permutit) process, Deionization (Demineralization) process. Numerical problems based on hardness, Lime-Soda and zeolite process. Unit-II Organic Fuels: Origin and classification of fuels. Solid fuels-, coal, classification of coal, significance of constituents, proximate and ultimate analyses of coal, gross and net calorific value, determination of calorific value of coal by Bomb Calorimeter. Metallurgical coke, carbonization processes- Beehive coke oven and Hoffmann Oven (by-products oven) method. Liquid fuels- Advantages of liquid	**Syllabus change** **Code change**

		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	fuels, petroleum and refining of petroleum, reforming, cracking, synthetic petrol, knocking, octane number, anti-knocking agents. Gaseous fuels-advantages, manufacture, composition and uses of coal gas and oil gas, determination of calorific value of gaseous fuels by Junker's calorimeter, flue gas analysis by Orsat's apparatus. Numerical problems based on determination of calorific value (bomb calorimeter/Junkers calorimeter/Dulongs formula, proximate analysis & ultimate and combustion of fuel. Unit-III Polymers: Classification, constituents, general properties of polymers and their uses. Preparation properties and uses of polyethylene, polyethylene terephthalate (PET), nylon 6, nylon 66, nylon 6, 10, Kevlar, Bakelite. Elastomers – natural rubber and vulcanization, synthetic rubbers viz. Buna-S, Buna –N, Butyl and Neoprene Rubbers. Conducting polymers-. Unit-IV Lubricants: Classification, types of lubrication, properties and uses. Viscosity and viscosity index, flash and fire point, cloud and pour point. Emulsification and steam emulsion number. Corrosion and its control: Definition and its significance. Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration type corrosion and pitting corrosion. Protection from corrosion-protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design. Unit-V Inorganic Engineering Materials: Cement: Manufacture of Portland cement. Rotary kiln technology. Chemistry of hardening and setting of cement. Role of gypsum. Refractories: Definition properties and classification. Silica and fire clay refractories. Glass: Definition, type and properties of glasses. Manufacture of glass, annealing of glass. Optical fibre grade glass.	

		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		
	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	BT-204 COMPUTER PROGRAMMING-II Unit-I Computer System Fundamentals: System software, firmware, freeware/open-source, loader, compiler, peripherals. Unit-II Computer Programming: one-dimensional arrays, multi-dimensional arrays, character arrays and strings, Unit-III Pointers ,Pointers arithmetic, Dynamic memory allocation: functions like malloc, calloc, free. Unit-IV Preprocessor, command line arguments, difference between macro and inline function. Structure & Union, typedef. Unit-V File operations and multi-file handling, sscanf()/sprintf(). Graphics using C.	**Syllabus change** **Code change**

		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.		
	BT 205	**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	BT 205.A BASIC ELECTRICAL AND ELECTRONICS ENGINEERING Unit-I Basic Concepts of Electrical Engineering: Electric Current, Electromotive force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction, Lenz's Law, Kirchhoff's laws, Network Sources, Resistive Networks, Series- Parallel Circuits, Node Voltage Method, Mesh Current Method, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems. Unit-II Transformers: Construction, EMF equation, ratings, phasor diagram on no load and full load, equivalent circuit, regulation and efficiency calculations, open and short circuit tests, auto-transformers Unit-III Alternating Quantities: 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.	**Syllabus change** **Title change** **Code change**

		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.	Unit-IV Rotating Electrical Machines; DC Machines: Principle of Operation of DC Machine as Motor and Generator, EMF Equation, Applications of DC Machines. AC Machines: Principle of Operation of 3-Phase Induction Motor, 3-Phase Synchronous Motor and 3- Phase Synchronous Generator (Alternator), Applications of AC Machines. Unit-V Basic Electronics: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behaviour of the PN Junction, PN Junction Diode, Zener Diode, Photovoltaic Cell, Rectifiers, Bipolar Junction Transistor, Field Effect Transistor, Transistor as an Amplifier. Digital Electronics: Boolean algebra, Binary System, Logic Gates and Their Truth Tables. Electrical Measuring Instruments: DC PMMC instruments, shunt and multipliers, multimeters, Moving iron ammeters and voltmeters, dynamometer, wattmeter, AC watthour meter, extension of instrument ranges.	
			BT-205.B BASIC CIVIL ENGINEERING Unit-I Introduction: Specialization of Civil Engineering, scope of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country. Surveying: Object & principles of Surveying, Unit-II Linear measurements: Direct measurements- Tape & Chain, Ranging out survey lines, taking measurements of sloping ground. Tape correction, conventional symbols. Introduction to Compass Surveying & Leveling. Introduction to totalstation. Unit-III Building & Building materials: Construction materials: Stone, Brick, Cement, Mortar, Concrete, Steel – their properties & uses. Unit-IV Selection of site for Buildings, types of buildings, plinth area, carpet area, floor space index, Introduction to building byelaws, concept of sun light and	New course

			ventilation. Components of Buildings & their functions, Basic concept of R.C.C., Introduction to types of foundation. Unit-V Transportation, Traffic and Road Safety: Types and characteristics of various modes of transportation, various road traffic signs, causes of accidents and road safety measures.	
			BT-205.C BASIC MECHANICAL ENGINEERING Unit-I Fundamentals: Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology. Steam Boilers, Steam Turbines and Power Plants: Introduction, classification and types of steam boilers and steam turbines. Discuss working of steam boilers and steam turbines. Introduction and Classification of power plants. Unit-II Pumps and IC Engines: Applications and working of Reciprocating and Centrifugal pumps. Introduction, Classification of IC Engines, Main Components of IC Engines, Working of IC Engines and its components. Unit-III Refrigeration and Air Conditioning: Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration an Air-conditioning. Transmission of Power: Introduction and types of Belt and Rope Drives. Introduction to Gears and Gear Trains. Unit-IV Primary Manufacturing Processes: Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces. Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing. Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering. Metal Removal or Machining Processes:	**New Course**

			Introduction to machining process and various machine tools. Unit-V Engineering Materials and Heat Treatment of Steel:Introduction to various engineering materials and their properties. Introduction to Heat Treatment and types of Heat Treatment Processes. Introduction to CAD, CAM, FMS, MEMS and CIM:Introduction to modern manufacturing systems and their applications.	
			BT-205.D ENGINEERING MECHANICS Unit-I Statics of particles and rigid bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem. Centroid & Moment of inertia (M.I): Location of centroid, Moment of inertia (mass and area), Parallel axis and perpendicular axis theorems, M.I of composite section, M.I. of solid bodies, Polar moment of inertia. Unit-II Virtual work: Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium. Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. Unit-III 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.	

			Kinetics of particles and rigid bodies: Newton's second law, Equation of motion in rectangular coordinate, Equation of motion in radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle. Unit-IV 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 Non-conservative Force, Conservation of energy. Unit-V 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 momentum, Angular momentum of rigid body, Principle of impulse and momentum for a rigid body, Central impact, System of variable mass.	
	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.	BT- 206 HUMAN VALUES: ACTIVITIES PS 1: Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you diffierentiate between right and wrong? What have been your salient achievements and shortcomings in your life ? Observe and analyze them. PS 2: Now-a-days, there is a lot of talk about many technogenic maladies such as energy and material resource depletion, environemental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. - all these seem to be manmade problems, threatening the survival of life Earth - What is the root cause of these maladies & what is the way out in opinion?	**New course**

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.

On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, breakdown of relationships, generation gap, depression & suicidal attempts etc. - what do you think, is the root cause of these threats threats to human happiness and peace - what could be the way out in your opinion?

PS 3:

1. Observe that each of us has the faculty of 'Natural Acceptance', based on which one can verify what is right or not right for him. (As such we are not properly trained to listen to our 'Natural Acceptance' and may a time it is also clouded by our strong per-conditioning and sensory attractions).

Explore the following:

(i) What is Naturally Acceptable' to you in relationship the feeling of respect or disrespect for yourself and for others?

(ii) What is 'naturally Acceptable' to you - to nurture or to exploit others?

Is your living in accordance with your natural acceptance or different from it?

2. Out of the three basic requirements for fulfillment of your aspirations - right understanding, relationship and physical facilities - observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

PS 4:

list down all your important desires. Observe whether the desire is related to Self (I) or the Body. If it appears to be related to both, visualize which part of it is related to Self (I) and which part is related to Body.

1. a. Observe that any physical facility you use, follows the given sequence with time:

Necessary and tasteful - unnecessary but still tasteful - unnecessary and tasteless - intolerable

b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If not acceptable, you want it continuously and if not acceptable, you do not want it any moment!

2. List down all your important activities. Observe whether the activity is of 'I' or of Body or with the participation of both or with the participation of both 'I' and Body.

3. Observe the activities within 'i'. Identify the object of your attention for different moments (over a period of sy 5 to 10 minutes) and draw a line diagram connecting these points. Try observe the link between any two nodes.

PS 6:

1. Chalk out some programs towards ensuring your harmony with the body - in tearms of nurturing, protection and right utilisation of the body.
2. Find out the plants and shrubs growing in and around your campus, which can be useful in curing common diseases.

PS 7:

Form small groups in the class and make them carry out a dialogue focusing on the following eight questions related to 'TRUST';

1a. Do I want to make myself happy? 2a. Do I want to make the other happy?
3a. Does the other want to make himself/herself happy? 4a. Does the other want to make me happy?
What is the answer?

			Intention (NaturalAcceptance) 1b. Am I able to always make myself happy? 2b. Am I able to always make the other happy? 3b. Is the other able to always make himself/herself happy? What is theanswer? Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate yourself and others on the basis of intention/competence. PS 8: 1. Observe, on how many occasions, you are able to respect your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation. 2. Also, observe whether your feeling of respect is based on treating the other as you would treat youself or on differentiations based on body, physical facilities or belieds. PS 9: 1. Write a narration in the form of a story, poem, skit or essay to clarify a salient Human Value to the children. 2. Recollect and narrate an incident in your life where you were able to exhibit willful adherence to balues in a difficult situation. PS 10: List down some common units (things) of Nature which you come across in your daily life and classify them in the four orders of Nature. Analysis and explain the aspect of mutual fulfillment of each unit with other orders. PS 11: Make a chart to show the whole existence as co-existence. With the help of this chart try to identify the role and the scope of some of the courses of your study. Also indicate the areas which are being either over-emphasized or ignored in the present	

			context. PS 12: Identify any two important problems being faced by the society today and analyze the root cause of these problems. Can these be solved on the basic of natural acceptance of human values. If so, how should one proceed in this direction from the present situation? PS 13: 1. Suggest ways in which you can use your knowledge of Science/Technology/Management etc. for moving towards a universal human order. 2. Propose a broad outline for humanistic Constitution at the level of Nation. PS 14: The course is going to be over now. It is time to evaluate what difference in your thinking it has made. Summarize the core massage of this course grasped by you. How has this affected you in terms of; a. Thought b. Behavior c. Work and d. Relization 3. What practical steps are you able to visualize for the transition of the society from its present state. 4. 5. 6. Project: 7. 8. Every student required to take-up a social project e.g. educating children in needy/weaker section, services in hospitals, NGO's and other such work	
	BT207	**Electrical and Electronics Lab-II** **List of Experiment:** 1. To verify the truth tables of basic logic gates: AND, OR, NOR, NAND,	**BT-207 ENGINEERING CHEMISTRY LAB** 1. To determine the hardness of water by HCL method. 2. To determine the hardness of water by	**Syllabus change** **Code change**

		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.	EDTA method 3. Measurement of conductivity of a given sample by conductivity meter. 4. Study of BombCalorimeter. 5. To determine the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution. 6. To determine the strength of $CuSO_4$ solution with the help of hypo solution. 7. To determine the strength of NaOH and Na_2CO_3 in a given alkali mixture. 8. To determine the flash and fire point of a given lubricating oil. 9. To determine the viscosity of a given lubricating oil by Redwood viscometer. 10. To determine cloud and pour point of lubricating oil.	
	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	**BT 208 COMPUTER PROGRAMMING-II LAB** The programs shall be developed in C language related with the following concepts: 1. Input roll numbers of your friends in an array & print in reverse order. 2. Input names of your friends in an array & print in reverse order. 3. Input two matrices and output third matrix after performing add/subtract the corresponding elements. 4. Four programs using malloc, calloc, free & sscanf()/sprintf() functions. 5. Two programs using macro and online functions. 6. Two programs using structure & union. 7. Two programs using pointers. 8. Three programs belonging to file operations and multi-file handling. 9. Three programs belonging to graphics using C.	**Syllabus change** **Code change**

		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.	**BT 209: COMPUTERS AIDED MACHINE DRAWING** 1.Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules of dimensioning. 2.Conversion of pictorial views into orthographic views: (1 drawing sheet) Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing view problems. 3.Sectional view : (1 drawing sheet) Introduction, cutting plane line, type of sectional views-full section, half section, partial or broken section, revolved section, removed section, offset section, sectioning conventions-spokes, web, rib, shaft, pipes, different types of holes, conventions of section lines for different metals and materials. 4.Fasteners: (1 drawing sheet) Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints. Riveted joints, rivets and riveting, types of rivets, types of riveted joints etc. 5.Assembly drawing: (1 drawing sheet) Introduction to assembly drawing, assembly drawing of simple machine elements; like rigid or flexible coupling, muff coupling, plummer block, footstep bearing, bracket etc. 6.Free hand sketching: Need for free hand sketching, Free hand sketching of conventional representation of materials, screw fasteners, foundation bolts, studs. 7.Bearing: Ball, roller, needle, foot step bearing.	New course

		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.	8.Coupling: Protected type, flange, and pin type flexible coupling. 9.Other components: Welded joints, belts and pulleys, pipes and pipe joints, valves etc. 10.Computer aided drafting: Concepts of computer aided 2D drafting using any drafting software like AutoCAD/ Solid works/Creo/Catia etc., basic drawing and modify commands, making 2D drawings of simple machine parts.	
	BT210	**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.		
	BTCS 301	Applied Mathematics 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	**Advanced Engineering Mathematics** **Detailed contents:** **Unit-1 (7 Hours)** ***Random Variables:*** ***Discrete and Continuous random variables, Joint distribution, Probability distribution function, conditional distribution. Mathematical Expectations: Moments, Moment Generating Functions, variance and correlation coefficients, Chebyshev's Inequality, Skewness and Kurtosis.*** **Unit-2 (5 Hours)** ***Binomial distribution, Normal Distribution, Poisson Distribution and their relations, Uniform Distribution, Exponential Distribution.: Karl Pearson's coefficient, Rank correlation. Curve fitting. Line of Regression.*** ***Unit-3 (8 Hours)*** ***Historical development, Engineering Applications of Optimization, Formulation of Design Problems as a Mathematical***	Syllabus Change

		(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.	***Programming Problems, Classification of Optimization Problems*** ***Unit-4 (6 Hours)*** ***Cassical Optimization using Differential Calculus: Single Variable and Multivariable Optimization with & without Constraints, Langrangian theory, Kuhn Tucker conditions***	
	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,	**Managerial Economics and Financial Accounting** UNIT 1: Basic economic concepts-Meaning, nature and scope of economics, deductive vs inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement. UNIT 2: Demand and Supply analysis-Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting – purpose, determinants and methods, Supply-determinants of supply, supply function, elasticity of supply. UNIT 3: Production and Cost analysis-Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation UNIT 4: Market structure and pricing theory-Perfect competition, Monopoly, Monopolistic competition, Oligopoly. UNIT 5: Financial statement analysis-Balance sheet and related concepts, profit and loss statement and related concepts, financial ratio analysis, cash flow analysis, funds-flow analysis, comparative financial statement, analysis and interpretation of financial statements, capital budgeting techniques.	new course

		Parsing of the query results, Checking data errors.		
	BTCS303	**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.	Digital Electronics Unit-1 (8 Hours) Fundamental concepts: Number systems and codes, Basic logic Gates and Boolean algebra: Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Unit-2 (8 Hours) Minimization Techniques and Logic Gates: Principle of Duality - Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions – Quine - McCluskey method of minimization. Unit-3 (8 Hours) 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. Unit-4 (8 Hours) Combinational Circuits: Combinational logic circuit design, adder, subtractor, BCD adder, encoder, decoder, BCD to 7-segment decoder, multiplexer, demultiplexer. Unit-5 (5 Hours) Sequential Circuits: Latches, Flip-flops - SR, JK, D, T, and Master-Slave Characteristic table and equation, counters and their design, Synchronous counters – Synchronous Up/Down counters – Programmable counters – State table and state transition diagram ,sequential circuits design methodology. Registers –shift registers.	Code change
	BTCS 304	**BTCS 304 Object Oriented Programming using C++** Units I Introduction: Review of structures in C, accessing members of structures using	**Data Structures and Algorithms** Unit-1 (8 Hours) Stacks: Basic Stack Operations, Representation of a Stack using Static Array and Dynamic	Code change

		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.	Array, Multiple stack implementation using single array, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions and Towers of Hanoi. Unit-2 (10 Hours) Queues: Basic Queue Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues-Round Robin Algorithm. Circular Queues, DeQueue Priority Queues. Linked Lists:Introduction, single linked list, representation of a linked list in memory, Different Operations on a Single linked list, Reversing a single linked list, Advantages and disadvantages of single linked list, circular linked list, double linked list and Header linked list. Unit-3 (7 Hours) Searching Techniques: Sequential and binary search. Sorting Techniques: Basic concepts, Sorting by: bubble sort, Insertion sort, selection sort, quick sort, heap sort, merge sort, radix sort and counting sorting algorithms. Unit-4 (7 Hours) Trees: Definition of tree, Properties of tree, Binary Tree, Representation of Binary trees using arrays and linked lists, Operations on a Binary Tree, Binary Tree Traversals (recursive), Binary search tree, B-tree , B+ tree, AVL tree, Threaded binary tree. Unit-5 (8 Hours) Graphs: Basic concepts, Different representations of Graphs, Graph Traversals (BFS & DFS), Minimum Spanning Tree(Prims &Kruskal), Dijkstra's shortest path algorithms. Hashing: Hash function, Address calculation techniques, Common hashing functions, Collision resolution: Linear and Quadratic probing, Double hashing.	
	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	**Object Oriented Programming** Detailed contents: Unit-1 (8 Hours) Introduction to different programming paradigm, characteristics of OOP, Class, Object, data	Syllabus change

		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,	member, member function, structures in C++, different access specifiers, defining member function inside and outside class, array of objects. Unit-2 (8 Hours) Concept of reference, dynamic memory allocation using new and delete operators, inline functions, function overloading, function with default arguments, constructors and destructors, friend function and classes, using this pointer. Unit-3(9 Hours) Inheritance, types of inheritance, multiple inheritance, virtual base class, function overriding, abstract class and pure virtual function Unit-4 (9 Hours) Constant data member and member function, static data member and member function, polymorphism, operator overloading, dynamic binding and virtual function Unit-5 (6 Hours) Exception handling, Template, Stream class, File handling.	

		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.		
	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	**Software Engineering** Detailed contents: Unit-1 (8 Hours) Introduction, software life-cycle models, software requirements specification, formal requirements specification, verification and validation. Unit-2 (8 Hours) Software Project Management: Objectives, Resources and their estimation, LOC and FP estimation, effort estimation, COCOMO estimation model, risk analysis, software project scheduling. Unit-3 (8 Hours) 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 Unit-4 (8 Hours) Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation. Unit-5 (8 Hours) Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling. Object Oriented Design: OOD concepts, Class and object relationships, object modularization, Introduction to Unified Modeling Language	**Code change**

		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.		
	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.	**Data Structures and Algorithms Lab** 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 up to 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 structure. 7. Implementation of binary tree with operations like addition, deletion,	**Code change**

		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.	traversal. 8. Depth first and breadth first traversal of graphs represented using adjacency matrix and list. 9. Implementation of binary search in arrays and on linked Binary Search Tree. 10. Implementation of different sorting algorithm like insertion, quick, heap, bubble and many more sorting algorithms.	
	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.	**Object Oriented Programming Lab** 1 Understand the basics of C++ library, variables, data input-output. 2 C++ program using with the concept of structures. 3 Implement class and object concepts and function overloading. 4 Write programs to understand dynamic memory allocation and array of objects. 5 Program to understand different types of constructors and destructor. 6Implement friend function to access private data of a class and usage of this pointer. 7Write programs to understand the usage of constant data member and member function, static data member and member function in a class. 8 Implement different types of inheritance, function overriding and virtual function 9 Implement Operator overloading concepts. 10 Write programs to understand function template and class template. 11 Write programs to understand exception handling techniques. 12 Write programs to understand file handling techniques.	**Code change**

		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	**Software Engineering Lab** 1. Development of requirements specification, function oriented design using SA/SD, object-oriented design using UML, test case design, implementation using Java and testing. Use of appropriate CASE tools and other tools such as configuration management tools, program analysis tools in the software life cycle. 2. Develop Software Requirements Specification (SRS) for a given problem in IEEE template. 3. Develop DFD model (level-0, level-1 DFD and Data dictionary) of the project. 4. Develop structured design for the DFD model developed. 5. Developed all Structure UML diagram of the given project. 6. Develop Behavior UML diagram of the given project. 7. Manage file, using ProjectLibre project management software tool.	**Subject Title Change**
	BTCS 310	**CORE PHP LAB** List of Experiments	**Digital Electronics Lab** 1. To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR.	**Code change**

		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.	Also to verify truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gateswith 2, 3, & 4 inputs). 2. To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized usingNAND & NOR gates. 3. To realize an SOP and POS expression. 4. To realize Half adder/ Subtractor& Full Adder/ Subtractor using NAND & NOR gatesand to verify their truth tables. 5. To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor& basic Full Adder/ Subtractor. 6. To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer. 7. Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display. 8. Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table. 9. Construct a divide by 2,4& 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop. 10. Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However, experiment Nos.	

			1-4 are to be performed on bread board only.	
	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.		

	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 .	**Discrete Mathematics Structure** Unit I: Set Theory: Definition of sets, countable and uncountable sets, Set operations, Partition of set, Cardinality (Inclusion- Exclusion & Addition Principles) Venn Diagrams, proofs of some general identities on sets. Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job - Scheduling problem. Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction. Composition of Functions. The Pigeonhole and Generalized Pigeonhole Principles. Unit II: Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers. 2 way predicate logic. Introduction to finite state machine Finite state machines as models of physical system equivalence machines, Finite state machines as language recognizers Unit III: Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices. Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Multimodal Coefficients Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms, linear recurrence relations with constant coefficients, Homogen eous solutions, Particular solutions, Total solutions, Generating functions, Solution by method of generating functions. Unit IV: Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results	Code change

			Unit V: Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs, matching, vertex/edge covering	
	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.	Technical Communication Unit I: Introduction to Technical Communication -Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication. Unit II: Comprehension of Technical Materials/Texts and Information Design & development - Reading of technical texts, Reading and comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note -making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media. Unit III: Technical Writing, Grammar and Editing - Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings. Unit IV: Advanced Technical Writing -Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles	**New subject**

		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.		
	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.	**Microprocessor & Interfaces** Unit I: Introduction to Microprocessors, microcontroller; 8085 Microprocessor Architecture, pin description, Bus concept and organization; concept of multiplexing and de-multiplexing of uses; concept of static and dynamic RAM, type of ROM, memory map. Unit II: Software architecture registers and signals, Classification of instruction, Instruction set, addressing modes, Assembly Language Programming and Debugging, Programming Technique, instruction Format and timing. UnitIII: 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. Unit IV: 8085 Microprocessor interfacing:, 8255 Programmable Peripheral Interface, 8254 programmable interval timer, interfacing of Input/output device, 8279 Key board/Display interface. Unit 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.	**Code change**
	BTCS 404	**Software Engineering**	**Database Management System**	Code change

		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	UNIT 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. 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, and 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. UNIT II: Relationship Algebra and Calculus: Relationship Algebra Selection and Projection, Set Operations, Renaming, Joints, Division, Relation Calculus, Expressive Power of Algebra and Calculus. SQL queries programming and Triggers: The Forms of a Basic SQL Query, Union, and 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. UNIT III: 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. UNIT IV: Transaction Processing: Introduction-Transaction State, Transaction properties, Concurrent Executions. Need of Serializability, Conflict vs. View Serializability, Testing for Serializability, Recoverable Schedules, Cascadeless Schedules. UNIT V: Concurrency Control: Implementation	

			of Concurrency: Lock-based protocols, Timestamp-based protocols, Validation-based protocols, Deadlock handling, Database Failure and Recovery: Database Failures, Recovery Schemes: Shadow Paging and Log-based Recovery, Recovery with Concurrent transactions.	
	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,	**Theory of Computation** UNIT I: Finite Automata & Regular Expression: Basic machine, Finite state machine, Transition graph, Transition matrix, Deterministic and nondeterministic finite automation, Equivalence of DFA and NDFA, Decision properties, minimization of finite automata, Mealy & Moore machines. Alphabet, words, Operations, Regular sets, relationship and conversion between Finite automata and regular expression and vice versa, designing regular expressions, closure properties of regular sets, Pumping lemma and regular sets, Myhill- Nerode theorem , Application of pumping lemma, Power of the languages. UNIT II: Context Free Grammars (CFG), Derivations and Languages, Relationship between derivation and derivation trees, leftmost and rightmost derivation, sentential forms, parsing and ambiguity, simplification of CFG, normal forms, Greibach and Chomsky Normal form , Problems related to CNF and GNF including membership problem. UNIT III: Nondeterministic PDA, Definitions, PDA and CFL, CFG for PDA, Deterministic PDA, and Deterministic PDA and Deterministic CFL , The pumping lemma for CFL's, Closure Properties and Decision properties for CFL, Deciding properties of CFL. UNIT IV: Turing Machines: Introduction,	**Code change**

		directsequence spread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hop spread spectrum (FHSS). Application of spread spectrum: CDMA.	Definition of Turing Machine, TM as language Acceptors and Transducers, Computable Languages and functions, Universal TM & Other modification, multiple tracks Turing Machine. Hierarchy of Formal languages: Recursive & recursively enumerable languages, Properties of RL and REL, Introduction of Context sensitive grammars and languages, The Chomsky Hierarchy. UNIT V: Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, Un-decidability, examples of these problems like vertex cover problem, Hamiltonian path problem, traveling sales man problem.	
	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.	**Data Communication and Computer Networks** UNIT II: Introductory Concepts: Network hardware, Network software, topologies, Protocols and standards, OSI model, TCP model, TCP/IP model, Physical Layer: Digital and Analog Signals, Periodic Analog Signals, Signal Transmission, Limitations of Data Rate, Digital Data Transmission, Performance Measures, Line Coding, Digital Modulation, Media and Digital Transmission System. UNIT II: Data Link Layer: Error Detection and Correction, Types of Errors, Two dimensional parity check, Detection verses correction, Block Coding, Linear Block Coding, Cyclic Codes, Checksum, Standardized Polynomial Code, Error Correction Methods, Forward Error Correction, Protocols: Stop and wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding window, Piggy backing, Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA. UNIT III: Network Layer: Design issues, Routing algorithms: IPV4, IPV6, Address	**Subject name change**

			mapping: ARQ, RARQ, Congestion control, Unicast, Multicast, Broadcast routing protocols, Quality of Service, Internetworking. UNIT IV: Transport Layer: Transport service, Elements of transport protocols,User Datagram Protocol, Transmission Control Protocol, Quality of service, Leaky Bucket and Token Bucket algorithm. UNIT V: Application Layer: WWW, DNS, Multimedia, Electronic mail, FTP, HTTP, SMTP, Introduction to network security	
	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.	**Microprocessor & Interfaces 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 and 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	**Subject Name change**

		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).	**Database Management System Lab** List of Experiments: 1. Design a Database and create required tables. For e.g. Bank, College Database 2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables. 3. Write a SQL statement for implementing ALTER, UPDATE and DELETE. 4. Write the queries to implement the joins. 5. Write the query for implementing the following functions: MAX (), MIN (), AVG () and COUNT (). 6. Write the query to implement the concept of Integrity constrains. 7. Write the query to create the views. 8. Perform the queries for triggers. 9. Perform the following operation for demonstrating the insertion , updation and deletion 10. Using the referential integrity constraints. 11. Write the query for creating the users and their role.	Code change

	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 Experime 1 Course Registration System 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 given symptoms	**Network Programming Lab** List of Experiments: 1. Study of Different Type of LAN& Network Equipments. 2. Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc. 3. LAN installations and Configurations. 4. Write a program to implement various types of error correcting techniques. 5. Write a program to implement various types of framing methods. 6. Write two programs in C: hello_client and hello_server a. 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 b.The client connects to the server, sends the string “Hello, world!”, then closes the connection 7. 7. 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. 8. Repeat Exercises 6 & 7 for UDP. 9. Repeat Exercise 7 with multiplexed I/O operations. 10. Simulate Bellman -Ford Routing algorithm in NS2	**New course**

		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.	**Linux Shell Programming Lab** 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 based on control structure -If-then-fi, if-then-else-if, nested if -else, to find: 3.1 Greatest among three numbers. 3.2 To find a year is leap year or not. 3.3 To input angles of a triangle and find out whether it is valid triangle or not. 3.4 To check whether a character is alphabet, digit or special character. 3.5 To calculate profit or loss. 4. Shell Programming Looping-while, until, for loops 4.1 Write a shell script to print all even and odd number from 1 to 10. 4.2 Write a shell script to print table of a given number 4.3 Write a shell script to calculate factorial of a given number. 4.4 Write a shell script to print sum of all even numbers from 1 to 10. 4.5 Write a shell script to print sum of digit of any number. 5. Shell Programming - case structure, use of break 5.1 Write a shell script to make a basic calculator which performs addition, subtraction, Multiplication, division 5.2 Write a shell script to print days of a week. 5.3 Write a shell script to print starting 4 months having 31 days. 6. Shell Programming -Functions 6.1 Write a shell script to find a number is Armstrong or not. 6.2 Write a shell script to find a number is	Code change

			palindrome or not. 6.3 Write a shell script to print Fibonacci series. 6.4 Write a shell script to find prime number. 6.5 Write a shell script to convert binary to decimal and decimal to binary 7. Write a shell script to print different shapes - Diamond, triangle, square, rectangle, hollow square etc. 8. Shell Programming –Arrays 8.1 Write a C program to read and print elements of array. 8.2 Write a C program to find sum of all array elements. 8.3 Write a C program to find reverse of an array. 8.4 Write a C program to search an element in an array. 8.5 Write a C program to sort array elements in ascending or descending order.	
	BTCS 411		**Java 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.	codechange

			6. Develop applications involving concurrency: Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, and Synchronization. Indicative List of exercises: 7. Programs to demonstrate basic concepts e.g. operators, classes, constructors, control & iteration statements, recursion etc. such as complex arithmetic, matrix arithmetic, tower of Hanoi problem etc. 8. Development of programs/projects to demonstrate concepts like inheritance, exception handling, packages, interfaces etc. such as application for electricity department, library management, ticket reservation system, payroll system etc. 9. Development of a project to demonstrate various file handling concepts. 10. Develop applications involving Applet: Applet Fundamentals, using paint method and drawing polygons. It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives.	
	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	**Information Theory & Coding** UNIT 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. UNIT II: Source coding schemes for data compaction: Prefix code,Huffman code, Shanon-Fane code &Hempel-Ziv coding channel capacity. Channel coding theorem. Shannon limit. UNIT III : Linear Block Code: Introduction to error connecting codes, coding & decoding of linear block code, minimum distance consideration,conversion of non-systematic form of matrices into systematic form. UNIT 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. UNIT V: Convolutional Code: Convolutional encoders of different rates. Code Tree, Trllis and	**Code change**

		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.	state diagram. Maximum likelihood decoding of convolutional code: The viterbi Algorithm fee distance of a convolutional code.	
	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.	**Compiler Design** UNIT I: Introduction: Objective, scope and outcome of the course. Compiler, Translator, Interpreter definition, Phase of compiler,Bootstrapping, Review of Finite automata lexical analyzer, Input,Recognition of tokens, Idea about LEX: A lexical analyzer generator, Error handling. UNIT II : Review of CFG Ambiguity of grammars: Introduction to parsing.Top down parsing, LL grammars & passers error handling of LL parser, Recursive descent parsing predictive parsers, Bottom up parsing, Shift reduce parsing, LR parsers, Construction of SLR, Conical LR & LALR parsing tables, parsing with ambiguous grammar. Operator precedence parsing, Introduction of automatic parser generator: YACC error handling in LR parsers. UNIT III : Syntax directed definitions; Construction of syntax trees, S Attributed Definition, L-attributed definitions, Top down translation. Intermediate code forms using postfix notation, DAG,Three address code, TAC for various control structures, Representing TAC using triples and quadruples, Boolean expression 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	Subject title change

		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.	analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code generation from DAG.	
	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.	**Operating System** UNIT I: Introduction and History of Operating systems: Structure and operations; processes and files Processor management: inter process communication, mutual exclusion,semaphores, wait and signal procedures, process scheduling and algorithms, critical sections, threads, multithreading UNIT II: Memory management: contiguous memory allocation, virtual memory,paging, page table structure, demand paging, page replacement policies,thrashing, segmentation, case study UNIT III : Deadlock: Shared resources, resource allocation and scheduling,resource graph models, deadlock detection, deadlock avoidance, deadlock prevention algorithms. Device management: devices and their characteristics, device drivers,device handling, disk scheduling algorithms and policies UNIT IV : : File management: file concept, types and structures, directory structure, cases studies, access methods and matrices, file security, user authentication UNIT V: UNIX and Linux operating systems as case studies; Time OS and case studies of Mobile OS	Code change

		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		
	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	**Computer Graphics & Multimedia** UNIT I: Basic of Computer Graphics: Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards UNIT II: Graphics Primitives Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, Fill area primitives including scanline polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers. Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm). UNIT III : Two Dimensional Graphics: Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping	**Code change**

		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.	(cohen-sutherland, liang- bersky, NLN), polygon clipping UNIT IV : Three Dimensional Graphics:3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves and surfaces.3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations. UNIT V: Illumination and Colour Models: Light sources – basic illumination models – halftone patterns and dithering techniques; Properties of light – Standard primaries and chromaticity diagram; Intuitive colour concepts –RGB colour model – YIQ colour model – CMY colour model – HSV colour model – HLS colour model; Colour selection. UNIT VI: Animations &Realism: Design of Animation sequences – animation function – raster animation – key frame systems – motion specification – morphing – tweening. Computer Graphics Realism: Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing.	
	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.	**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. UNIT II: Greedy Method: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees. Dynamic Programming: Matrix Chain Multiplication. Longest CommonSubsequence and 0/1 Knapsack Problem. UNIT III : Branch And Bound: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem.Pattern Matching Algorithms: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms. UNIT IV : Assignment Problems: Formulation of Assignment and Quadratic Assignment Problem. 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	Subject title change

		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	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 NPComplete Problems - Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover and Set Cover Problem.	

		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.		
	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	**Wireless Communication** UNIT I: Wireless Channels: Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading. UNIT II: Cellular Architecture: Multiple Access techniques - FDMA,TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement. UNIT III : Digital Signaling For Fading Channels: Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR. UNIT IV : Multipath Mitigation Techniques: Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver, UNIT V: Multiple Antenna Techniques: MIMO systems – spatial multiplexing -System model - Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information capacity in fading and non-fading channels.	**New subject**

		Integer Factorization.		
	BTCS 506B	**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.	**Human Computer Interaction** UNIT I: Historical evolution of the field, Interactive system design, Concept of usability - definition and elaboration, HCI and software Engineering, GUI design and Aesthetics, Prototyping techniques. Model-based Design and evaluation: Basic idea, introduction to different types of models, GOMS family of models (KLM and CMNGOMS), BFitts' law and Hick-Hyman's law, Model-based design case studies, UNIT II: Guidelines in HCI:Shneiderman's eight, golden rules, Norman's seven principles, Norman's model of interaction, Nielsen's ten heuristics with example of its use Heuristic evaluation, Contextual inquiry, Cognitive walkthrough UNIT III : Empirical research methods in HCI: Introduction (motivation, issues, research question formulation techniques), Experiment design and data analysis (with explanation of one-way ANOVA) UNIT IV : Task modelling and analysis: Hierarchical task analysis (HTA), Engineering task models and Concur Task Tree (CTT),I introduction to formalism in dialog design, design using FSM (finite state machines) State charts and (classical) Petri Nets in dialog design UNIT V: Introduction to CA, CA types, relevance of CA in IS design Model Human Processor (MHP), OOP- Introduction OOM- Object Oriented Modeling of User Interface Design.	**Subject Title change**
	BTCS 506C	**Information Theory & Coding** Units I Introduction to information theory.	**Bioinformatics** UNIT I: Introduction: Basics of biology. UNIT II Sequences: Problem Statement, Edit	New course

		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.	distance and substitution matrices, HMMs and pairwise HMMs, Global and local alignments, Spliced alignment, Space-efficient sequence alignment, multiple alignment, Database searching tools, Sequence by hybridization, Profile HMMs UNIT III : Structures: Protein structure alignment, Protein structure prediction UNIT IV : Phylogenetic trees: Large parsimony and small parsimony problems, Probabilistic approaches, Grammar-based approaches UNIT V: Miscellaneous topics: Pathways and networks, Microarrays, Biomedical images	
	BTCS 507	**Data Base 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.	**Computer Graphics & Multimedia Lab** List of Experiments: 1. Implementation of Line, Circle and ellipse attributes 2. To plot a point (pixel) on the screen 3. To draw a straight line using DDA Algorithm 4. Implementation of mid-point circle generating Algorithm 5. Implementation of ellipse generating Algorithm 6. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear 7. Composite 2D Transformations 8. Cohen Sutherland 2D line clipping and Windowing 9. Sutherland – Hodgeman Polygon clipping Algorithm 10. Three dimensional transformations -	Code change

		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.	Translation, Rotation, Scaling 11. Composite 3D transformations 12. Drawing three dimensional objects and Scenes 13. Generating Fractal images	
	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 -	**Compiler Design Lab** List of Experiments: 1. Introduction: Objective, scope and outcome of the course. 2. To identify whether given string is keyword or not. 3. Count total no. of keywords in a file. [Taking file from user] 4. Count total no of operators in a file. [Taking file from user] 5. Count total occurrence of each character in a given file. [Taking file from user] 6. Write a C program to insert, delete and display the entries in Symbol Table. 7. Write a LEX program to identify following: 1) Valid mobile number 2) Valid url 3) Valid identifier 4) Valid date (dd/mm/yyyy) 5) Valid time (hh:mm:ss) 8. Write a lex program to count blank spaces,words,lines in a given file.	Code change

		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.	9. Write a lex program to count the no. of vowels and consonants in a C file. 10. Write a YACC program to recognize strings aaab,abbb using a^nb^n, where b>=0. 11. Write a YACC program to evaluate an arithmetic expression involving operators +,-,* and /. 12. Write a YACC program to check validity of a strings abcd,aabbcd using grammar a^nb^nc^md^m, where n , m>0 Write a C program to find first of any grammar.	
	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	**Analysis of Algorithms Lab** List of Experiments: 1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. 2. Implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. 3. a. Obtain the Topological ordering of vertices in a given digraph. b. Compute the transitive closure of a given directed graph using Warshall's algorithm. 4. Implement 0/1 Knapsack problem using Dynamic Programming. 5. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm. 6. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm. 7. a. Print all the nodes reachable from a given	Subject Name change

		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.	starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method. 8. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm. 9. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. 10. Implement N Queen's problem using Back Tracking.	
	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	**Advance Java Lab** List of Experiments: 1. Introduction To Swing, MVC Architecture, Applets, Applications and Pluggable Look and Feel, Basic swing components : Text Fields, Buttons, Toggle Buttons, Checkboxes, and Radio Buttons 2. Java database Programming, java.sql Package, JDBC driver, Network Programming With java.net Package, Client and Server Programs, Content And Protocol Handlers 3. RMI architecture, RMI registry, Writing distributed application with RMI, Naming services, Naming And Directory Services, Overview of JNDI, Object serialization and Internationalization 4. J2EE architecture, Enterprise application concepts, n-tier application concepts, J2EE platform, HTTP protocol, web application, Web containers and Application servers 5. Server side programming with Java Servlet, HTTP and Servlet, Servlet API, life cycle, configuration and context, Request and Response objects, Session handling and event handling, Introduction to filters with writing simple filter application 6. JSP architecture, JSP page life cycle, JSP elements, Expression Language, Tag Extensions, Tag Extension API, Tag handlers, JSP Fragments, Tag Files, JSTL, Core Tag library, overview of XML Tag library, SQL Tag library and Functions Tag library	**New subject**

	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:	**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, Pseudocolouring, 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.	Code change

		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.		
	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	Machine Learning UNIT I: Supervised learning algorithm: Introduction, types of learning, application, Supervised learning: Linear Regression Model, Naïve Bayes classifier Decision Tree, K nearest neighbor, Logistic Regression, Support Vector Machine, Random forest algorithm UNIT II: Unsupervised learning algorithm: Grouping unlabelled item susing k-means clustering, Hierarchical Clustering, Probabilistic clustering, Association rule mining, Apriori Algorithm, f-p growth algorithm, Gaussian mixture model. UNIT III: Introduction to Statistical Learning Theory, Feature extraction-Principal component analysis, Singular value decomposition. Feature selection–feature ranking and subset selection, filter, wrapper and embedded methods, Evaluating Machine Learning algorithms and Model Selection. UNIT IV: Semi supervised learning, Reinforcement learning : Markov decision process (MDP), Bellman equations, policy evaluation using Monte Carlo, Policy iteration and Value iteration, Q-Learning, State-Action-Reward-State-Action (SARSA), Model-based Reinforcement Learning. UNIT V: Recommended system, Collaborative filtering,	New subject

		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.	Content-based filtering Artificial neural network, Perceptron, Multilayer network, Back propagation, Introduction to Deep learning.	
	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.	**Information Security System** UNIT I: Introduction to security attacks: services and mechanism, classical encryption techniques-substitution ciphers and transposition ciphers, cryptanalysis, stream and block ciphers. UNIT II: Modern block ciphers: Block Cipher structure, Data Encryptionstandard (DES) with example, strength ofDES, Design principles ofblock cipher, AES with structure, its transformation functions, keyexpansion, example and implementation.Multiple encryption and triple DES, Electronic Code Book, CipherBlock Chaining Mode, Cipher Feedback mode, Output Feedbackmode, Counter mode.	**Code change**

		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	UNIT III: Public Key Cryptosystems with Applications: Requirements and Cryptanalysis, RSA cryptosystem, Rabin cryptosystem, Elgamal crypto system, Elliptic curve cryptosystem UNIT IV: Cryptographic Hash Functions, their applications: Simple hash functions, its requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA).Message Authentication Codes, its requirements and security, MACs based on Hash Functions, Macs based on Block Ciphers .Digital Signature, its properties, requirements and security, various digital signature schemes (Elgamal and Schnorr), NIST digital Signature algorithm. UNIT V: Key management and distribution: symmetric key distribution using symmetric and asymmetric encryptions, distribution of public keys, X.509 certificates, Public key infrastructure. Remote user authentication with symmetric and asymmetric encryption, Kerberos Web Security threats and approaches, SSL architecture and protocol, Transport layer security, HTTPS and SSH	

		Definition & descriptions of Theory & Organization of Linear bounded Automata Properties of context-sensitive languages		
	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,	**Computer Architecture and Organization** UNIT I: Computer Data Representation: Basic computer data types, Complements, Fixed point representation, Register Transfer and Micro-operations: Floating point representation, Register Transfer language, Register Transfer, Bus and Memory Transfers (Tree-State Bus Buffers, Memory Transfer), Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logical shift unit. Basic Computer Organization and Design Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description, Design of Basic computer, design of Accumulator Unit UNIT II: Programming The Basic Computer: Introduction, Machine Language, Assembly Language, assembler, Program loops, Programming Arithmetic and logic operations, subroutines, I-O Programming. Micro programmed Control: Control Memory, Address sequencing, Micro program Example, design of control UNIT III: Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC) Pipeline And Vector Processing, Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processors UNIT IV: Computer Arithmetic: Introduction, Addition and subtraction, Multiplication Algorithms (Booth Multiplication Algorithm), Division Algorithms, Floating Point Arithmetic operations, Decimal Arithmetic Unit. Input-Output Organization, Input-Output Interface, Asynchronous Data Transfer, Modes Of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPU IOP Communication, Serial communication UNIT V: Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory. Multiprocessors: Characteristics of	Code change and minor title change

		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.	Multiprocessors, Interconnection Structures, Inter-processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence, Shared Memory Multiprocessors.	
	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	**Artificial Intelligence** UNIT I: Introduction to AI and Intelligent agent: Different Approach of AI, Problem Solving : Solving Problems by Searching, Uninformed search, BFS, DFS, Iterative deepening, Bi directional search, Hill climbing, Informed search techniques: heuristic, Greedy search, A* search, AO* search, constraint satisfaction problems. UNIT II: Game Playing: Minimax, alpha-beta pruning, jug problem, chess problem, tiles problem UNIT III: Knowledge and Reasoning: Building a Knowledge Base: Propositional logic, first order logic, situation calculus. Theorem Proving in First Order Logic. Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks UNIT IV: Learning: Overview of different forms of learning, Supervised base learning: Learning Decision Trees, SVM, Unsupervised based learning, Market Basket Analysis, Neural Networks. UNIT V: Introduction to Natural Language Processing: Different issue involved in NLP, Expert System, Robotics.	Code change

		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		
	BTCS 606		**Cloud Computing** UNIT I: Introduction: Objective, scope and outcome of the course. 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 centre Design and inter connection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Fractures of cloud programming, Parallel and distributed programming paradigms-Map Reduce, Had oop, High level Language for Cloud. Programming of Google App engine. UNIT III: Virtualization Technology: Definition, Understanding andBenefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms, Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices,Virtual Cluster	New subject

			and Resources Management, Virtualization ofServer, Desktop, Network, and Virtualization of data-centre 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 App Engine, Microsoft Azure Design, Aneka: Cloud Application Platform-Integration of Private and Public Clouds Cloud applications: Protein structure prediction, Data Analysis, Satellite Image Processing, CRM	
	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.		Subject removed

		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.		
	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		**Subject available with code change**

		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.		
	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,		Subject available with different code

		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.		

	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.		Subject available with different code

	BTCS 607A		**Distributed System** UNIT I: Distributed Systems :Features of distributed systems, nodes of a distributed system, Distributed computation paradigms, Model ofdistributed 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 oftime 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, GraphModels for Process Representation, Client/Server Model, Time Services,Language Mechanisms for Synchronization, Object Model ResourceServers, Characteristics of Concurrent Programming Languages (Languagenot included).Inter-process Communication and Coordination: MessagePassing, Request/Reply and Transaction Communication, Name andDirectory services, RPC and RMI case studies UNIT III: Distributed Process Scheduling:A System Performance Model, StaticProcess Scheduling with Communication, Dynamic Load Sharing andBalancing, Distributed Process Implementation. Distributed File Systems:Transparencies and Characteristics of DFS, DFS Design andimplementation, Transaction Service and Concurrency Control, Data andFile Replication. Case studies: Sun network file systems, General Parallelfile 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, Modelling a Distributed Computation, Failures in a Distributed System, Distributed Mutual Exclusion, Election, Distributed Deadlock handling, and Distributed termination detection. UNIT V:	Code change

			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	
	BTCS 607B		**Software Defined Network** UNIT I: History and Evolution of Software Defined Networking (SDN):Separation of Control Plane and Data Plane, IETF Forces, Active Networking. Control and Data Plane Separation: Concepts, Advantages and Disadvantages, the Open Flow protocol.. UNIT II: 033Network Virtualization: Concepts, Applications, Existing Network Virtualization Framework (VMWare and others), Mininet based examples. Control Plane: Overview, Existing SDN Controllers including Floodlight and Open Daylight projects UNIT III: 054Customization of Control Plane: Switching and Firewall Implementation using SDN Concepts. Data Plane: Software-based and Hardware-based; Programmable Network Hardware.. UNIT IV: 075Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs. Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications UNIT V: 076DataCenter Networks: Packet, Optical and Wireless Architectures, Network Topologies.Use Cases of SDNs: Data Centers, Internet Exchange Points, Backbone Networks, Home Networks, Traffic Engineering. Programming Assignments forimplementing some of the theoretical concepts listed above.	**New subject**
	BTCS 607C		**Ecommerce & ERP** UNIT I: Introduction toE-Commerce:Defining Commerce; Main Activities ofElectronic Commerce; Benefits of E-Commerce; Broad Goals of ElectronicCommerce; Main Components of E-Commerce; Functions of ElectronicCommerce–Communication, Process Management, Service Management,Transaction	New subject

			Capabilities; Process of E-Commerce; Types of E-Commerce;Role of Internet and Web in E-Commerce; Technologies Used; E-Commerce Systems; Pre-requisites of E-Commerce; Scope of E-Commerce; E-Business Models. UNIT II: E-Commerce Activities:VariousActivities of E-Commerce; VariousModes of Operation Associated with E-Commerce; Matrix of E-CommerceTypes; Elements and Resources Impacting E-Commerce and Changes;Types of E-Commerce Providers and Vendors; Man Power Associated withE-Commerce Activities; Opportunity Development for E-CommerceStages; Development of E-Commerce Business Case; Components andFactors for the Development of the Business Case; Steps to Design andDevelop an E-Commerce Website. UNIT III: Internet–The Backbone for E-Commerce:Early Ages of Internet;Networking Categories; Characteristics of Internet; Components ofInternet–Internet Services, Elements of Internet, Uniform ResourceLocators, Internet Protocol; Shopping Cart, Cookies and E-Commerce;Web Site Communication; StrategicCapabilities of Internet. UNIT IV: SP, WWW and Portals:Internet Service Provider (ISP); World Wide Web(WWW); Portals–Steps to build homepage, Metadata; Advantages ofPortal; Enterprise Information Portal (EIP).E-Commerce & OnlinePublishing:This unit explains the concept of online publishing, strategiesand approaches of online publishing, and online advertising UNIT V: XML and Data Warehousing:Definition of eXtensible MarkupLanguage(XML); XML Development Goals; Comparison between HTML and XML;Business importance in using XML Based Technology; Advantages,Disadvantages and Applications of XML; Structure of an XML Document;XHTML and X/Secure; Data Warehousing; Data Marts and OperationalData Stores.E-Marketing:Traditional Marketing; E-Marketing; Identifying WebPresence Goals–Achieving web presence goals, Uniqueness of the web,Meeting the needs of website visitors, Site Adhesion: Content, format and access; Maintaininga Website; Metrics Defining Internet Units of Measurement; Online Marketing; Advantages of Online Marketing.	
	BTCS 608	**Computer Graphics & Multimedia Lab** 1 Implementation of Line, Circle and ellipse attributes	**Digital Image Processing Lab** List of Experiments 1. Point-to-point transformation. This laboratory experiment provides for	Code change

		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	thresholding an image and the evaluation of its histogram. Histogram equalization. This experiment illustrates the relationship among the intensities (gray levels) of an image and its histogram. 2. Geometric transformations. This experiment shows image rotation, scaling, and translation. Two-dimensional Fourier transform 3. Linear filtering using convolution. Highly selective filters. 4. Ideal filters in the frequency domain. Non Linear filtering using convolutional masks. Edge detection. This experiment enables students to understand the concept of edge detectors and their operation in noisy images. 5. Morphological operations: This experiment is intended so students can appreciate the effect of morphological operations using a small structuring element on simple binary images. The operations that can be performed are erosion, dilation, opening, closing, open-close, close-open.	
	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	**Machine Learning Lab** List of Experiments 1. Implement and demonstrate the FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file. 2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination	New subject

		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	algorithm to output a description of the set of all hypotheses consistent with the training examples. 3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample 4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets 5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets. 6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set. 7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API. 8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program. 9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris	

		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	data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem. 10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.	

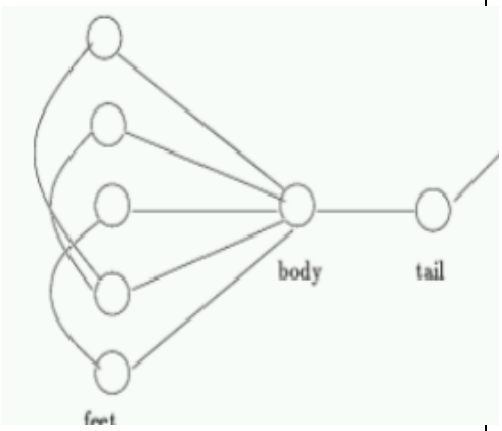
		vertices. Give an O(|V| log |V| + |E|) time algorithm to find the shortest path among the set of paths possible from any node in S to any node in D. ii. Paths in Directed Acyclic Graph a. Counting the number of paths Given two nodes u,v in a directed acyclic graph G(V,E). Give an O(|E|) time algorithm 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	Python Lab List of Experiments 1. Write a program to demonstrate basic data type in python. 2. Write a program to compute distance between two points taking input from the user Write a program add.py that takes 2 numbers as command line arguments and prints its sum. 3. Write a Program for checking whether the given number is an even number or not. Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10 4. Write a Program to demonstrate list and tuple in python. Write a program using a for loop that loops over a sequence. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero. 5. Find the sum of all the primes below two million. By considering the terms in the Fibonacci sequence whose values do not exceed four million, WAP to find the sum of the even-valued terms.	New subject

		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	6. Write a program to count the numbers of characters in the string and store them in a dictionary data structure Write a program to use split and join methods in the string and trace a birthday of a person with a dictionary data structure 7. Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file? Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file? 8. Write a program to print each line of a file in reverse order. Write a program to compute the number of characters, words and lines in a file. 9. Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on. Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line. 10. Write a program to implement Merge sort. Write a program to implement Selection sort, Insertion sort.	

		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	**Mobile Application Development Lab** List of Experiments 1. To study Android Studio and android studio installation. Create "Hello World" application. 2. To understand Activity, Intent, Create sample application with login module.(Check username and password). 3. Design simple GUI application with activity and intents e.g. calculator. 4. Develop an application that makes use of RSS Feed. 5. Write an application that draws basic graphical primitives on the screen 6. Create an android app for database creation using SQLite Database. 7. Develop a native application that uses GPS location information	**New subject**

		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.	8. Implement an application that writes data to the SD card. 9. Design a gaming application 10. Create an application to handle images and videos according to size.	
	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,	**Internet of Things** UNIT-1 Introduction: Objective, scope and outcome of the course. UNIT-2 Introduction to IoT: Definition and characteristics of IoT, Design of IOT: Physical design of IOT, Logical Design of IOT-Functional Blocks, communication models, communication APIs, IOT enabling Technologies- Wireless Sensor Networks, Cloud computing, big data analytics, embedded systems. IOT Levels and deployment templates. UNIT-3 IoT Hardware and Software: Sensor and actuator, Humidity sensors, Ultrasonic sensor, Temperature Sensor, Arduino, Raspberry Pi, LiteOS, RIoTOS, Contiki OS, Tiny OS. UNIT-4 Architecture and Reference Model: Introduction, Reference Model and architecture, Representational State Transfer (REST) architectural style, Uniform Resource Identifiers	New subject

		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.	(URIs). Challenges in IoT- Design challenges, Development challenges, Security challenges, Other challenges. UNIT-5 IOT and M2M: M2M, Difference and similarities between IOT and M2M, Software defined networks, network function virtualization, difference between SDN and NFV for IoT. Case study of IoT Applications: Domain specific IOTs- Home automation, Cities, environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyles.	
	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		Subject available different code

		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.		
	BTCSOE 702A		**Principle of Electronic Communication** UNIT-1 Introduction: Objective, scope and outcome of the course. UNIT-2 Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels. Simple description on Modulation: Analog Modulation-AM, Frequency modulation-FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes. UNIT-3 Telecommunication Systems: Telephones Telephone system, Paging systems, Internet, Telephony. Networking and Local Area	New subject

			Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN. UNIT-4 Satellite Communication: Satellite Orbits, satellite communication systems, satellite subsystems, Ground Stations Satellite Applications, Global Positioning systems. Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing. UNIT-5 Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA and WCDMA. Wireless Technologies: Wireless LAN, PANs and Bluetooth, Zig Bee and Mesh Wireless networks,	
	BTCSOE 702B		**Micro and Smart System Technology** UNIT-1 Introduction: Objective, scope and outcome of the course. UNIT-2 INTRODUCTION TO MICRO AND SMART SYSTEMS: (a) Smart-material systems-History, Introduction and evolution of smart materials, structures and systems. Components of a smart system. Application areas. Commercial products. (b) Microsystems- Introduction, History and their evolution, Feynman's vision. Micromachined transducers. Evolution of micro-manufacturing. Multi-disciplinary aspects. Applications areas. Commercial products. UNIT-3 MICRO AND SMART DEVICES AND SYSTEMS: PRINCIPLES AND MATERIALS: a) Definitions and salient features of sensors, actuators, and systems. b) Sensors: silicon capacitive accelerometer, piezo-resistive pressure sensor, blood analyzer, conductometric gas sensor, fiber-optic gyroscope and surface-acoustic-wave based wireless strain sensor. c) Actuators: silicon micro-mirror arrays, piezo-electric based inkjet print head, electrostatic comb-drive and micromotor, magnetic micro	New subject

			relay, shape memory-alloy based actuator, electro-thermal actuator. d) Systems: micro gas turbine, portable clinical analyzer, active noise control in a helicopter cabin. UNIT-4 MICROMANUFACTURING AND MATERIAL PROCESSING: a. Silicon wafer processing, lithography, thin-film deposition, etching (wet and dry), wafer-bonding, and metallization. b. Silicon micromachining: surface, bulk, moulding, bonding based process flows. c. Thick-film processing: d. Smart material processing: e. Processing of other materials: ceramics, polymers and metals f. Emerging trends. UNIT-5 MODELING: a. Scaling issues. b. Elastic deformation and stress analysis of beams and plates. Residual stresses and stress gradients. Thermal loading. Heat transfer issues. Basic fluids issues. c. Electrostatics. Coupled electromechanics. Electromagnetic actuation. Capillary electro-phoresis. Piezoresistive modeling. Piezoelectric modeling. Magnetostrictive actuators. UNIT-6 INTEGRATION AND PACKAGING OF MICROELECTRO MECHANICAL SYSTEMS: Integration of microelectronics and micro devices at wafer and chip levels. Microelectronic packaging: wire and ball bonding, flip-chip. Low temperature-cofired-ceramic (LTCC) multi-chip-module technology. Microsystem packaging examples. Examples from smart systems and micromachined accelerometer or a thermal cycler BEL pressure sensor, thermal cycler for DNA amplification, and active vibration control of a beam	
	BTCSOE 702C		**Optimization Techniques** UNIT-1 Introduction Objective, scope and outcome of the course. UNIT-2 Introduction and Classification Basic concept of optimization, Mathematical formulation of optimization problems; applications of optimization in chemical engineering. Classification of Optimization	New subject

			Problems - single variable problems, Multivariable problems without constraints, Multivariable problems with constraints, Maximization and minimization problems. Single Variable Optimization Necessary and sufficient conditions for optimum; interpolation method quadratic. Region elimination methods-internal halving, Fibonacci. UNIT-3 Multivariable Optimization Optimization of Functions One Dimensional Search: Analytical Methods: classification, stationary points, direct substitution, constrained variation, penalty function, Lagrangian Multiplier, Kuhn-Tucker theorem. Numerical methods general principles of numerical search, direction of search, final stage in search, direct search, pattern search. UNIT-4 Other Optimization Technics Introduction to geometric, dynamic and integer programming and genetic algorithms. Application of Geometric Programming: chemical engineering problems with degree of difficulty equal to zero or one with constraints. UNIT-5 Applications of Optimization Optimization of staged and discrete processes. Optimal shell-tube heat exchanger design. Optimal pipe diameter.	
	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	**Internet of Things Lab** 1 Start Raspberry Pi and try various Linix commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc. 2 Run some python programs on Pi like: a) Read your name and print Hello message with name b) Read two numbers and print their sum, difference, product and division. c) Word and character count of a given string. d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input. 3 Run some python programs on Pi like: a) Print a name 'n' times, where name and n are read from standard input, using for and while loops. b) Handle Divided by Zero Exception. c) Print current time for 10 times with an interval	New subject

		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.	of 10 seconds. d) Read a file line by line and print the word count of each line. 4 a) Light an LED through Python program b) Get input from two switches and switch on corresponding LEDs c) Flash an LED at a given on time and off time cycle, where the two times are taken from a file. 5 a) Flash an LED based on cron output (acts as an alarm) b) Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load. c) Get the status of a bulb at a remote place (on the LAN) through web. 6 The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.	
	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.	**Cyber Security Lab** 1 Implement the following Substitution & Transposition Techniques concepts: a) Caesar Cipherb) Rail fence row & Column Transformation 2 Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob). 3 Implement the following Attack: a) Dictionary Attack b) Brute Force Attack 4 Installation of Wire shark, tcpdump, etc and observe data transferred in client server communication using UDP/TCP and identify the	New subject

		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.	UDP/TCP datagram. 5 Installation of rootkits and study about the variety of options. 6 Perform an Experiment to Sniff Traffic using ARP Poisoning. 7 Demonstrate intrusion detection systems using any tool (snort or any other s/w). 8 Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures. PROJECT: In a small area location such as a house, office or in a classroom, there is a small network called a Local Area Network (LAN). The project aims to transfer a file peer-to-peer from one computer to another computer in the same LAN. It provides the necessary authentication for file transferring in the network transmission. By implementing the Server-Client technology, use a File Transfer Protocol mechanism and through socket programming, the end user is able to send and receive the encrypted and decrypted file in the LAN. An additional aim of the project is to transfer a file between computers securely in LANs. Elements of security are needed in the project because securing the files is an important task, which ensures files are not captured or altered by anyone on the same network. Whenever you transmit files over a network, there is a good chance your data will be encrypted by encryption technique. Any algorithm like AES is used to encrypt the file that needs to transfer to another computer. The encrypted file is then sent to a receiver computer and will need to be decrypted before the user can open the file.	
	BTCS 705	**Compiler Construction** UNIT I Compiler, Translator, Interpreter definition, Phase of compiler introduction to one pass & Multipass compilers, Bootstrapping,	**Industrial Training**	Code change

		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.		
	BTCS 706		Seminar	Code change
	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]		
	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,		Code change

		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.		
	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		Removed

		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.		
	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:	Social Outreach, Discipline &Extra Curricular Activities	Code change

		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		Removed

		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		Code change

		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		
	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.	Big Data Analytics UNIT-1 Introduction: Objective, scope and outcome of the course. 01 UNIT-2 Introduction to Big Data: Big data features and challenges, Problems with Traditional Large-Scale System , Sources of Big Data, 3 V's of Big Data, Types of Data. Working with Big Data: Google File System. Hadoop Distributed File System (HDFS) - Building blocks of Hadoop (Namenode. Data node. Secondary Namenode. Job Tracker. Task Tracker), Introducing and Configuring Hadoop cluster (Local. Pseudodistributed mode, Fully Distributed mode). Configuring XML files. UNIT-3 Writing MapReduce Programs: A Weather Dataset. Understanding Hadoop API for MapReduce Framework (Old and New). Basic programs of Hadoop MapReduce: Driver code. Mapper code, Reducer code. Record Reader, Combiner, Partitioner. UNIT-4 Hadoop I/O: The Writable Interface. Writable Comparable and comparators. Writable Classes: Writable wrappers for Java primitives. Text. Bytes Writable. Null Writable, Object Writable and Generic Writable. Writable collections. Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators. UNIT-5 Pig:Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow. Working through the ABCs of Pig Latin. Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin. Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive. Examining the Hive Clients. Working with Hive Data Types. Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data	**New subject**
	BTCS 802	Digital Image Processing	Robotics and control Unit-1	New subject

		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	Introduction: Introduction to control problem-Industrial Control examples.Transfer function. System response. Control hardware and their models: potentiometers, synchros, LVDT, dc and acservo motors, tacho-generators, electro hydraulic valves, hydraulic servomotors, electropneumatic valves, pneumatic actuators. Closed-loop systems. Blockdiagram and signal flow graph analysis. Stability, steady-state accuracy,transient accuracy, disturbance rejection, insensitivity and robustness.proportional, integral and derivative systems. Feedforward and multi-loop control configurations, stability concept, relative stability, Routhstability criterion Unit-2 Time response of second-order systems-steady-state errors and errorconstants. Performance specifications in time-domain. Lead and lagcompensation.Frequency-response analysis-Polar plots, Bode plot, stability infrequency domain, Nyquist plots. Nyquist stability criterion. Performance specifications in frequency-domain.. Lead and Lag compensation.07 Unit-3 ROBOT ARM KINEMATICS: Introduction, The direct KinematicsProblem, Rotation Matrices, Composite Rotation Matrix, Rotation matrixabout an arbitrary axis, Rotation matrix with Euler anglerepresentation,Geometric interpretation of Homogeneous transformation matrices,composite homogeneous transformation matrix, Links joints and theirparameters. The Denavit Hartenberg representation. Kinematicequations for manipulators, Otherspecifications of the locations of theEnd-Effector, Classification of Manipulators, The inverse Kinematicsproblem, Inverse Transform	

			Technique for Euler Angles Solution08 Unit-4 Planning of Manipulator Trajectories: Introduction, General considerations on Trajectory planning, joint-interpolated Trajectories, calculation of a 4-3-4 Joint trajectory, Cubic Spline Trajectory. Sensing: Range sensing, Triangulation, Structured Lighting Approach, Time-of-Flight range finders. Proximity sensing, Inductive sensors, Hall effect sensors, CapacitiveSensors, Ultrasonic sensors, Optical Proximity Sensors, Touch sensors,Binary sensors, Analog sensors, Force and Torque sensing, Elements ofa Wrist sensor.LOW-LEVEL VISION:Image acquisition, illumination Techniques,imaging geometry, some basic transformations, perspectivetransformations.Higher-Level Vision: Segmentation, Edge Linking and Boundarydetection, Unit-5 Camera model, camera calibration, stereo imaging, some basicrelationships between pixels, Neighbours of a Pixel, connectivity,distance measures, Preprocessing, Spatial-Domain methods, Frequency-Domain methods, Smoothing, Enhancement, Edge detection,Thresholding.Thresholding. Region-oriented segmentation, the use of motion, description, Boundary descriptors, Regional descriptors.	
	BTCS802C		Simulation Modeling and Analysis Unit-1 Physicalmodeling:Conceptofsystemandenvironment,continuousanddiscretesystem,linearandnonlin	New subject

			earsystem,stochasticactivities,staticanddynamicmodels,principlesusedinmodeling,Basicsimulationmodeling,4Roleofsimulationinmodelevaluationandstudies,AdvantagesandDisadvantagesofsimulation.ModelingofSystems,iconicanalog.MathematicalModeling Unit-2 Computersystemsimulation:Techniqueofsimulation,MonteCarlomethod,experimentalnatureofsimulation,numericalcomputationtechniques,continuoussystemmodels,analogandhybridsimulation,feedbacksystems4Buildingssimulationmodelsofwaitinglinesystem,Jobshop,materialhandlingandflexiblemanufacturingsystems. Unit-3 Probability concepts in simulation: Stochastic variables, discrete and continuous probability functions mainly Normal, log normal, Weibull, exponential, Uniform, Poisson, Binomial, Triangular, Erlang etc. Unit-3 RandomNumbers:Properties,Generationsmethods,TestsforRandomnumber-Frequencytest,Runstest,Autocorrelationtest.RandomVariateGeneration:InverseTransformTechnique-Exponential,Uniform,Weibull,Triangulardistributions,DirecttransformationforNormalandlognormalDistributions,convolutionmethods-Erlangdistribution, Acceptance Rejection Technique Unit-4 Input Modeling: Data collection, Identification and distribution with data, parameter estimation, Goodness of fit tests, Selection of input models without data, Multivariate and time series analysis. Verification and validation: Design of simulation experiments, validation of experimental models, testing and analysis.	

			Unit-5 Output Analysis–Types of Simulations with Respect to Output Analysis, Stochastic Nature of output data, MeasuresofPerformanceandtheirestimation,Outputanalysisofterminatingsimulation,Output analysis of steady state simulations.4SelectionofSimulationSoftware,Simulationpackages,TrendinSimulation. Do modeling using ARENA software which is freely available. Some more suggested simulation packages are Promodel, Quest, Witness, Extend, Simio etc. Students can learn	
	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	Big Data Analytics Lab 1 Implement the following Data structures in Java i) Linked Lists ii) Stacks iii) Queues iv) Set v) Map 2 Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo distributed, Fully distributed. 3 Implement the following file management tasks in Hadoop: Adding files and directories Retrieving files Deleting files Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities. 4 Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm. 5 Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented. 6 Implement Matrix Multiplication with Hadoop Map Reduce 7 Install and Run Pig then write Pig Latin scripts	New subject

		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.	to sort, group, join, project, and filter your data. 8 Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes. 9 Solve some real life big data problems.	
	BTCS804		Software Testing and Validation Lab 1 a) Write a program that calculates the area and perimeter of the circle. And find the Coverage & Test Cases of that program using JaButi Tool. b) Write a program which read the first name and last name from console and matching with expected result by using JaBuTi. c) Write a program that takes three double numbers from the java console representing , respectively, the three coefficients a,b, and c of a quadratic equation. d) Write a program that reads commercial website URL from a url from file .you should expect that the URL starts with www and ends with .com. retrieve the name of the site and output it. For instance, if the user inputs www.yahoo.com, you should output yahoo. After	New subject

that find the test cases and coverage using JaButi.

e) Write a program for a calculator and find the test case and coverage and Def-use-graph.

f) Write a program that reads two words representing passwords from the java console and outputs the number of character in the smaller of the two. For example, if the words are open and sesame, then the output should be 4, the length of the shorter word, open. And test this program using JaButi

2 Analyze the performance of following website using JMeter.

Site	Website
Amazon	Amazon.com
Flip kart	Flipkart.com
Railway reservation	Irctc.co.in
Train searching	Erail.in

3 Calculate the mutation score of programs given in 1(a) to 1 (f) using jumble Tool.

4 Calculate the coverage analysis of programs given in 1 (a) to 1 (f) using Eclemma Free open source Tool.

5 Generate Test sequences and validate using Selenium tool for given websites below:

Site	Website
Amazon	Amazon.co
Flip kart	Flipkart.co
Railway reservation	Irctc.co.in
Train searching	Erail.in

	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		**Removed**

		architectures for disk storage systems. Fault tolerance in interconnection networks. Fault-tolerant routing techniques.		
	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		Removed

		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		
	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		Removed

	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	Project	Code change
	BTCS 806	FPGA Lab Fundamental Theory • Introduction to DSP architectures and programming • Sampling Theory, Analog-to-Digital Converter (ADC), Digital-	Social Outreach, Discipline &Extra Curricular Activities	New subject

		toAnalog Converter (DAC), and Quantization; • Decimation, Interpolation, Convolution, Simple Moving Average; • Periodic Signals and harmonics; Design (Simulation) using MATLAB/ Simulink • Simulate the lab exercises using MATLAB/Simulink • Fourier Transform (DFT/FFT), Spectral Analysis, and time/spectrum representations; FIR and IIR Filters; 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		
	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		Subject available with different code

Calculation:

$$\textbf{Syllabus Revision Calculation}: = \frac{\textbf{Course in which syllabus revision occurs}}{\textbf{Total Number of Courses}} \times \mathbf{100}$$

$$= \frac{\mathbf{50}}{\mathbf{90}} \times \mathbf{100}$$

$$\cong \mathbf{55.55}\%$$