Curriculum and Syllabus of Bachelor of Technology in Computer Science

Semester I

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BTCS101HST	English Communication	3	1	0	4	30	70	100
2	BTCS101BST	Engineering Mathematics-I	3	1	0	4	30	70	100
3	BTCS102BST	Engineering Physics	2	1	0	3	30	70	100
4	BTCS103BST	Engineering Chemistry	2	1	0	3	30	70	100
5	BTCS101EST	Basic Electrical Engineering	3	1	0	4	30	70	100
6	BTCS101PCT	Computer Fundamentals and Programming	3	1	0	4	30	70	100
7	BTCS150BSP	Engineering Physics Lab.	0	0	3	2	50	50	100
8	BTCS151BSP	Engineering Chemistry Lab.	0	0	3	2	50	50	100
9	BTCS150ESP	Basic Electrical Engineering Lab	0	0	3	2	50	50	100
10	BTCS150PCP	Basic Programming Lab	0	0	3	2	50	50	100
11	BTCS101NCT	Tarseel-e-Urdu.	2	0	0	-	30	70	100
	Total					30	410	690	1100

Semester II

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BTCS201BST	Engineering Mathematics – II	3	1	0	4	30	70	100
2	BTCS201EST	Basic Engineering Mechanics	3	0	0	3	30	70	100
3	BTCS202EST	Engineering Graphics	2	0	3	4	30	70	100
4	BTCS203EST	Basic Electronics	3	1	0	4	30	70	100
5	BTCS201HST	Environmental Studies	3	0	0	3	30	70	100
6	BTCS201PCT	Computer Programming using C++	3	1	0	4	30	70	100
7	BTCS250HSP	English Language Communication Skills Lab	0	0	3	2	50	50	100
8	BTCS250ESP	Engineering workshop	0	0	3	2	50	50	100
9	BTCS250PCP	Computer Programming using C++ Lab	0	0	3	2	50	50	100
	Total					28	330	570	900

Semester III

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BTCS301BST	Probability & Statistics	3	1	0	4	30	70	100
2	BTCS301PCT	Mathematical Foundations of Computer Science	3	1	0	4	30	70	100
3	BTCS302PCT	Data Structures	3	1	0	4	30	70	100
4	BTCS303PCT	Computer Organization	3	1	0	4	30	70	100
5	BTCS304PCT	Digital Logic Design	3	1	0	4	30	70	100
6	BTCS350PCP	Data Structures LAB Using C/C++ Lab.	0	0	3	2	50	50	100
7	BTCS351PCP	Computer Organization and Digital Logic Design Lab	0	0	3	2	50	50	100
	Total					24	250	450	700

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Semester IV

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BTCS401PCT	Java Programming	3	1	0	4	30	70	100
2	BTCS402PCT	Data Base Management System	3	1	0	4	30	70	100
3	BTCS403PCT	Operating System	3	1	0	4	30	70	100
4	BTCS404PCT	Formal Languages and Automata Theory	3	1	0	4	30	70	100
5	BTCS401HST	Managerial Economics And Financial Analysis	3	1	0	4	30	70	100
6	BTCS450PCP	Java Programming Lab	0	0	3	2	50	50	100
7	BTCS451PCP	Data Base Management Systems Lab	0	0	3	2	50	50	100
	Total					24	250	450	700

Semester V

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BTCS501PCT	Data Communication & Computer Networks s	3	1	0	4	30	70	100
2	BTCS502PCT	Design Analysis and Algorithms	3	1	0	4	30	70	100
3	BTCS503PCT	Compiler Design	3	1	0	4	30	70	100
4	BTCS504PCT	Principles of programming Languages	3	1	0	4	30	70	100
5	BTCS505PCT	Microprocessors & Assembly Language	3	1	0	4	30	70	100
6	BTCS550PCP	Compiler Design & Computer Networks s Lab	0	0	3	2	50	50	100
7	BTCS551PCP	Microprocessors & Assembly language Lab	0	0	3	2	50	50	100
	Total					24	250	450	700

Semester VI

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BTCS601PCT	Object Oriented Analysis and Design	3	1	0	4	30	70	100
2	BTCS602PCT	Computer Graphics	3	1	0	4	30	70	100
3	BTCS603PCT	Software Engineering	3	1	0	4	30	70	100
4	BTCS604PCT	Data Ware Housing and Data Mining	3	1	0	4	30	70	100
5	BTCS605PCT	E-Commerce	3	1	0	4	30	70	100
6	BTCS650PCP	Unified Modeling Language Lab	0	0	3	2	50	50	100
7	BTCS651PCP	Computer Graphics Lab	0	0	3	2	50	50	100
	Total					24	250	450	700

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Semester VII

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BTCS701PCT	Linux Programming	3	1	0	4	30	70	100
2	BTCS702PCT	Software Testing Methodologies	3	1	0	4	30	70	100
3	BTCS703PCT	Web Technologies	3	1	0	4	30	70	100
4	BTCS750PCP	Linux Programming Lab	0	0	3	2	50	50	100
5	BTCS751PCP	Web Technologies Lab	0	0	3	2	50	50	100
6	BTCS752PCP	Minor Project	0	0	8	4	50	50	100
	BTCS701PET	ELECTIVE – I	3	1	0	4	30	70	100
	Total					24	270	430	700

S.No.	ELECTIVE – I
1	BTCS701PET - Cloud Computing
2	BTCS702PET - Distributed Computing
3	BTCS703PET - Mobile Computing
4	BTCS704PET - Software Project Management
5	BTCS705PET – Soft Computing

Semester VIII

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BTCS801PCT	Networks Security	3	1	0	4	30	70	100
2	BTCS850PCP	Major Project	0	0	24	12	200	200	400
3	BTCS801PET	ELECTIVE – III	3	1	0	4	30	70	100
4	BTCS810PET	ELECTIVE – IV	3	1	0	4	30	70	100
	Total					24	290	410	700

S.No.	ELECTIVE – III	ELECTIVE – IV
1	BTCS801PET - Web Services	BTCS811PET -Adhoc and Sensor Networks s
2	BTCS802PET -Semantic Web and Social Networks s	BTCS812PET -Storage area Networks s
3	BTCS803PET -Scripting Languages	BTCS813PET -Database Security
4	BTCS804PET -Multimedia and Rich Internet applications	BTCS814PET -Embedded System
5	BTCS805PET – Artificial Intelligence	

BTCS101HST	English Communication	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

No specific prerequisite is required

Learning Objectives

1. Enhancement of the soft and communication skills
2. Understanding the phonetics & developing vocabulary
3. Writing applications, letters formal and non-formal, technical writing

Learning Outcomes

After successful completion of course student shall be able to:

1. Read and write paragraphs in English confidently & Differentiate among homonyms, homophones, synonmys and antonyms
2. Read and write the specific details and information such as writing applications, formal letters, CVs, technical reports and project reports
3. Comunicate with more confident among students, teachers & other stakeholders of the society

Course Content

UNIT 1

- Writing paragraphs
- Reading for subject
- Types of nouns and pronouns
- Homonyms, homophones, synonyms and antonyms

UNIT 2

- Reading for theme and gist
- Describing people, places objects, events
- Verb forms
- Noun, verb, adjective and adverb

UNIT 3

- Note-taking
- Reading for details
- Note-making, information transfer
- Present tense

UNIT 4

- Reading for specific details and information
- Writing formal letters and CVs
- Past and future tenses
- Vocabulary – Idioms and phrases

UNIT 5

- Technical reports, project reports
- Adjectives, prepositions and concord
- Collocations

Text Books:

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi.2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.

Reference Books:-

1. English Grammar Practice, Raj N Bakshi, Orient Longman.
2. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.

3. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
4. Enjoying Every day English published by sangam books, Hyderabad

BTCS101BST	Engineering Mathematics-I	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of Mathematics at 10+2 level

Learning Objectives

1. To understand fundamentals of mathematics and its application in the field of engineering.
2. Introduce the basic concepts of differential calculus, improper and multiple integration and differential equations.
3. Explain different mathematical distribution functions and their applications in engineering domain

Learning Outcomes

After successful completion of course student shall be able to:

1. Learn various value theorems – Generalized mean value theorem – Curvature, radius of Curvature, Centre of curvature. Learn envelopes in Cartesian and parametric coordinates – Jacobians and their properties
2. Learn the overview of differential equations and use of equations reducible to exact form using Integrating factors - Linear, Bernoulli ‘s equations
3. Learn the applications to Newton’s Law of Cooling – Law of natural growth and decay Orthogonal Trajectories in Cartesian and polar form

Course Content

UNIT I:

Differential Calculus Rolle’s theorem-Lagrange’s and Cauchy’s mean value theorems – Generalized mean value theorem – Curvature, radius of Curvature, Centre of curvature –Evolutes and Involutes – Envelopes in Cartesian and parametric coordinates – Jacobians and their properties.

UNIT II:

Improper Integration: Beta and Gamma functions, Beta function, various forms of beta function, properties of gamma function, Relation between beta and gamma function, complete function of gamma function

UNIT III:

Multiple Integration and applicatications- Double integrals in Cartesian coordinates, double integral in polar coordinates, change of variables, – Change of order of integration. Triple integration .Application of multiple integration.

UNIT IV:

Differential Equations I-Differential equations an overview –Exact and equations reducible to exact form using Integrating factors - Linear, Bernoulli ‘s equations – Applications to Newton’s Law of Cooling Law of natural growth and decay – Orthogonal Trajectories in Cartesian and polar form

UNIT V:

Differential equations II-Linear differential equations of higher order with constant coefficients complementary function and Particular Integrals - General form of Particular Integrals and special types such as e^{ax} , ,cosax, sinax, x^m, $e^{ax}V$, xV, method of variation of parameters for a second order differential equation – Applications to bending of beams, electrical circuits and simple harmonic motion.

Text Books:

1. Advanced Engineering Mathematics by B.S Grewal.
2. Advanced Engineering Mathematics by Kreyzsig

Reference Books:

1. Differential Calculus by shantinarayana
2. Engineering Mathematics by B.V Ramana

BTCS102BST	Engineering Physics	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of Physics at 10+2 level

Learning Objectives

1. To acquire competency in the field of engineering with adaptability to new development in science and technology
2. Demonstrate various scientific principles, engineering methods and technological development.
3. Learning basic properties and characteristics of light, Double slit and triple slit interference, Newton's rings, interference in thin films

Learning Outcomes

After successful completion of course student shall be able to:

1. Learn basic properties and characteristics of light, Double slit and triple slit interference, Newton's rings, interference in thin films
2. Understand the working principle of LASER, laser action, population inversion, Einstein coefficients, elementary laser types and applications of LASER
3. Understand magnetic field and forces, electric field and usage of quantum theory

Course Content

UNIT-I

Physics of Motion: Conservative & non conservative forces, Potential energy function in one, two and three dimensions, equation of motion for a conservative system (in one dimension), effect of friction on simple harmonic motion.

Special theory of relativity: Non relativistic view point, inertial and non-inertial frames, Galilean transformations, principle of relativity, Lorentz transformations and their consequences, mass, momentum and energy in relativity.

UNIT-II

Optics: Interference of light, Double slit and triple slit interference, Newton's rings, interference in thin films, single slit diffraction, N slit diffraction.

Introduction to lasers: qualitative introduction to lasers, uses of lasers. Principle of laser action, population inversion, Einstein coefficients, elementary laser types, applications of lasers.

UNIT-III

Electromagnetism: Maxwell's equations, wave equation, plane electromagnetic wave, Pointing vector, electromagnetic spectrum.

Quantum theory: Wave function, probability density, Schordinger equation, free article, particle in a box, system of two dissimilar particles, system of two identical particles.

UNIT-IV

Quantum Ideas: Photoelectric effect, Compton effect, Planck hypothesis, Bohr theory, de Broglie hypothesis, wave particle duality, uncertainty principle and its implications.

Physics of Solids: Classification of solids, Bragg diffraction technique, Electrical properties of solids, thermal properties, classical free electron model for metals, critical assessment of the model. Classical and quantum statistics, quantum free electron model of metals, critical assessment of the model, Fermi energy, intrinsic and extrinsic semiconductors, electron and hole densities, properties of semiconductors.

UNIT-V

Frontiers of Physics: Big bang model of the universe, critical assessment of the model, elementary particles and conservation laws, Last Nobel Prize in Physics.

Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-gel, Precipitation, Combustion Methods; Top-down Fabrication: Chemical Vapour Deposition, Physical Vapour Deposition, Pulsed Laser Vapour Deposition Methods, Characterization(XRD&TEM) and Applications.

Text Books:

1. Beiser : Modern Physics

2. Mani and Damask : Modern Physics

Reference Books:

1. Resnick and Halliday : Physics
2. M. Ratner & D. Ratner (Pearson Ed.): Nanotechnology
3. A.J. Decker (Macmillan): Solid State Physics
4. C. Kittel (Wiley Eastern): Introduction to Solid State Physics

BTCS103BST	Engineering Chemistry	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of Chemistry at 10+2 level

Learning Objectives

1. To understand the physical and chemical properties of atoms, treatment of water.
2. Explain reactivity of organic molecules, types of reactions and mechanism, Classification of fuel and Characteristic o f a good fuel.
3. Explain conventional fuels (solid, liquid, gaseous). Solid fuels- Coal analysis- (proximate and ultimate) and their significance. Liquid fuels – petroleum and its refining cracking – types – fixed bed catalytic.

Learning Outcomes

After successful completion of course student shall be able to:

4. Determine the hardness of Water by different methods & Understand the softening of water, Understand and learn types of reactions and mechanism
5. Classify the fuel Characteristics and learning the applications of natural gas, LPG and CNG.
1. Determine calorific value by Bomb Calorimeter, theoretical calculation of calorific value by Dulong's formula – Numerical problems on combustion

Course Content

UNIT I:

Water Treatment: Hardness of water, types of hardness, unites of hardness of water, determination of hardness of water by EDTA method. Boiler troubles - scale and sludge formation in boilers, caustic embrittlement, priming and foaming, Softening of water- Lime soda, permuted and ion exchange process. Problems

UNIT II:

Reactivity of Organic Molecules & Types of Reaction and Mechanism: Inductive effect, Resonance or Mesmeric effect, Electrometric effect, hyper conjugation, Carbocation, Carbanion & Free radical. Substitution, Addition and Elimination reaction. Mechanism of the following reactions Aldol condensation, Cannizzaro reaction, Hoffmann reaction & Diels-Alder reaction

UNIT III

Fuels and Combustion**:** Classification of fuel and Characteristic of a good fuel- conventional fuels (solid, liquid, gaseous). Solid fuels- Coal – analysis- (proximate and ultimate) and their significance. Liquid fuels – petroleum and its refining – Cracking – types – fixed bed catalytic cracking. Knocking – octane and cetane number. Synthetic petrol – Bergius and Fischer Tropsech's process, Gaseous fuels: Constituents, characteristics and applications of natural gas, LPG and CNG. Calorific value of fuel – HCV, LCV, determination of calorific value by Bomb Calorimeter, theoretical calculation of calorific value by Dulong's formula – Numerical problems on combustion.

UNIT IV

Corrosion and its control: Causes, Theories of corrosion – Chemical and electrochemical corrosion, Water line and pitting corrosion; Factors affecting rate of corrosion – Nature o f metal and Nature of environment. Corrosion control Methods: using pure metal and alloys, modifying the environment, cathodic protection (sacrificial anodic and impressed current cathodic). Surface coatings: Metallic coatings & methods of application of metallic coatings – hot dipping (galvanization & tinning), electroplating.

UNIT V

Lubricants: Classification – solid, semi-solid and liquid lubricants, characteristics of a good lubricant. Mechanism of lubrication – (Hydrodynamic, boundary and extreme pressure) - Properties of lubricants: viscosity, flash and fire points, cloud and pour point.

Refractories: Classification – acidic, basic and neutral refractories, characteristics of good refractory, properties of Refractories: refractoriness, refractoriness under load (RUL), porosity, thermal spalling and thermal conductivity, applications of refractories

Text Books:-

1. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpatrai Publishing Company (2008)
2. Engineering Chemistry by R.P Mani and K.N.Mishra, B. Rama Devi /CENGAGE learning

Reference Books

1. Engineering Chemistry by B. Siva Shankar Mc.Graw Hill Publishing Company Limited, New Delhi(2006)
2. Enginering Chemistry J.C. Kuriacase & J. Rajaram, Tata McGraw Hills co., New Delhi (2004).
3. Chemistry of Engineering Materials by CV Agarwal,C.P Murthy, A.Naidu, BS Publications.
4. Text of Engineering Chemistry by S.S. Dara & Mukkati S. Chand & Co,New Delhi(2006)
5. Applied Chemistry – A text for Engineering & Technology – Springar (2005).
6. Engineering Chemistry – R. Gopalan, D. Venkatappayya, D.V. Sulochana Nagarajan Vikas Publishers (2008).

BTCS101EST	Basic Electrical Engineering	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of Physics & Mathematics at 10+2 level

Learning Objectives

1. To understand the essence of electricity, conductors, semiconductors
2. Explain insulators, electric current, electromotive force
3. Demonstrate the principle of electric power, potential difference & Understand the working principle of a transformer, DC generators, AC motors

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the Networks reduction techniques – series, parallel and series parallel combination– Source transformation – star-to-delta ,delta-to-star transformation,Thevenin's theorem,Norton theorem
2. Analyse AC circuits with single basic Networks element, single phase series circuits,single phase parallel circuits,single phase series parallel circuits, power in ac circuits with simple related problems.
3. Learn the characteristics of series, shunt and compound motor, application of dc motor with suitable numerical problems.

Course Content

UNIT – I

Introduction to Electrical Circuits: Essence of electricity, conductors, semiconductors and insulators, electric current, electromotive force, electric power, potential difference, ohm's law, active and passive circuits,branch and loop in a circuit,types of sources, Kirchhoff's laws ,Networks reduction techniques – series, parallel and series parallel combination– Source transformation – star-to-delta ,delta-to-star transformation,Thevenin's theorem,Norton theorem and with simple related problems.

UNIT – II

Single Phase A.C Circuits:Principle of a.c ,sinusoidal emf equation, relationship between poles ,speed and frequency ,average value, RMS, form factor ,peak factor, phasor representation of alternating quantities ,the J -operator and phasor algebra difference , J-notation for alternative quantity, analysis ac circuits with single basic Networks element, single phase series circuits,single phase parallel circuits,single phase series parallel circuits, power in ac circuits and with simple related problems.

UNIT – III

Transformers: Principle of operations, construction details ,emf equation of transformer, types of transformer, ideal transformer and practical transformer, losses in a transformer, transformer test-open circuit ,short circuit, voltage regulation,effieiency and with simple related problems.

UNIT – IV

D.C Generators: Working principle of generator and constructional of dc generator, types of dc armature windings- lap and wave windings ,types of dc generators: methods of excitation, separately excited and self excited dc generators ,emf equation of a dc generator ,constant and variable losses,efficiency and condition for maximum efficiency and with simple related problems.

UNIT – V

D.C Motors: Working principle of dc motor ,significance of back emf equation, types of dc motors-shunt ,series and compound wound motor, production of torque in a dc motor, Characteristics of series, shunt and compound motor,losses in a dc motor, efficiency and maximum efficiency, application of dc motor and with simple related problems.

Induction Motor: Working principle, constructions of three phase Induction Motor, synchronous speed, torque, slip, rotor frequency, torque-slip characteristic, application, and with simple related problems.

TEXT BOOKS:

1. Networks Analysis by Vanvalkenburg, PHI.
2. Networks Theory: - N.C. Jagan & C.Lakshminarayana, B.S Publications.
3. Principle of Electrical Engineering- V.K.Metha-S.Chand Publisher.

REFERENCE BOOKS:

1. Electrical machines: P.S.bimbra, khanna publishers.
2. Electrical Circuits: S.Sudhakar, P.S.M.Satyanarayana, TMH Publication.
3. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata McGraw – Hill Publishers, 3rd edition, 2004.

BTCS101PCT	Fundamentals of Computer Programming	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

No specific pre-requisites is required

Learning Objectives

1. To provide an overview of computers and problem solving methods using 'C' language
2. Serve as a foundation for the study of programming languages.
3. Learn to develop program using 'C' language.

Learning Outcomes

After successful completion of course student shall be able to:

1. The student would acquire various problem solving techniques and implement them in 'C' language.
2. Understand the basic terminology used in computer programming and write, compile and debug programs in C language.
3. Develop programs involving decision structures, loops and functions using different data types and data structures

Course Content

UNIT – I

Introduction to Computers – Role of computers, Definition, Characteristics and Applications, Generations of Computer, Basic block diagram. CPU, Primary and Secondary storage devices and I/O Devices. Information Concepts: Data and its representation, Information and its characteristics, categories of information, Introduction System software and Application Software. Generation of computer languages, types of languages, language translators – Assembler, Interpreter, Compiler, Link and Loader. Introduction to Computer Networks s, History and usage of Internet, Browser and its types, Domain Name System (DNS), WWW, Electronic Mail (e-mail), Search Engines and Intranets.

UNIT-II

Introduction to programming – definitions and developing Algorithms and flowcharts for simple programs. Introduction to C Programming: Origin and history of c programming character set, Identifiers and keywords data types, constants, variables operators, symbolic constants, Expressions, compound statements, structure of C program, Input and output function.

UNIT – III

C Statements – selection statements – if nested if's, the if-else –if ladder the conditional expressions, switch statement nested switch statements, iteration statements – the for loop, for loop variations, the while loop, the do-while loop, declaring variable with in selection and iteration statements, jump statement, the return statement, the go to submit, break statement, exit ( ) function, the continue statement, expression statement. Block statements

UNIT – IV

Arrays – Array what is an array? – Array Declaration, Array Initialization – Accessing individual elements of an array – Two Dimensional Arrays – Passing an array element to a function – Rules of using an array. What are strings? String I/O, string Manipulation Functions – The General Form of a Function, elements of function, function categories, types of functions, Function Arguments Call by value, Call by Reference, return statement. Uses of functions. C pre – processor, storage classes – Automatic – Register, Static and external.

UNIT – V

Pointers – definition, pointer variables, pointer expressions, arithmetic pointers, pointers and arrays, initializing pointers and functions and problems with pointers. Structures – definition, accessing structure members, structure assignments, array of structures, passing structures, structure pointers, uses of structures Unions – definitions, difference between structure and union, type def. **Files** – introduction to streams and files, basics of files – file pointer, opening and closing files, writing and reading character, file functions.

Text Books:

1. Let Us C by Yashwanth Kanethar.
2. "Programming in ANSI C" by E. Balaguruswamy.

Reference Books:

1. Introduction to Computers by Peter Norton.
2. Introduction to Information Technology – Breaking Wave

3. Programming in C, 2nd Edition, Oxford by Pradip Dey, Mannas Ghosh

BTCS150BSP	Engineering Physics Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Knowledge of Physics at 10+2 level

Learning Objectives

1. To is to acquire competency in the field of engineering
2. Demonstrate to new development in physics laboratory by successfully completing the experiments.
3. Understand and learn basic theory and principles of science

Learning Outcomes

After successful completion of course student shall be able to:

1. Learn basic properties and characteristics of light, Double slit and triple slit interference, Newton's rings, interference in thin films
2. Understand the working principle of LASER, laser action, population inversion, Einstein coefficients, elementary laser types and applications of LASER
3. Understand magnetic field and forces, electric field and usage of quantum theory

Course Content

List of Experiments

1. Dispersive power of the material of a prism – Spectrometer
2. Determination of wavelength of a source – Diffraction Grating.
3. Newton's Rings - Radius of curvature of plano convex lens.
4. Melde's experiment – Transverse and longitudinal modes.
5. Time constant of an R-C circuit.
6. L-C-R circuit
7. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
8. Study the characteristics of LED and LASER sources.
9. Study the characteristics of p-i-n and avalanche photodiode detectors.
10. Bending losses of fibres.
11. Evaluation of numerical aperture of given fibre.
12. Energy gap of a material of p-n junction.
13. Thermo electric effect – Seebeck effect and Peltier effect.
14. Torsional pendulum.
15. Single slit diffraction using laser.

Text Books:

1. Beiser : Modern Physics
2. Mani and Damask : Modern Physics3.

Reference Books:

1. Resnick and Halliday : Physics
2. C. Kittel (Wiley Eastern): Introduction to Solid State

BTCS151BSP	Engineering Chemistry Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Knowledge of Chemistry at 10+2 level

Learning Objectives

1. To understand the physical and chemical properties of atoms, treatment of water.
2. Explain reactivity of organic molecules, types of reactions and mechanism, Classification of fuel and Characteristic of a good fuel.
3. Explain conventional fuels (solid, liquid, gaseous). Solid fuels- Coal analysis- (proximate and ultimate) and their significance. Liquid fuels – petroleum and its refining cracking – types – fixed bed catalytic.

Learning Outcomes

After successful completion of course student shall be able to:

1. Determine the hardness of Water by different methods & Understand the softening of water, Understand and learn types of reactions and mechanism
2. Classify the fuel Characteristics and learning the applications of natural gas, LPG and CNG.
3. Determine calorific value by Bomb Calorimeter, theoretical calculation of calorific value by Dulong's formula – Numerical problems on combustion

List of Experiments

1. Determination of carbonate and bicarbonate in a given mixture
2. Determination of temporary and permanent hardness in water sample using EDTA as standard solution
3. Determination of copper using standard sodium thiosulphate
4. Determination of chloride content in bleaching powder
5. Determination of iron content in the given water sample by Mohr's methods
6. pH- metric titration of acid and base
7. Conductometric titration of acid and base
8. Titration of acid and base by Potentiommetry
9. Recording of Cu^{+2} Spectrum, absorptivity (demo only) determination of λ_{max} and molar concentration by Spectrophotometer
10. Preparation of organic compound benzoic acid

Text Books:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Inorganic quantitative analysis, Vogel.

Reference Books:

1. Text Book of engineering chemistry by R. N. Goyal and Harrmendra Goel.
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

BTCS152ESP	Basic Electrical Engineering Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Knowledge of Physics & Mathematics at 10+2 level

Learning Objectives

1. To is to understand the essence of electricity, conductors, semiconductors
2. Demonstrate the characteristics of insulators, electric current.
3. Demonstration of electromotive force, electric power, potential difference.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the Networks reduction techniques – series, parallel and series parallel combination– Source transformation – star-to-delta ,delta-to-star transformation,Thevenin's theorem,Norton theorem
2. Analyse AC circuits with single basic Networks element, single phase series circuits,single phase parallel circuits,single phase series parallel circuits, power in ac circuits with simple related problems.
3. Learn the characteristics of series, shunt and compound motor, application of dc motor with suitable numerical problems.

Course Content

List of Experiments

1. Verification of Thevenin's and Norton Theorems
2. Study of Single –Phase R,L & C Series & Parallel Circuits
3. To Determine the Performance Characteristics of a Series Motor
4. To Determine the Performance Characteristics of a Shunt Motor
5. To Determine the Performance Characteristics of a Compound Motor
6. Speed Control of DC Shunt Motor
7. To Determine the Load Characteristics of a Shunt Generator
8. To Determine the Load Characteristics of a Single Phase Induction Motor
9. Measurement of Three Phase Power by Two Wattmeter Method
10. To Determine the Performance Characteristics of a Three Phase Induction Motor

Text Books:-

1. Basic Electrical Engineering, S.N. Singh, PHI, Learning Private Limited.
2. Electrical Machines M. N. Bandyopadhya, PHI, Learning Private Limited.

Reference Books:-

1. Electrical Machines, Ashfaq Husain, Dhanpatrai Company, 4th edition.
2. Basic Electrical Engineering, D.C. Kulshreshtha, revised 1st edition, Tata Mc-Graw Hill education pvt. Ltd.
3. Testing Commissioning Operation & Maintenance Of Electrical Equipment – S. Rao Khanna Publication.

BTCS153PCP	Programming Lab in C	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Basic knowledge of computer fundamentals

Learning Objectives

1. Provide an overview of computers and problem solving methods using 'C' language
2. Serve as a foundation for the study of programming languages.
3. Learn to develop program using 'C' language.

Learning Outcomes

After successful completion of course student shall be able to:

1. The student would acquire various problem solving techniques and will be able to implement them in 'C' language.
2. Understand the basic terminology used in computer programming and write, compile and debug programs in C language.
3. Develop programs involving decision structures, loops and functions using different data types and data structures & Understand difference between call by value and call by reference

Course Content

List of Experiments

1. Write C program to input and output the text message.
2. Write C Program to perform all arithmetic operations.
3. Write C Program to utilize the math function.
4. Write C Program to perform the mathematical expressions.
5. Write C Program for Local and Global Variables.
6. Write C Program for internal static and external static variables.
7. Write C Program to find the roots of a Quadratic equation.
8. Write C Programs for all the Operators. (Arithmetical, Logical, Relational, Bitwise).
9. Write C Programs for Increment and Decrement Operators.
10. Write C Programs to implement the Ternary Operator.
11. Write C Programs for special Operators.
12. Write C Programs for all the Control Structures. (Sequential Control Structures, Conditional Control Structures, Iterative Control Structures).
13. Write C Programs to display the different types of patterns using nested for loop.
14. Write C Program for Statements. (switch, break, goto, continue etc.,).
15. Write C Program to print biggest number from n numbers.
16. Write a C Program to find the given integer number is even or odd number.
17. Write a C Program to calculate the factorial of a given number.
18. Write a C Program to swap the two numbers using temp variable and without using temp variable.
19. Reading and Printing a single dimensional array of elements.
20. Ascending and descending of an array.
21. Sum of all odd numbers and sum of all even numbers in a single dimensional array.
22. Mathematical operations on single dimensional arrays.
23. Reading and Printing a multi-dimensional array of elements.
24. Mathematical operations on multi-dimensional array of elements.
25. Passing an array element to a function.
26. Reading and Printing a string.
27. C Programs on String functions.
28. Write a C program to calculate string length by writing the user-define function.
29. Function declaration and initialization.
30. C Program to differentiate the parameters and arguments in functions.
31. Programs for different types of inbuilt functions.
32. Call by value and Call by reference programs in functions.
33. Write a program to swap the given 2 number using passing by reference.
34. Write C Programs to perform all valid arithmetic operations using pointers.
35. C programs on Structures and accessing of members of the structures.

36. Write a C program to print a book information (Book name, Book no, author name) by writing a structure.
37. Write a C program by passing structure elements to a function and display employee Information (emp no, emp name, emp salary, and emp address).
38. C Programs on Reading a file from the secondary storage device.
39. C Program on writing and appending a file on the secondary storage device.
40. C Program on Opening and closing a file

Text Books:

1. E. Balagurusamy (2008), Computing Fundamentals And C Programming, Tata McGraw-Hill
2. Brian W. Kernighan and Dennis M. Ritchie, The C programming Language, Prentice-Hall in 1988

Reference Books:

1. Let Us C by Yashwanth Kanethar, BPB publications.
2. Programming in ANSI C by E. Balaguruswamy.

BTCS201BST	Engineering Mathematics-II	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Engineering Mathematics-I.

Learning Objectives

1. Develope a foundation of matrices, partial differential equations, Laplace transformation and numerical analysis
2. Explore a variety of various mathematical structures by focusing on mathematical objects, operations, and resulting properties
3. Understand and learn uses and applications of matrices, partial differential equations, Laplace transformation and numerical analysis in the field of engineering and technology

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate the ability to solve problems using matrices, partial differential equations, Laplace transformation and numerical analysis
2. Solve problems involving recurrence relations and generating functions.
3. Perform operations on discrete structures such as sets, functions, relations and sequence

Course Content

Unit I:

Matrices I- Rank of a Matrix and methods of finding the rank, Inverse of a matrix by elementary row transformations (Gauss_Jordan) method, Linear system of homogeneous and non-homogeneous equations – consistency, Linear transformations, Eigenvalues and Eigen vectors, Cayley – Hamilton Theorem and its application to find the inverse of a square matrix.

Unit II:

Matrices II-Linear Transformations, Diagonalization of matrices, symmetric, Skew symmetric, Hermitian and Skew Hermitian matrices, Orthogonal matrices and their properties, Quadratic and canonical forms and their nature, - rank, signature and index of quadratic forms, Complete matrices.

Unit III:

Partial differential equations -Formation of Partial differential equations by eliminating the arbitrary constants and arbitrary functions, Solution of partial differential equations (Lagranges method), Non-linear differential equations of order one (Special forms), Method of Separation of variables for solving one dimensional wave equation and heat equation and problems.

Unit IV:

Laplace Transforms-Laplace transform of standard functions-inverse transform-first shifting theorem, transform of derivatives and integrals-unit step function-second shifting theorem-diracs delta function-convolution theorem-periodic function-differentiation and integration of transforms- application of Laplace transform to ordinary differential equations.

Unit V:

Numerical Analysis-Numerical Differentiation, Numerical Integration-Trapezoidal rule, Simpson's One-Third rule, Simpson's Three-Eighth rule and Weddle's rule, fitting of curves like straight line, parabola and exponential by the method of least squares, numerical solution of ordinary differential equations by Euler's method, modified Euler's method and Runge -kutta methods.

Text Books:-

1. Matrices by A. R Vasistha
2. Partial Differential Equation by Sneddon
3. Laplace Transform by Schaum's series

Reference Books:-

1. Numerical Analysis by Shastry
2. Engineering Mathematics by B.V Ramana

BTCS201EST	Basic Engineering Mechanics	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of Physics & Mathematics at 10+2 level

Learning Objectives

1. To understand the concept of force transfer, necessary conditions of equilibrium
2. Describe static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions.
3. Analyses the properties of surfaces & solids in relation to moment of inertia & Illustrate the friction, laws of motion, kinematics of motion and their interrelationship.

Learning Outcomes

After successful completion of course student shall be able to:

1. Student's ability to examine mechanical interaction between different bodies when they interact through the forces applied on each other
2. Student's ability to analysis the effect of Friction on general plane motion.
3. Student's ability to apply the principles learnt for the analysis of structures and equipment.

Course Contents

UNIT-I

System of forces: Introduction-statics, concept of force, component of forces in a plane, Resultant Coplanar Concurrent forces, Moment of force, Principle of Transmissibility, Varignon's theorem, Moment of couples and Resultant of forces systems.

Equilibrium of systems of forces**:** Equations of equilibrium of coplanar systems and conditions for equilibrium, Application in solving the problems on static equilibrium of bodies.

UNIT- II

Centroid and Moment of Inertia: Significance of centroid and moment of area. Centroid of elementary areas and lines , composite areas, centroid of volume, center of gravity of bodies, Moment of inertia of elementary areas and composite areas , Polar moment of inertia, Radius of gyration, Parallel axis theorem, Mass Moment of Inertia elementary bodies.

UNIT-III

Friction: Theory of friction, Types of friction, Limiting friction, Static & Dynamic friction, Laws of friction, Angle of friction, Friction of motion of bodies, Application of fiction- Ladder, Wedge, Screw jack.

UNIT- IV

Kinematics: Introduction to Dynamics, Rectilinear motion of particles-Equations of motion for constant acceleration- motion under gravity-Variable acceleration, curvilinear motion of particles- Equation of motion in rectangular-cartesian coordinate, tangential-normal coordinate and radial-transverse coordinate, Kinematics of rigid bodies: Translation- Rotation and General plane motion.

UNIT- V

Kinetics: Newton's second law of motion, Motion of lift, D'Alembert's principle, Work energy principle, Principle of conservation of energy, Linear Impulse & Momentum, Conservation of momentum, Impulse -momentum principle, Kinetics of rigid bodies in translation and rotation, Equation of circular motion-Fixed axis of rotation.

TEXT BOOKS:

1. Engineering Mechanics 6th Edition by R.K. Bansal **,** Laxmi Publications. New Delhi, 2008.
2. Engineering Mechanics by P. N Chandramouli, PHI Learning Pvt. Ltd , 2011
3. Engineering Mechanics 20th Edition by R.S.Khurmi ,Chand Publications.

Reference Books

1. Engineering Mechanics: Statics and Dynamics 1st Edition, Tata McGraw Hill, N. H. Dubey. New Delhi, 2012.
2. Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press, New Delhi, 2008.
3. Engineering Mechanics, K.L Kumar &Veenu Kumar, Tata McGraw Hill, New Delhi, 2011.

BTC202EST	**Engineering Graphics**	**L**	**T**	**P**	**C**
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of Physics & Mathematics at 10+2 level

Learning Objectives

1. Learn to sketch and take field dimensions.
2. Learn to take data and transform it into graphic drawings.
3. Increase ability to communicate with people & prepare the student for future Engineering positions.

Learning Outcomes

After successful completion of course student shall be able to:

1. Comprehend general projection theory, with emphasis on orthographic projection to represent three-dimensional objects in two-dimensional views (principal, auxiliary, sections)
2. Dimension and annotate two-dimensional engineering drawings & Understand the application of industry standards and best practices applied in engineering graphics.
3. Emphasize freehand sketching to aid in the visualization process and to efficiently communicate ideas graphically.

Course Contents

UNIT-I

Instruments and their use: Lettering and various types of lines, scaled reduced and enlarged scales, representive fraction, types of scales Plain, Diagonal, Vernier scale. Geometrical construction: Construction of regular polygons inscribed in a circle given side of polygon.

Curves Used in Engineering Practice & their Constructions: a) Cycloid, Epicycloid and Hypocycloid b) Involutes.

UNIT–II

Projections of Points and Straight Line: Point placed in different quadrants. Projections of straight lines - Parallel, perpendicular, inclined to one plan and inclined to planes. True lengths and true angle of a line.Traces of a line. Projections of Planes: Projections of regular planes parallel, perpendicular and inclined to one reference plane. Plane inclined to both the reference plane.

UNIT–III

Projections of Solids: Projections of regular solids, cube, prism, pyramids, tetrahedran, cylinder and cone,axis inclined to one and both the references plane.

UNIT – IV

Sections and Sectional Views: True shape of section, Right Regular Solids- Prism, Cylinder, Pyramid, Cone.

UNIT – V

Isometric Projections: Principles of Isometric Projection, Isometric scale, Isometric views-Conventions-Plane Figures, Simple and Compound Solids.

TEXT BOOK:

1. N.D.Bhatt and V.M.Panchal, “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010
2. K. V.Natrajan, “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.

REFERENCES:

1. M.B.Shah and B.C.Rana, “Engineering Drawing”, Pearson, 2nd Edition, 2009
2. K.Venugopal and V.Prabhu Raja, “Engineering Graphics”, New Age International (P) Limited ,2008.
3. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi,2008.

BTCS203EST	Basic Electronics	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of Physics at 10+2 level

Learning Objectives

1. Develope a foundation of the characteristics of diodes, Diode models; Ideal, constant voltage and piecewise linear, load line concept, Diode applications; Rectifiers, logic gates, Zener diode, operation, characteristics, voltage regulation.
2. Understand and learn uses and applications of Bipolar Junction Transistor; construction, operation, configurations, characteristics of common emitter configuration, DC load line analysis**.**
3. Study various transducer (LVDT, Strain gauge, Temperature, Force), Photo Electric Devices. Photo diode, Photo Transistor, LED, LCD, constructional details of C.R.O and their uses & applications.

Learning Outcomes

After successful completion of course student shall be able to:

1. Analyse the characteristics of diodes, Rectifiers, logic gates, Zener diode, operation, characteristics, voltage regulation.
2. Understand the working principle of Bipolar Junction Transistor; construction, operation, configurations, characteristics of common emitter configuration, DC load line analysis**.**
3. Understand the working principle of various transducer (LVDT, Strain gauge, Temperature, Force), Photo Electric Devices. Photo diode, Photo Transistor, LED, LCD.

Course Content

Unit-I: Diode; Characteristics & Applications, Terminal characteristics of diodes, Diode models; Ideal, constant voltage and piecewise linear, load line concept, Diode applications; Rectifiers, logic gates, Zener diode, operation, characteristics, voltage regulation.

Unit-I: BJT; Characteristics & Applications, Bipolar Junction Transistor; construction, operation, configurations, characteristics of common emitter configuration, DC load line analysis.

Unit-III: MOSFET and OpAmp; Characteristics & Applications, Introduction to MOSFET; Depletion MOSFET construction & operation, Enhancement MOSFET construction & operation, Operational Amplifier; Equivalent circuit, ideal behavior, open loop and closed loop concept, concept of virtual short, simple OpAmp applications; Unity gain amplifier, inverting, non- inverting, integrator, differentiator, subtractor, summer.

Unit-IV: Feedback Concepts**:** Properties of Negative Feedback Amplifiers, Classification, Parameters Applications. Oscillators – LC Type and RC Type Oscillators and Crystal Oscillators.

Unit-V: Data Acquisition Systems: Study of transducer (LVDT, Strain gauge, Temperature, Force), Photo Electric Devices. Photo diode, Photo Transistor, LED, LCD. Display Systems: constructional details of C.R.O and Applications.

TEXT BOOKS

1. R. Boylestad & L. Nashelsky, “Electronics Devices and circuits”, Prentice Hall, 1995.
2. A.S. Sedra and K.C. Smith, *Microelectronic Circuits*, Oxford University Press, Vth Edition, 2004.

REFERENCE BOOKS

1. A.K. Sawhney, “A Course in electrical & Electronics Meas. & Inst.”,Dhanpat Rai & Sons.
2. Mathur, Chadda and Kulshrestha, “Electronics Devices, Applications and Integrated circuits”, Umesh Publications.

BT1/ BTCS201HST	Environmental Study	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

No specific knowledge is required

Learning Objectives

1. Study and aware the students about need and importance of Natural resources: Water resources; use and over utilization of surface and ground water, floods, drought, conflicts over water, dams - benefits and problems, water logging, salinity. Energy resources, growing energy needs, renewable and non – renewable energy sources.
2. Understand the concepts of an ecosystem, structure and functions of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, aquatic ecosystem (ponds, lakes, streams, rivers, oceans, estuaries).
3. Study and aware the students about causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste management.

Learning Outcomes

After successful completion of course student shall be able to:

1. Develop the mechanism to control and measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste management.
2. Apply the Environment Protection Act, in order to handle disaster management and enforcement of environmental legislation.
3. Understand the working principles of disaster mitigation, disaster management cycle, and disaster management in India

Course Content

UNIT-1:

Evironmental Studies: Definition, scope and importance, need for public awareness. Natural resources: Water resources; use and over utilization of surface and ground water, floods, drought, conflicts over water, dams - benefits and problems, water logging, salinity. Energy resources, growing energy needs, renewable and non – renewable energy sources.

UNIT – II

Ecosytems: Concepts of an ecosystem, structure and functions of an ecosystem, producers,consumers and decomposers, energy flow in ecosystem, food chains, aquatic ecosystem (ponds, lakes, streams, rivers, oceans, estuaries).

UNIT – III

Biodiversity: Genetic, species and ecosystem diversity, bio-geographical classification of India.Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT – IV

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste management. Environment Protection Act: Air, water, forest and wild life acts, issues involved in enforcement of environmental legislation.

UNIT – V

Social Aspects and the Environment: Water conservation and environmental ethics: Climate change, global warming, acid rain, ozone layer depletion.

Disaster Management: Types of disasters, impact of disasters on environment, infrastructure and development. Basic principles of disaster mitigation. disaster management cycle, and disaster management in India.

Text Books:-

1. A.K. De, Environmental Chemistry, New Age Publications, 2002.
2. E.P. Odum, Fundamentals of Ecology, W.B. Sunders Co., U.S.A.

Reference Books:-

1. G.L. Karia and R.A. Christain, Waste Water Treatment, Concepts and Design Approach, Prentice Hall of India, 2005.
2. Benny Joseph, Environmental Studies, Tata McGraw – Hill, 2005.

3. V.K. Sharna, Disaster Management, National Centre for Disaster Management, IIPE, Delhi, 1999.

BTCS201PCT	Computer Programming Using C++	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Basic knowledge of programming language

Learning Objectives

1. Explain the basic concepts of object oriented programming and importance of object oriented modeling.
2. Evaluate variable scopes, memory management, and reference versus value types in relation to parameters and arguments in function calls.
3. Understand key merits of object oriented programming in comparison with alternative orientations and class design principles.

Learning Outcomes

After successful completion of course student shall be able to:

1. Explain the principles of the object oriented programming paradigm specifically including abstraction, encapsulation, inheritance and polymorphism.
2. Demonstrate best practices in designing classes and class hierarchies from problem statements using sub-classing, abstract classes, and interfaces to achieve polymorphism in object oriented software. Describe non-sequences of the lack or presence of multiple inheritances for their design.
3. Demonstrate the use of encapsulation within and across software components and packages.

Course Content

UNIT – I

Principles of OOP: Programming paradigms, basic concepts, benefits of OOP, applications of OOP Introduction to C++: History of C++, structure of C++, basic data types, type casting, type modifiers, operators and control structures, input and output statements in C++. Classes and objects: class specification, member function specification, scope resolution operator, access qualifiers, instance creation.

UNIT-II

Functions: Function prototyping, function components, passing parameters, call by reference, return by reference, inline functions, default arguments, overloaded function. Pointers: Array of objects, pointers to objects, this pointer, dynamic allocation operators, dynamic objects.

UNIT – III

Constructors: Constructors, parameterized constructors, overloaded constructors, constructors with default arguments, copy constructors, static class members and static objects. Operator overloading: Overloading unary and binary operator, overloading the operator using friend function, stream operator overloading and data conversion.

UNIT – IV

Inheritance: Defining derived classes, single inheritance, protected data with private inheritance, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance, multi -path inheritance, constructors in derived and base class, abstract classes, virtual function and dynamic polymorphism, virtual destructor.

UNIT –V

Exception Handling: Principle of Exception handling, exception handling mechanism, multiple catch, nested try, rethrowing the exception. Streams in C++: Stream classes, formatted and unformatted data, manipulators, user defined manipulators, file streams, file pointer manipulation, file open and close. Templates: Template functions and Template classes.

Text Books:

1. Complete Reference of C++ by Herbert Schilde
2. Object Oriented Programming with C++ By E.Balaguruswamy

Reference Books:

1. Object Oriented Turbo C Plus Plus by Robert Lafore
2. Programming with C Plus Plus by D.RaviChandra
3. Object Oriented Turbo C Plus Plus by Balaguruswamy

4. C Plus Plus Premier Plus by Stephen Prata

BTCS250HSP	English Language Communication Skills Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

No specific knowledge is required

Learning Objectives

1. To achieve the perfection of understanding in English language.
2. To understand the spoken English.
3. To understand the written English.

Learning Outcome:

After successful completion of course student shall be able to:

1. Student will be able to understand, comprehend and analyse the professional and soft communication skills
2. Learn the perfection of understanding in English language.
3. Can read, write and communicate effectively in English.

Course Content:

The following course content is prescribed for the English Language Laboratory sessions:

UNIT 1 Introduction to Phonetics – Speech Sounds – Vowels & Consonants
UNIT 2 Structure of Syllables – weak forms & strong forms
UNIT 3 Minimal pairs – word accent and stress shifts
UNIT 4 Intonation and common errors in pronunciation
UNIT 5 Conversation practice – oral presentation skills

a. Greeting and leave taking, introducing oneself and others
b. Apologizing, interrupting, requesting and making polite conversation
c. Giving instructions and directions: speaking of hypothetical situations
d. Narrating, expressing opinions and telephone interactions

Text Books:-

1. "Enjoying Every day English", Published by Sangam Books, Hyderabad
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.

Reference Books:-

1. English Grammar Practice, Raj N Bakshi, Orient Longman.
2. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
3. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
4. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
5. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
6. Technical Communication, Meenakshi Raman, Oxford University Press
7. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education

BTCS251PCP	Engineering Workshop	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Basic electrical engineering & mechanics.

Learning Objectives

1. To is to understand the physical aspects of engineering through laboratory technology.
2. Understand the working of carpentry, fitting and plumbing techniques.
3. Learn the characteristic engineering workshop with hands on practice on machine tools

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate the working of carpentry, fitting and plumbing techniques.
2. Analyze the characteristic engineering workshop with hands on practice on machine tools.
3. Perform the experiments in workshop

Course Content

List of Experiments

1. **Carpentry:** Study of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints. Practice in planning, chiselling, marking and sawing. Joints –Cross joint, T joint, Dove tail joint.
2. **Fitting**: Study of different fitting tools. Use and setting of fitting tools for marking, center punching, chipping, cutting, filing, drilling, their use, different measuring tools, Files – Material and Classification. Practice in filing, cutting, drilling and tapping. Male and female joints, Stepped joints.
3. **Plumbing:** Study of different plumbing tools. Details of plumbing work in domestic and industrial applications. Study of pipe joints, cutting, threading and laying of pipes different fittings using PVC pipes. Use of special tools in plumbing work. Practice of a domestic line involving fixing of a water tap and use of coupling, elbow, tee, and union etc.

TRADES FOR DEMONSTRATION & EXPOSURE:

1. **House Wiring:** Study of wiring tools, industrial wiring, accessories, earthing, and safety precaution. Practice to make parallel and series connection of three bulbs, stair case wiring, florescent lamp fitting.
2. **Machine Tools**: Study and demonstration on working of machine tools. Lathe and Drilling machine.

Text Books:-

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.

Reference Books:-

1. Elements of Workshop Technology (Volume - 1): Hajra Choudhury
2. Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition

BTCS252PCP	Computer Programming Using C++ Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

BTL23-COMPUT

Prerequisite(s)

Basic knowledge of Programming

Learning Objectives

1. Explain the basic concepts of object oriented programming and importance of object oriented modeling.
2. Understand key merits of object oriented programming in comparison with alternative orientations and class design principles.
3. Undestand the principles of combining sub-classing and interfaces in designing class hierarchies.

Learning Outcomes

After successful completion of course student shall be able to:

1. Learn the principles of the object oriented programming paradigm specifically including abstraction, encapsulation, inheritance and polymorphism.
2. Demonstrate the use of encapsulation within and across software components and packages.
3. Practice of self-documentation and consistent coding style in writing programs using C++

Course Content

List of Experiments

1. Program on Pointers and structure
2. Program on type def.
3. Handling array elements using pointers.
4. Swapping of two numbers using pointers and a function
5. Sorting of any array using pointers and functions.
6. Pointer Arithmetic.
7. Sorting and array of structures.
8. Passing of individual elements of a structure to a function.
9. Passing of entire structure to function.
10. Structures – Arrays – Pointers.
11. Inline Function.
12. Function Overloading.
13. Programs on Classes.
14. Constructors, Destructors
15. Static Members.
16. Friend Function, Friend Class
17. Dynamic Memory Allocation using new and delete.
18. Pointer to object.
19. Overloading unary operator, Overloading binary Operators
20. Overloading binary operators using Friend function.
21. Single and Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance.
22. Constructors and Destructors in derived classes.
23. Virtual Function.
24. Programs on file handling using classes.

BTCS301BST	Probability & Statistics	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Engineering Mathematics-II.

Learning Objectives

1. Develope a foundation of probability, distributions, estimation and testing of hypotheses
2. Explore a variety of corelation and regression techniques by focusing on mathematical objects, operations, and resulting properties
3. Understand and learn uses and applications of queues, arrival pattern, Pure Birth and death processes, M/M/1 models

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate the ability to solve problems using probability and statistics & Understanding the method of probability distribution function, estimation and testing of hypotheses
2. Establish the relation between regression coefficient and the two correlation coefficient, Karl Pearson's and Spearman's methods of finding correlation coefficients
3. Develop the applications of queues, arrival pattern, Pure Birth and death processes

Course Content

Unit I: Probability

Axioms of Probability, some elementary theorems, Addition theorem on probability, conditional Probability & problems, Baye's Theorem ,Random variables, types of random variables and their distribution functions.

Unit II: Distributions

Binomial Distribution, Poisson's distribution, Normal Distribution and its properties moment generating functions, coefficient of skewness, kurtosis. Sampling distribution, Distribution of mean (variance is known and unknown).

Unit III: Estimation and Testing of Hypothesis

Definitions, properties of good estimator, types of estimations, Large and small samples, Null Hypothesis and alternative hypothesis, types of errors, critical region. Z-test and t-tests for means and differences of means, chi-square test of goodness to fit and test of independence.

Unit IV: Correlation and Regression

Bivariate distribution, correlation, coefficient of correlation, regression coefficients, lines of regression, relation between regression coefficient and the two correlation coefficient, Karl Pearson's and Spearman's methods of finding correlation coefficients.

Unit V: Queuing Theory

Definition and types of queues, arrival pattern, Pure Birth and death processes, M/M/1 models.

Text Books:-

1. Probability & Statistics, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text book of Probability & Statistics, Shahnaz Bathul, V. G. S. Book Links.
3. Fundamentals of statistical methods S.S. Gupta and V.C. Kapoor, S. Chand & Company.

Reference Books:-

1. Probability & Statistics, Arnold O. Allen, Academic Press.
2. Probability & Statistics for Engineers, Miller and John E. Freund, Prentice Hall of India.
3. Probability & Statistics, Mendan Hall, Beaver Thomson Publishers.
4. Probability & Statistics, D. K. Murugeson & P. Guru Swamy, Anuradha Publishers.

BTCS301PCT	Mathematical Foundation of Computer Science	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Engineering Mathematics and Statistics.

Learning Objectives

1. Explore a variety of various mathematical structures by focusing on set theory, mathematical objects, operations, and resulting properties
2. Develop formal logical reasoning techniques and notation and Demonstrate the application of logic to analyzing and writing proofs, techniques for counting, permutations and combinations
3. Develop the concept of relation through various representations of Graphs, DFS, BFS, Spanning Trees, Planar Graphs. Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Learning Outcomes

After successful completion of course student shall be able to:

1. Construct Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers.
2. Perfom operations on set theory, mathematical objects, operations, and resulting properties
3. Perform the application of logic to analyzing and writing proofs, techniques for counting, permutations and combinations and Apply the concepts of Graphs, DFS, BFS, Spanning Trees, Planar Graphs. Graph Theory and other engineering applications

Course Content

UNIT I

Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers. Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT II

Relations: Properties of binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram. Functions: Inverse Function, Composition of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

UNIT III

Elementary Combinatorics: Basics of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial and Multinomial theorem, the principles of Inclusion – Exclusion.

UNIT IV

Recurrence Relations: Generating Functions, Function of Sequences, Calculating Coefficients of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, solution of Inhomogeneous Recurrence Relations.

UNIT V

Graph Theory: Representation of Graphs, DFS, BFS, Spanning Trees, Planar Graphs. Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Text books:-

1. Mathematical Foundation of Computer Science – Shahnaz Bathul, PHI.
2. Elements of Discrete Mathematics- A Computer Oriented Approach,C.L.Liu, D.P. Mohapatra,3edition,TMH.
3. Discrete Mathematics for Computer Scientists & Mathematicians, second edition, J.L.Mott, A. Kandel, T.P. Baker, PHI
4. Discrete and Combinatorial Mathematics- An Applied Introduction-5th Edition– Ralph. P.Grimaldi, Pearson Education.

Reference books:-

1. Discrete Mathematics and its applications, 6th edition, K.H. Rosen, TMH.
2. Discrete Mathematical Structures, Mallik and Sen, Cengage Learning.
3. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby, Sharon Cutler Ross, PHI/ Pearson Education.
5. Discrete Mathematics with Applications, Thomas Koshy, Elsevier.
6. Logic and Discrete Mathematics, Grass Man and Tremblay, Pearson Education.

BTCS302PCT	Data Structures	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of Programming.

Learning Objectives

1. The purpose of course is to provide the students with solid foundations in the basic concepts of programming: data structures and algorithms.
2. The main goal of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter.
3. Course is also about showing the correctness of algorithms and studying their computational complexities. Course offers the students a mixture of theoretical knowledge and practical experience.

Learning Outcomes

After successful completion of course student shall be able to:

1. Use and implement appropriate data structure for the required problems using a programming language such asC/C++.
2. Analyze step by step and develop algorithms to solve real world problems.
3. Implementing various data structures viz. Stacks, Queues, Linked Lists, Trees and Graphs.

Course Content

UNIT I:

Introduction to data structures and objectives, basic concepts Arrays: one dimensional, multi-dimensional, Elementary Operations.

Analysis of Algorithm: Time Complexity and Space Complexity, Big-O Notation, Omega Notation, Theta Notation.

UNIT II:

Stacks: Representation, elementary operations and applications such as infix to postfix, postfix evaluation, parenthesis matching Queues: Simple queue, circular queue, dequeue, elementary operations and applications. Recursion Technique, Tower of Honoi Problem.

UNIT III:

Linked lists: Linear, circular and doubly linked lists, elementary operations and applications such as polynomial manipulation.

UNIT IV:

Trees: Binary tree representation, tree traversal, complete binary tree, heap, binary search tree, height balanced trees like AVL tree, Huffman Tree, B Tree, B+ Tree and other operations and applications of trees.

UNIT V:

Graph: Undirected Graph, Directed Graph, Representation of Graph, Operation on Graph, Traversal in Graph, BFS (Breadth First Search), DFS (Depth First Search), Spanning Tree. Algorithm: Warshall's Algorithm, Shortest Path Algorithm (Dijkstra), Prim's Algorithm, Kruskal's Algorithm.

Sorting: what is sorting, Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Merging, Merge Sort, Radix Sort, Quick Sort, Heap Sort, Binary Tree Sort, Address Calculation Sort, Sequential Search, Binary Search.

Text Books:-

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

Reference Books:-

1. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
2. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

BTCS303PCT	Computer Organization	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s) & Co-requisite:

Fundamental of Computers, Digital Logic Design.

Learning Objectives

1. Explain the organization of the classical von Neumann machine and its major functional Modules.
2. Provide knowledge of computer system organization and structure through instruction cycles.
3. Explain the basic concepts of interrupts and how interrupts are used to implement I/O control and data transfers. Identify various types of buses in a computer system and illustrate how data transfers is performed.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understandand and analyze computer organization, computer arithmetic, and CPU design & 2. Understand I/O system and interconnection structures of computer
3. Understand and analyze different inturupts, I/O techniques, PLDs and memory organization
4. Incorporate independent learning skills and be able to develop different hardware for computer organization

Course Contents

Unit I:

Introduction: Function and structure of computer Functional components of a computer, Interconnection of components, Performance of a computer. Computer Organization and Architecture Basic structure of General purpose Computer with instruction set, Basic Computer and registers, Hardware Organization.

Unit II:

Registers Microoperations and Arithmetic Logic Structure: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Adder-Subtractor, Arithmetic Logic Shift Unit.

Unit III:

CPU Organization: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control Organization of a control unit-Operations of a control unit, Hardwired control unit, Microprogrammed control unit.

Unit IV:

Input Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA controlled I/O, Direct Memory Access, Input-Output Processor

Unit V:

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware

Text Books:-

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI

Reference Books:-

1. Computer Organization and Architecture–William Stallings Sixth Edition, Pearson/PHI
2. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
4. Fundamentals o r Computer Organization and Design, -Sivaraama Dandamudi Springer Int. Edition.
5. Computer Architecture a quantitative approach, John L. Hennessy and David A.

Patterson, Fourth Edition Elsevier

6. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

BTCS304PCT	Digital Logic Design	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Fundamental of Electronics.

Learning Objectives

1. Study different types of memories and their applications.
2. Introduces Boolean algebra, Reduction techniques and demonstrate design of circuits using logic gates and flip flops.
3. Impart knowledge of digital systems design based on combinational and sequential and demonstrate the operation of simple digital gates, identify the symbols, develop the truth table for those gates, combine simple gates into more complex circuits

Learning Outcomes

After successful completion of course student shall be able to:

1. Realize minimization methods using Boolean algebra and understand functioning of digital logic families.Verify digital systems, such as memories, PLA, PLDs and FPGA.
2. Design and verify experiments on sequential and combinational circuits.
3. Perform the operation of a flip-flop and design counters and clear the concept of shift resisters.

Course Contents

UNIT I

Digital Computers and digital systems. Binary Numbers. Number based conversion. Octal and Hexadecimal Numbers. Signed Binary Numbers. Complements. Arithmetic Operations (Add and Subtract).

UNIT II

Logic Gates: NOT, AND, OR, NAND, NOR, Exclusive-OR and Equivalence. Logic Circuits. Binary Codes: BCD, ASCII and EBCDIC. Boolean Algebra. Basic Definition. Basic Theorems. Boolean Functions. Canonical Forms: Minterms & Maxterms. Simplification using SOP and POS. Simplification Using Map Method: Two- and Three- Variables Maps. Four-Variable Map. NAND and NOR Implementation. Don't Care conditions.

UNIT III

Combinational Logic Circuits: Adders and Sub tractors. Multilevel NAND. Multilevel NOR. Combinational Logic Circuit with MSI and LSI Binary Adders, Binary Sub tractor, Decoders, Multiplexers.

UNIT IV

Sequential Circuits: Flip-Flops. Analysis of Clocked Sequential Circuits. Flip-Flops: RS, D, JK and T. Flip-Flop Excitation Tables. Design Procedure.

UNIT V

Registers, Counters, Synchronous Counters, Shift Registers, Ripple Counter, Random Access Memory, Memory Decoding, Error correcting codes, PLA, PAL.

Text Books:-

1. DIGITAL DESIGN – Third Edition, M. Morris Mano, Pearson Education/PHI.
2. FUNDAMENTALS OF LOGIC DESIGN, Roth, 5th Edition, Thomson.

Reference Books:-

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D. Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

BTCS350PCP	Data Structures Using C/C++ Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Knowledge of Data Structures & programming language C or C++

Learning Objectives

1. Explain the basic concepts of object oriented programming and importance of object oriented modeling.
2. Evaluate variable scopes, memory management, and reference versus value types in relation to parameters and arguments in function calls.
3. Undestand the principles of combining sub-classing and interfaces in designing class hierarchies.

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate best practices in designing classes and class hierarchies from problem statements using sub-classing, abstract classes, and interfaces to achieve polymorphism in object oriented software. Describe non-sequences of the lack or presence of multiple inheritances for their design.
2. Demonstrate the use of encapsulation within and across software components and packages.
3. Practice of self-documentation and consistent coding style in writing programs using C++

Course Content

List of Experiments

1. Implementation of array operations, Structures & Unions.
2. Stacks, Queues, Circular Queues, Priority Queues, Multiple stacks and queues.
3. Infix to postfix expression using stack
4. Implementation of linked lists: stacks, queues, single linked lists.
5. Implementation of polynomial operations. Doubly linked lists.
6. Tree traversal: AVL tree implementation, application of trees.
7. Implementation of Hash Table.
8. Searching and sorting
9. Traversal of graph

Text Books:-

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

Reference Books:-

1. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
2. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

BTCS351PCP	CO & Digital Logic Design Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s) and Co-requisite:

Fundamental of Electronics, digital logic and computer organization.

Learning Objectives

1. Study different types of organization techniques
2. Introduces Boolean algebra, Reduction techniques and demonstrate design of circuits using logic gates and flip flops.
3. Impart knowledge of digital systems design based on combinational and sequential and demonstrate the operation of simple digital gates, identify the symbols, develop the truth table for those gates, combine simple gates into more complex circuits

Learning Outcomes

After successful completion of course student shall be able to:

1. Realize minimization methods using Boolean algebra and understand functioning of digital logic families.
2. Design and verify experiments on sequential and combinational circuits.
3. Perform the operation of a flip-flop and design counters and clear the concept of shift resisters.

Course Contents

List of Experiments

1. Bread Board Implementation of various logic gates
2. Bread Board Implementation of various logic gates using NAND gate.
3. Bread Board Implementation of various logic gates using NOR gate.
4. Bread Board implementation of Binary Adder (Half and Full) using general gates.
5. Bread Board implementation of Adder/Subtractor.
6. Bread Board Implementation of Flip-Flops.
7. Experiments with clocked Flip-Flop.
8. Design of Counters.
9. Bread Board implementation of counters & shift registers.
10. Implementation of Arithmetic algorithms.

Text Books:-

1. DIGITAL DESIGN – Third Edition, M. Morris Mano, Pearson Education/PHI.
2. FUNDAMENTALS OF LOGIC DESIGN, Roth, 5th Edition, Thomson.

Reference Books:-

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D. Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

BTCS401PCT	Java Programming	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of any programming language

Learning Objectives

1. Course introduces computer programming using JAVA programming language with object-oriented programming principles.
2. Elaborate variable scopes, memory management, and reference versus value types in relation to parameters and arguments in function calls.
3. Demonstrate the principles of object oriented features of Java programming language with security features

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the principles of object oriented programming paradigm specifically including abstraction, encapsulation, inheritance and polymorphism.
2. Demonstrate best practices in designing classes and class hierarchies from problem statements using sub-classing, abstract classes, and interfaces to achieve polymorphism in object oriented software.
3. Demonstrate informed use of encapsulation within and across software components and packages & Apply exception handling, generation and escalation mechanisms and practices in writing Java programs.

Course Content

UNIT I

Java Basics - Review of OOP concepts, History of Java, Java buzzwords, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow-block scope, conditional statements, loops, break and continue statements, simple java program, arrays, input and output, formatting output, encapsulation, inheritance, polymorphism, classes, objects, constructors, methods, parameter passing, static fields and methods, access control, this keyword, overloading methods and constructors, recursion, garbage collection, String Handling, Enumerations.

UNIT II

Inheritance – Inheritance concept, benefits of inheritance ,Super classes and Sub classes, Member access rules, Inheritance hierarchies, super keyword, preventing inheritance: final classes and methods, casting, polymorphism - dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

UNIT III

Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface. **Inner classes** – Uses of inner classes, local inner classes, anonymous inner classes, static inner classes.

Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

UNIT IV

Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally , re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes, Guide lines for proper use of exceptions.

Multi-threading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, thread groups, daemon threads.

UNIT V

APPLETS, JAVA GUI AND DATABASE CONNECTIVITY, Networks ing - Applets – Applet life cycle methods – Applets based GUI – AWT Introduction - GUI components – Basics of Swings – Accessing database with JDBC basics- Types of Drivers – Basics of Networks Programming, Addresses, Ports, Sockets, Simple Client and Server Program, Multiple Clients and Single Server.

Text Books:-

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

Reference Books:

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, pearson education.
3. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, seventh Edition, Pearson Education.
4. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education
5. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.

BTCS402PCT	Database Management System	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Basic knowledge of computer fundamentals & Data Structures

Learning Objectives

1. Understand the concept of data planing and database design for serving different types of users with varying skill levels.
2. Handling different user views of the same stored data, combining interrelated data , setting standards, controlling concurrent updates so as to maintain data integrity.
3. Managing, planning and coordinating restart and recovery operations across multiple users for a large complex systems.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the relational database theory, and be able to write relational algebra expressions for queries, logical design of databases, including the E-R method and normalization approach.
2. Understand and analyze the database storage structures and access techniques like file and page organizations, indexing methods including B-tree, hashing, query evaluation techniques and and query optimization.
3. Understand various issues of transaction processing and concurrency control by designing and development of a database application system as part of a team.

Course Contents

UNIT I:

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor.History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

UNIT II:

Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views. Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT III:

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema refinement – Problems Caused by redundancy Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT IV:

Transaction Concept- Transaction State- Implementation of Atomicity and Durability Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Base Protocols – Multiple Granularity. Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT V:

Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Text books :

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.
3. Fundamentals of Database Systems , Elmasri,Navathe, Addison Wesley

Reference Books:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education

BTCS403PCT	Operating System	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Computer Organization

Learning Objectives

1. Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,
2. Understand how the operating system abstractions can be used in the development of application programs, or to build higher level abstractions,
3. Understand the principles of concurrency and synchronization, and apply them to write correct concurrent programs/software,

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate how to manage multiple tasks that execute at the same time and share resources including processes and threads, context switching, synchronization, schedule CPU time, and deadlock.
2. Design, implement and evaluate a computer-based system, process, components, or program to meet desired needs in context of operating system
3. Identify the System calls, protection, interrupts and know Input/output, disk access, file systems facilities.

Course Contents

UNIT I:

Introduction : Operating system and functions, Clasification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocesor Systems, Multiuser Systems, Multiproces Systems, Multihreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Rentrant Kernels, Monolithic and Microkernel Systems.

Unit – II

Concurent Proceses: Proces Concept, Principle of Concurency, Producer /Consumer Problem, Mutual Exclusion, Critcal Section Problem, Deker's solution, Peterson's solution, Semaphores, Test and Set peration; Clasical Problem in Concurency- Dining Philosopher Problem, Sleping Barber Problem; Inter Proces Communication models and Schemes, Proces generation.

Unit – III

CPU Scheduling: Scheduling Concepts, Performance Criteria, Proces States, Proces Transiton Diagram, Schedulers, Proces Control Block (PCB), Process address space, Proces identification information, Threads and their management, Scheduling Algorithms, Multiprocesor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

UNIT IV:

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partions, Multiprogramming with variable portions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

Unit – V

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O bufering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and aces mechanism, File directories, and File sharing, Filesystem implementation isues, File system protection and security.

Text Books:-

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. SibsankarHalder and Alex A Aravind, "Operating Systems", Pearson Education

Reference Books:-

1. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
2. D M Dhamdhere, "Operating Systems :A Concept basedAproach", McGraw Hill
3. Charles Crowley, "Operating Systems: A Design-Oriented Aproach", Tata McGraw Hill Education".

4. Stuart E. Madnick & John J. Donovan. Operating Systems. McGraw Hill

BTCS404PCT	Formal Languages and Automata Theory	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Mathematical foundation of Computer Science.

Learning Objectives

1. Introduces the fundamental concepts in automata theory and formal languages including grammar, finite automaton, regular expression, formal language, pushdown automaton and Turing machine.
2. Explain the basic models of computation including the foundation of many branches of computer science, e.g. compilers, software engineering, concurrent systems, etc.
3. Acquire insights into the relationship among formal languages, formal grammars, and automata.

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate the understanding of abstract models of computing, including deterministic (DFA), non-deterministic (NFA), and Turing (TM) machine models.
2. Demonstrate an understanding of regular expressions and grammars, including context-free and context-sensitive grammars.
3. Understand the relationships between language classes, including regular, context-free, context-sensitive, recursive, and recursively enumerable languages.

Course Contents

UNIT I

Models of computation, classification, properties and equivalences, automata: Introduction to formal proof, additional forms of proof, inductive proofs, finite automata (FA), deterministic finite automata (DFA), non-deterministic finite automata (NFA) , Finite Automata with Epsilon transitions.

UNIT II

Regular expression and languages: Introduction to regular expression, building regular expression, converting DFA to a regular expression, converting regular expression to DFA, pumping lemma and its applications to prove languages not to be regular, closure properties of regular languages, minimization of automata.

UNIT III

Context free grammars (CFG) and languages: Definition, derivations, parse trees, ambiguity in grammars and languages, pushdown automata (PDA): Definition, Graphical notation, deterministic and nondeterministic, instantaneous descriptions of PDAs, language acceptance by final states and by empty stack, equivalence of the CFG and PDAs, pumping lemma for CFLs, closure properties of CFLs, decision problems for CFLs.

UNIT IV

Turing machines: Introduction to Turing machines, instantaneous descriptions, language acceptance by Turing machines, Turing machine transition diagrams, Church-Turing hypothesis, Chomsky hierarchy, recursively enumerable sets, existence of non-recursively enumerable notion of undecidable problems, universality of Turing machine, separation of recursive and recursively enumerable classes, notion of reduction, undecidable problems of Turing machines.

UNIT V

Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar, decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence problem, Turing reducibility,

Text Books:-

1. "Introduction to Automata Theory Languages and Computation". Hopcroft H.E. and Ullman J. D. Pearson Education
2. Theory of Computer Science: Automata, Languages and Computation, K.L.P.Mishra, N.Chandrasekaran.

Reference Books:-

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation ,John C Martin, TMH
3. "Elements of Theory of Computation", Lewis H.P. & Papadimition C.H. Pearson /PHI.

BTCS401HST	Managerial Economics and Financial Accountancy	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Basic knowledge of inventory system

Learning Objectives

1. Explain the Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.
2. Understand the Significance of Elasticity of Demand, Factors governing demand forecasting, methods of demand forecasting
3. Develop the managerial skills with necessary knowledge of economics, accounts and finance

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate the activities of Managerial Economics–Demand Analysis
2. Analyze methods of demand forecasting through survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting
3. Demonstrate Break-even Analysis (BEA)-Determination of Break-Even Point with Managerial Significance and limitations of BEA.

Course Contents

UNIT I

Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Elasticity of demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand or casting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT II

Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb- Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

UNIT III

Introduction to Markets & Pricing Policies: Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

Objectives and Policies of Pricing- Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

UNIT IV

Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario

Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

UNIT V

Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance-Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

Text books:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

Reference Books:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Edition.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.

BTCS450PCP	Java Programming Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Knowledge of Java Programming with object oriented concepts

Learning Objectives

1. Demonstrate the features of advanced java programming language such as AWT, Applet, JDBC, Servlets etc.
2. Elaborate variable scopes, memory management, and reference versus value types in relation to parameters and arguments in function calls.
3. Demonstrate the principles of object oriented features of Java programming language with security features

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the principles of object oriented programming paradigm specifically including abstraction, encapsulation, inheritance and polymorphism.
2. Demonstrate informed use of encapsulation within and across software components and packages & Apply exception handling, generation and escalation mechanisms and practices in writing Java programs.
3. Describe and explain the factors that contribute to a good object oriented solution, reflecting on your own experiences and drawing upon accepted good practices.

Course Content

List of Experiments

1. Write a program to print the Fibonacci series up to a given number?
2. Write a Java Program to find the maximum of two numbers using command line arguments?
3. Write a Java Program to demonstrate the operation of super keyword in Java?
4. Write a Java Program to demonstrate the concept of method overriding?
5. Write a Java Program to describe about abstract class?
6. Write a Java Program to demonstrate about the final method?
7. Write a Java Program to define and implements an interface?
8. Write a Java Program to describe about try and catch blocks for handling exceptions?
9. Write a Java Program to demonstrate about throw and throws keywords?
10. Write a Java Program to raise and handle custom or user defined exceptions in java?
11. Write a Java Program to demonstrate about switch case?
12. Write a Java Program to find whether the given number is palindrome or not?
13. Write a Java Program on the operation of this keyword?
14. Write a Java Program on concept of method overloading?
15. Write a Java Program to explain single inheritance concept?
16. Write a Java program to demonstrate the operation of scanner class?
17. Write a Java Program to create threads in java by extending Thread Class?
18. Write a Java Program to create threads in java by implementing Runnable Interface?
19. Write a Java Program to define and import the user defined package?
20. Write a Java program to print a message using applet concept?
21. Write a Java Program to pass the parameters using applet concept?
22. Write a program to generate random numbers sequence in Java?
23. Write a program to swap the numbers without using third variable in Java?
24. Write a Java Program to find the sum and product of digits of a given number?
25. Write a Java Program to display multiplication table?

BTCS451PCP	Database Management System Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Basic knowledge of DBMS

Learning Objectives

1. Knowledge of DBMS, in terms of use and implementations.
2. Understand the concept of data planing and database design for serving different types of users with varying skill levels.
3. Handling different user views of the same stored data, combining interrelated data , setting standards, controlling concurrent updates so as to maintain data integrity.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the relational database theory, and be able to write relational algebra expressions for queries, logical design of databases, including the E-R method and normalization approach.
2. Illustrate commercial relational database system by writing SQL.
3. Understand and analyze the database storage structures and access techniques like file and page organizations, indexing methods including B-tree, hashing, query evaluation techniques and and query optimization.

Course Contents

List of Experiments

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

BTCS501PCT	Data Communication & Computer Networks s	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of computer fundamentals & Operating System.

Learning Objectives

1. Understand the fundamental concepts of data communications and computer Networks s.
2. Identify the basic components/instrument/equipment and their respective roles in data communication system
3. To incorporate Networks skills in various capacity like Networks administrators, Networks designers and Networks consultants who are able to design, implement and maintain communication systems, computer Networks s and related technologies.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the different Networking sub-systems and their functions in a telecommunication system.
2. Understand and configure the different types of Networks topologies and protocols.
3. Understand the different protocols layers of the OSI model & TCP/IP

Course Contents

UNIT I

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

UNIT II

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

UNIT III

Networks Layer: Networks Layer - Point - to Pont Networks s, routing, Congestion control InterNetworks ing -TCP / IP - IP packet, IP address, IPv6.

UNIT IV

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

UNIT V

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

Text books:-

1. Forouzen, "Data Communication and Networks ing", TMH
2. A.S. Tanenbaum, “Computer Networks s”, 3rd Edition, Prentice Hall India, 1997.

Reference Books:-

1. S. Keshav, “An Engineering Approach on Computer Networks ing”, Addison Wesley, 1997
2. W. Stallings, “Data and Computer Communication”, Macmillan Press, 1989.

BTCS502PCT	Design Analysis and Algorithm	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Data Structure and any programming language

Learning Objectives

To is to learn:

1. Understand the concepts and skills of algorithm design, Implemental some well-known algorithms and analyze the performance of algorithms
2. Define the complexity of algorithms, Reasoning about the correctness of the algorithm
3. Behaviors of algorithms and the notion of tractable and intractable problems.

Learning Outcomes

After successful completion of course student shall be able to::

1. Analyze algorithms and determine efficiency of algorithm.
2. Understand advanced abstract data type (ADT), data structures and their implementations
3. Prove problems of P, NP, or NP-Complete & develop and implement learned/new algorithm using appropriate techniques to solve problems.

Course Contents

UNIT I

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- O notation, Omega notation, Theta notation **Divide and Conquer:** Structure of divide-and-conquer algorithms; Binary search; Merge Sort; Quick sort.

UNIT- II

Greedy Method: General method- Knapsack problem – job sequencing with deadlines– minimum-cost spanning trees: Prim's and Kruskal's algorithms – Single source shortest paths: Dijkstra's algorithm.

UNIT-III

Dynamic Programming: General method – Multistage Graphs – All pairs shortest paths, Single source shortest paths – optimal binary search trees – 0/1 Knapsack problem traveling sales person problem.

UNIT-IV

Back Tracking: General method – n-queen problem – sum of subsets problem – graph colouring – Hamiltonian cycles – Knapsack problem.

UNIT-V

Branch and Bound: Least Cost (LC) search, bounding – LC branch and bound – FIFO branch and bound – Travelling sales person problem.

Text Books:-

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.
2. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", Pearson Education, 2007.

Reference Books:-

1. RCT Lee, SS Tseng, RC Chang and YT Tsai, "Introduction to the Design and Analysis of Algorithms", Mc Graw Hill, 2005.
2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms", Berman, Paul," Algorithms", Cengage Learning.
3. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.

BTCS503PCT	Compiler Design	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of programming language and theory of automata

Learning Objectives

1. Provide an introduction to the system software like assemblers, compilers, and macros which provides the complete description about inner working of a compiler.
2. Explore the design of compilers and optimization techniques. It also includes the design of Compiler writing tools.
3. Understand the language specifications, use of regular expressions and context free grammars behind the design of compiler.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand fundamentals of compiler and identify the relationships among different phases of the compiler.
2. Understand the application of finite state machines, recursive descent, production rules, parsing, and language semantics.
3. Analyze & implement required module, which may include front-end, back-end, and a small set of middle-end optimizations.

Course Contents

Unit I:

Introduction to compiler design, Model of a Compilers, Translators, Interpreters, Assemblers, Languages, Computer Architecture vs Compiler Design, Lexical analyzer, Regular expressions and finite automata.

Unit II:

Introduction to context free grammars, BNF notation, Syntax Analysis,Parsing Techniques: Top-down parsing and Bottom-up parsing, general parsing strategies, brute force approach, recursive descent parser and algorithms, simple LL(1) grammar.

Unit III:

Bottom-up parsing-handle a right sentential form, shift reduce parsers, operator precedence parsers, LR, SLR, Canonical LR, LALR grammar and parsers, error recover strategies for different parsing techniques.

Unit IV:

Symbol table, syntax-directed translation schemes, intermediate code generation, translation schemes for programming language constructs, runtime storage allocation.

Unit V:

Code generation and instruction selection: Issues, basic blocks and flow graphs, register allocation, DAG representation of programs, code generation from DAG, peep hole optimization, code generator generators, specifications of machine. Code optimization, source of optimizations, optimization of basic blocks, loops, global dataflow analysis, solution to iterative dataflow equations.

TEXT BOOKS :

1. Principles of compiler design -A.V. Aho .J.D.Ullman; Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge, University Press.

REFERENCES Books:

1. lex&yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly, Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
2. Engineering a Compiler-Cooper & Linda, Elsevier
3. Compiler Construction, Louden, Thomson.

BTCS504PCT	Principles of Programming Languages	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Concepts of programming language

Learning Objectives

1. Explain the value of declaration models, especially with respect to programming languages
2. Identify and describe the properties of a variable such as its associated address, value, scope, persistence, and size.
3. Understand the importance of types and type-checking in providing abstraction and safety.

Learning Outcomes

On successful completion of course the students should be able to:

1. Evaluate programming languages on a feature-by-feature basis and explain the meaning and use of different features.
2. Explain the implementation of a non-trivial software system and demonstrate its correctness using appropriate test cases.
3. The student would acquire various problem solving techniques and will be able to implement them in 'C' , C++ or Java language

Course Contents

Unit I

Preliminary Concepts: Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming , Logic Programming. Programming Language Implementation –Compilation and Virtual Machines, programming environments.

Syntax and Semantics: general Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotational semantics and axiomatic semantics for common programming language features.

UNIT II:

Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization.

Expressions and Statements: Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands

UNIT III:

Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static anddynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

UNIT IV:

Abstract Data types: Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95 Concurrency: Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads. **Exception handling :** Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.

UNIT V:

Logic Programming Language : Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

Functional Programming Languages: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.

Text Books :

1. Concepts of Programming Languages Robert .W. Sebesta 6/e, Pearson Education.
2. Programming Languages –Louden, Second Edition, Thomson.

Reference Books :

1. Programming languages –Ghezzi, 3/e, John Wiley
2. Programming Languages Design and Implementation – Pratt and Zelkowitz, Fourth Edition PHI/Pearson Education
3. Programming languages –Watt, Wiley Dreamtech
4. LISP Patric Henry Winston and Paul Horn Pearson Education.

BTCS550PCP	Compiler Design & Computer Networks s Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	3	2

Prerequisite(s) and co-requisite:

Compiler Design and Computer Networks

Learning Objectives

1. Provide an introduction to the system software like assemblers, compilers, and macros which provides the complete description about inner working of a compiler.
2. Explore the design of compilers and optimization techniques. It also includes the design of Compiler writing tools.
3. Understand the language specifications, use of regular expressions and context free grammars behind the design of compiler.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand fundamentals of compiler and identify the relationships among different phases of the compiler.
2. Understand the application of finite state machines, recursive descent, production rules, parsing, and language semantics.
3. Analyze & implement required module, which may include front-end, back-end, and a small set of middle-end optimizations.

Course Contents

List of Experiments

1. Simulation of a Finite state Automata to recognize the tokens of various control statements.
2. Simulation of a Finite state machine to distinguish among Integers, Real Numbers & Numbers with Exponents.
3. Program in LEX tool to recognize the tokens and to return the token found for a C like Language
4. Parsing of arithmetic and algebraic expressions and equations.
5. Use of YACC tool to parse the statements of C like Language.
6. Implementation of the Data Link Layer framing method such as character stuffing and bit stuffing in C.
7. Implementation of CRC algorithm in C.
8. Implementation of a Hamming (7, 4) code to limit the noise. We have to code the 4 bit data in to 7 bit data by adding 3 parity bits. Implementation will be in C.
9. Implementation of LZW compression algorithm in C.
10. Write a socket program in C to implement a listener and a talker.
11. Simulation of a Networks of 3 nodes and measure the performance on the same Networks
12. Write a program in C to encrypt 64-bit text using DES algorithm.

BTCS505PCT	Microprocessor & Assembly Language	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Computer Organization and digital logic design

Learning Objectives

1. To gain an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques with peripheral devices
2. To learn the concept of designing computer organization and architecture
3. To gain an understanding of applications of microprocessors in designing processor-based automated electronics system.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the internal organization and operation of microprocessors/microcontrollers.
2. Design microprocessors/microcontrollers-based systems with the help of toolkit
3. Implement and program new experiments on microprocessor/microcontroller based systems.

Course Contents

UNIT I 8085 Microprocessor

8085 Architecture – Instruction set – Addressing modes – Timing diagrams – Assembly language programming – Counters – Time Delays – Interrupts – Memory interfacing –Interfacing, I/O devices.

UNIT II 8086 Microprocessor

Intel 8086 Internal Architecture – 8086 Addressing modes- Instruction set- 8086 Assembly language Programming–Interrupts.

UNIT III 8051 MICROCONTROLLER

8051 Micro controller hardware- I/O pins, ports and circuits- External memory –Counters and Timers-Serial Data I/O- Interrupts-Interfacing to external memory and 8255.

UNIT IV 8051 PROGRAMMING AND APPLICATIONS

8051 instruction set – Addressing modes – Assembly language programming – I/O port programming - Timer and counter programming – Serial Communication – Interrupt programming –8051 Interfacing: LCD, ADC, Sensors, Stepper Motors, Keyboard and DAC.

UNIT V PERIPHERALS INTERFACING

Inter facing Serial I/O (8251)- parallel I/O (8255) –Keyboard and Display controller (8279) – ADC/DAC interfacing – Inter Integrated Circuits interfacing (I2C Standard)- Bus: RS232C-RS485-GPIB

TEXT BOOKS

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 4th Edition, Penram International Publishing, New Delhi, 2000.
2. John Uffenbeck, The 80x86 Family, Design, Programming and Interfacing, Third Edition. Pearson Education, 2002.
3. Mohammed Ali Mazidi and Janice Gillispie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, New Delhi, 2003.

REFERENCES

1. A.K. Ray and K.M.Burchandi, Intel Microprocessors Architecture Programming and Interfacing, McGraw Hill International Edition, 2000
2. Kenneth J Ayala, The 8051 Microcontroller Architecture Programming and Application, 2nd Edition, Penram International Publishers (India), New Delhi, 1996.
3. M. Rafi Quazzaman, Microprocessors Theory and Applications: Intel and Motorola prentice Hall of India, Pvt. Ltd., New Delhi, 2003.

BTCS551PCP	Microprocessor & Assembly Language Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Computer Organization and digital logic design

Learning Objective

1. To gain an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques with peripheral devices
2. To learn the concept of designing computer organization and architecture
3. To gain an understanding of applications of microprocessors in designing processor-based automated electronics system.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the internal organization and operation of microprocessors/microcontrollers.
2. Design microprocessors/microcontrollers-based systems with the help of toolkit
3. Implement and program new experiments on microprocessor/microcontroller based systems.

List of Experiments

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

BTCS601PCT	Object Oriented Analysis and Design	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Software Engineering

Learning Objectives

1. Understand Basic Structural Modeling objects such as Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams.
2. Introduce Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams. Advanced Behavioral Modelling: Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.
3. Understand Unified Software Development Process:, Use Case Driven Process, An Architecture, An Architecture-Centric Process, An Iterative and Incremental Process. Requirements Capture, Capturing Requirements as Use Cases, Analysis, Design, Implementation, and Test.

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate the importance of object oriented modeling principles in context of software development using UML
2. Construct structural Modeling objects such as Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams.
3. Design Use Case Diagrams, Interaction Diagrams, Activity Diagrams. Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.

Course Content

UNIT-I

UML Introduction: Why we Model, Introducing the UML, Hello World. Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams.

Advanced Structural Modeling: Advanced Classes, Advanced Relationships, interfaces, Types and Roles, Packages, Instances, Object Diagrams, Components.

UNIT-II

Basic behavioral Modeling: Interactions, Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams.

Advanced Behavioral Modelling: Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.

UNIT-III

Architecture Modeling: Artifacts, Deployment Collaborations, Patterns and Frame Works, Artifact Diagrams, Deployment Diagrams, Systems and Models.

UNIT-IV

Unified Software Development Process: The Unified Process, The Four P's, A Use Case Driven Process, An Architecture, An Architecture-Centric Process, An Iterative and Incremental Process.

UNIT-V

Core Workflows: Requirements Capture, Capturing Requirements as Use Cases, Analysis, Design, Implementation, and Test.

Text Books:-

1. Grady Booch, James Rumbaugh, Ivor Jacobson, "The Unified Modeling Language-user
2. Guide", (Covering UML 2.0), 2nd Edition, Pearson Education, India, 2007.

Reference Books:-

1. Ivor Jacobson, Grady Booch, James Rumbaugh, "The Unified Software Developmen
2. Process", Pearson Education, India, 2008.

BTCS602PCT	Computer Graphics	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Knowledge of Geometrical coordinate systems and programming language

Learning Objectives

1. To provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
2. To understand computer graphics techniques (2-D/3-D), focusing on 3D modeling, image synthesis, and rendering.
3. Introduce geometric transformations, geometric algorithms, software systems, 3D object models (surface, volume and implicit), visible surface algorithms, image synthesis, shading and mapping, ray tracing, radiosity, global illumination, photon mapping, and anti-aliasing.

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate geometrical transformations (2-D/3-D) with the relevant mathematics of computer graphics, e.g., 3D rotations using both vector algebra, geometrical transformations and projections using homogeneous co-ordinations system
2. Apply principles and techniques of computer graphics, e.g., the graphics pipeline, and Brenham algorithm for speedy line and circle generation.
3. Apply computer graphics concepts in the development of computer games, information visualization, and business applications.

Course Contents

UNIT I

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms

UNIT II

2-D geometrical transforms: Translation, scaling, rotation, other transformations, matrix representations and homogeneous coordinates, transformations between coordinate systems.

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm

UNIT III

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods

UNIT IV

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

UNIT V

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

Text Books:-

1. "Computer Graphics *C version*", Donald Hearn and M.Pauline Baker, Pearson Education.
2. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

Reference Books:

1. "Computer Graphics", second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
2. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc- Graw hill edition.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
5. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH

BTCS603PCT	Software Engineering	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s) and Co-requisite:

Fundamental knowledge of DBMS & programming concepts

Learning Objectives

1. Study the fundamentals of software systems (including analysis, design, construction, maintenance, quality assurance and project management) using the appropriate theory, principles, tools and processes.
2. Use appropriate computer science and mathematics principles in the development of software systems.
3. Develop software in at least one application domains like Healthcare, safety, Society, Legal, Environment, Communication etc.

Learning Outcomes

After successful completion of course student shall be able to:

1. To apply software engineering theory, principles, tools and processes, as well as the theory and principles of computer science and mathematics, to the development and maintenance of complex software systems.
2. To design and validate various software prototypes and to develop quality software metrics.
3. To elicit, analyze and specify software requirements through a productive working relationship with project stakeholders.

Course Contents

UNIT I

Software Engineering Fundamentals: Definition of software product and process, Software Characteristics, Components, Applications, Layered Technologies, Processes and Product, Methods and Tools, Generic View of Software Engineering, Software Crisis, Software development paradigms, Techniques of Process Modelling, Software Process and lifecycle models: Build & Fix Model, Waterfall Model, Prototyping Model, Iterative Enhancement Model, Evolutionary Development Model and Spiral Model, Incremental, and Concurrent Development Model.

UNIT II

Software Requirements Analysis & Specification: System specification, Software requirements specification (SRS) standards, Formal specification methods, Specification tools, Requirements validation and management. Problem Recognition, Evaluation and Synthesis, Modelling, Specifications and Review Techniques. Analysis Modelling: Difference between Data and Information, ER Diagram, Dataflow Model, Control Flow Model, Control and Process Specification, Data Dictionary.

UNIT III

Software Design: Software architecture, Modular Design-cohesion and coupling, Process-oriented design, Process and Optimization, Data-oriented design, User-interface design, Real-time software design, Architectural Designing, Interface Design, Procedural Design, Object Oriented Design.

CASE Tools: Computer-aided software engineering, Introduction to CASE, Building Blocks of CASE, Relevance of CASE tools, High-end and low-end CASE tools, automated support for data dictionaries, DFD, ER diagrams, Integrated Case Environment, CASE workbenches.

UNIT IV

Coding and Testing: Choice of Programming languages, Coding standards, Introduction to Testing Process, Functional & Structural Testing, Testing Activities like Unit, Integration & System Testing, Testing tools and workbenches.

User Interface Design: Concepts of Ui, Interface Design Model, Internal and External Design, Evaluation, Interaction and Information Display.

UNIT V

Configuration Management: Concepts in Configuration Management, The Configuration Management Process: Planning and Setting up Configuration Management, Perform Configuration Control, Status Monitoring and Audits.

Software Maintenance: What is software maintenance, Maintenance Process & Models, Reverse Engineering, Software re- engineering, Configuration Management issues and concept, Configuration planning & techniques, Software versions and change control process, Documentation.

Text Books:

1. R. Pressman, "Software Engineering", 7th Edition, 2002, McGraw-Hill.
2. W.S. Jawadekar, Software Engineering – A Primer, TMH-2008

Reference Books:

1. Software Engineering, Yogesh Singh, New Age Publications, Delhi,
2. Shari Pfleeger, "Software Engineering", 2001, Pearson Education.
3. Stephen Schach, Software Engineering, TMH, 2007
4. Sommerville I., Software Engineering, Addision-Wesley.

BTCS604PCT	Data Warehouse and Data Mining	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

DBMS, Algorithms & Data Structure

Learning Objectives

1. Introduce data mining principles and techniques with data mining as a cutting edge business intellegence tool.
2. Develop critical thinking, problem solving and decision making skills wrt Data warehouse and data mining.
3. Describe various schema model and the Star Schema to design a Data Warehouse.

Learning Outcomes

After successful completion of course student shall be able to:

1. Design a data warehouse or data mart to present information needed by the manager and can be utilized for managing clients.
2. Design and implement a quality data warehouse or data mart effectively and administer the data resources in such a way that it will truly meet management's requirements.
3. Evaluate standards and new technologies to determine their potential impact on your information resource for a large complex data warehouse/data mart.

Course Contents

UNIT-I

Introduction: What is Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining. Data Preprocessing: Needs Preprocessing, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT-II

Data Warehouse and OLAP Technology: What is Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture and Implementation, from Data Warehousing to Data Mining, Mining Frequent Patterns, Associations Rules: Basic Concepts, Efficient and Scalable Frequent Item Set Mining Methods, Mining Various kinds of Association Rules.

UNIT-III

Classification and Prediction: Introduction, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule based Classification, Classification by Back Propagation, Support Vector Machines, Prediction, Accuracy and Error Measures

UNIT-IV

Cluster Analysis: Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid Based Methods, Model Based Clustering Methods, Outlier Analysis.

UNIT—V

Mining Object, Spatial, Multimedia, Text, and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Text Books:-

1. Han J & Kamber M, "Data Mining: Concepts and Techniques", Harcourt India, Elsevier India, Second Edition.
2. Pang-NingTan. MichaelSteinback,VipinKumar, "Introduction to Data Mining", Pearson Education, 2008.

References:

1. Margaret H Dunham,S.Sridhar, "Data mining: Introductory and Advanced Topics", Pearson Education, 2008.
2. Humphires,hawkins,Dy, "Data Warehousing: Architecture and Implementation", Pearson Education, 2009.
3. Anahory, Murray, "Data Warehousing in the Real World", PearsonEçiucation, 2008.
4. Kargupta,Joshi,etc., "Data Mining: Next Generation Challenges and Future Directions" Prentice

Hall of IndiaPvtLtd, 2007

BTCS605PCT	E-Commerce	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Internet

Learning Objectives

1. Evaluate the role of major types of information systems in a business environment and their relationship to each other
2. Assess the impact of the Internet and Internet technology on electronic commerce and electronic business
3. Identify the major management challenges for building and using information systems and learn how to find appropriate solutions to those challenges.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the basic concepts and technologies used in the field of management information systems
2. Perform the ethical, social, and security issues of information systems and
3. Understand the role of information systems in organizations, the strategic management processes, and the implications for the management and learn about the importance of managing organizational change associated with information systems implementation

Course Contents

UNIT – I

Introduction to Electronic Commerce – E-Commerce Framework- Anatomy of E-Commerce Applications – E-Commerce Consumer & Organization Applications- E- Commerce and World Wide Web – Internet Service Providers – Architectural Framework for Electronic Commerce – WWW as the Architecture- Hypertext publishing.

UNIT – II

Electronic Payment Systems – Types of Electronic Payment Systems – Digital Token Based Electronic Payment System – Smart Cards – Credit Cards – Risk in Electronic Payment Systems – Designing Electronic Payment Systems

UNIT – III

Corporate Digital Library – Document Library, Digital Document Types, Corporate Data Warehouse, Advertising and Marketing – Information based Marketing, Advertising on Internet, On-Line Marketing Process, Market Research.

UNIT –IV

Consumer Search and Resource Discovery – Information Search and Retrieval, Commerce Catalogues, Information Filtering Multimedia – Key Multimedia Concepts, Digital Video and Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing .

UNIT - V

Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda

Text Books

1. Ravi Kalakota & A. B. Whinston - "Frontiers of Electronic Commerce", Pearson, Education, India, 1999.
2. Daniel Minoli, Emma Minoli: "Web Commerce Technology Handbook", Tata McGraw Hill
3. Bajaj and Nag. "E-Commerce the cutting edge of Business". TMH.
4. E-Business & Commerce: Brahm Cazner, Wiley dreamtech.

BTCS650PCP	Unified Modeling Language Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s)

Software Engineering.

Learning Objectives

1. Explain Advanced Classes, Advanced Relationships, interfaces, Types and Roles, Packages, Instances, Object Diagrams, Components
2. Introduce Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams. Advanced Behavioral Modelling: Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.
3. Understand Unified Software Development Process:, Use Case Driven Process, An Architecture, An Architecture-Centric Process, An Iterative and Incremental Process. Requirements Capture, Capturing Requirements as Use Cases, Analysis, Design, Implementation, and Test.

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate the importance of object oriented modeling principles in context of software development using UML
2. Design Use Case Diagrams, Interaction Diagrams, Activity Diagrams. Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.
3. Design and apply Use Case Driven Process, Iterative and Incremental Process.

Course Content

List of Experiments

Students have to perform the following OOAD steps on a given Case Study:

- Use Case Modeling
- Structural Modeling
- Behavioural Modeling
- Architecture Modeling

The output should consist of:

- Use Case Diagrams
- Class Diagrams
- Sequence Diagrams
- Collaboration Diagrams
- State Chart Diagrams
- Activity Diagrams
- Deployment Diagrams
- Component Diagrams

Students should form into groups. They should carry out the Case Study as a group activity. The lab should be carried out using a CASE Tool. Finally they should submit a report.

BTCS651PCP	Computer Graphics Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s) and co-requisite:

Mathematical Foundation in Computer Science and computer graphics.

Learning Objectives

1. To provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
2. To understand computer graphics techniques (2-D/3-D), focusing on 3D modeling, image synthesis, and rendering.
3. Introduce geometric transformations, geometric algorithms, software systems, 3D object models (surface, volume and implicit), visible surface algorithms, image synthesis, shading and mapping, ray tracing, radiosity, global illumination, photon mapping, and anti-aliasing.

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate geometrical transformations (2-D/3-D) with the relevant mathematics of computer graphics, e.g., 3D rotations using both vector algebra, geometrical transformations and projections using homogeneous co-ordinations system
2. Apply principles and techniques of computer graphics, e.g., the graphics pipeline, and Brenham algorithm for speedy line and circle generation.
3. Analyze back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

Course Contents

List of Experiments

1) Write a C Program to draw a line using Bresenhams Line Drawing Algorithm.
2) Write a C Program to draw a line using Digital Differential Analyzer Line Drawing Algorithm.
3) Write a C Program to draw a Circle using Mid-Point Circle Algorithm.
4) Write a C Program to draw an Ellipse using Mid-Point Ellipse Algorithm.
5) Write a C Program to draw user defined Polygon at run time.
6) Write a C Program for Scan Line Polygon Filling Algorithm.
7) Write a C Program for Boundary Fill Algorithm.
8) Write a C Program for Flood Fill Algorithm.
9) Write a C Program for Basic Transformations.
10) Computer Graphics Functions:
    - i) Line Function.
    - ii) Circle and arc Functions.
    - iii) Ellipse Function.
    - iv) floodfill and setfillstyle Functions. v) setcolor Function.
    - vi) Rectangle Function.
    - vii) putpixel Function.
    - viii) outtext and outtextxy Functions.
11) Write a C Program to draw a Square, Rectangle and Triangle using Graphics Functions.
12) Write a C Program to draw an Ellipse, Circle and Arc using Graphics Functions.
13) Write a C Program to draw a Fish with different color using Graphics Functions.
14) Write a C Program to draw a Flag with orange, white and green colors using Graphic Functions.
15) Write a C Program to draw a Flag with user defined colors at run time.
16) Write a C Program to draw a Star using line function.
17) Write a C Program to draw a Cylinder using ellipse and line functions.
18) Write a C Program to construct a clock.
19) Write a C Program to draw Umbrella using line and ellipse functions.
20) Write a C Program to Construct an Animated Car/Truck.

BTCS701PCT	Linux Programming	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Operating System and Programming

Learning Objectives

1. Understand the working of linux operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,
2. Understand how Networks operating system can be used in the development of application programs, or to build higher level abstractions,
3. Understand how Networks operating system abstractions can be implemented,

Learning Outcomes

After successful completion of course student shall be able to:

1. Perform basic command and operatins using Linux commands and through scripting
2. Demonstrate ability to design, implement and evaluate a computer-based system, process, components, or program in Linux environment
3. Identify the System calls, IPC/RPC, protection, interrupts and know Input/output, disk access, file systems facilities.

Course Contents

UNIT I

Introduction – Short History - Why is Linux So Successful?- UNIX Flavors - BSD, SysV, Linux - Standards - System Architecture - The Kernel - The Shell - Utilities - Tools and Applications – Linux Programming Security – Users and Groups - PUID & PGID - Real and Effective IDs - Authenticating Users - File System Permissions.

UNIT II

Programming under Linux- Privileged Execution Mode - Kernel Mode Vs. User Mode System calls. **Files** - Using Files - Using Links - Working With Directories - Obtaining File Information – File Permissions - Special Permissions – Signals - The Way the Kernel Handles Signals- Types of Signals- Results of a Process - Receiving a Signal - Handling Signals - Signals List - Sending Signals - Handling Signals - Response to Signals - Activation of pause, signal - System Call for Signal Handling - Error Handler.

UNIT III

Process - Programs and Processes - The Process IDs - The Process Table - The Process State PS Report - Process Status - Context Switch - The Process Environment - Process Group - Job and Processes - Process Termination - Creating a New Process - The wait Function Family - Executing a Program - The system C Library Function - Redirection of Input and Output - The vfork System Call.

UNIT IV

Threads - Thread Creation - Thread Cancellation - Thread-Specific Data Synchronization and Critical Sections - GNU/Linux Thread Implementation - Processes Vs. Threads - Inter-Process communication (IPC) - Pipes - Named Pipes - Shared Memory - Message Queue - csh Level commands - Synchronization Mechanisms - File locking - Semaphore.

UNIT V

Sockets - What Is A Socket? - A Brief History Of Sockets - Communication Protocols - communication Capabilities - Endpoint Addresses - The Internet Protocol (IP) - Internet Addresses - Address Classes - Connection Oriented Communications And TCP - Connectionless communications And UDP - Stream Sockets - The Basic Model - Sending Data(send) - Receiving Data(recv.) - Shutting Down A Socket - Related files - The select( ) System Call -Broadcast and Datagram Sockets

TEXT BOOKS:-

1. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education, 2003.

REFERENCE BOOKS:-

1. Unix Networks Programming, W.R.Stevens, PHI.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.

BTCS702PCT	Software Testing Methodologies	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Software Engineering

Learning Objectives

1. Introducing various testing approaches, tools, techniques, models and metrics.
2. Presenting various techniques and strategies of software testing and inspection and pointing out the importance of testing in achieving high-quality software.
3. Understand concept of reliability, the role it plays in software engineering, and how it is modeled and measured.

Learning Outcomes

After successful completion of course student shall be able to:

1. Use the appropriate methods and tools for estimating software cost.
2. Understand the difference between different software design models and techniques and how to apply them.
3. Recognize the importance of software reliability and how we can design dependable software, and what measures are used.

Course Contents

UNIT I:

Introduction: Software program and its objective, Software development techniques, top-down Vs. bottom-up approach, modular and structures programming. A brief introduction about object oriented approach.

Importance of Software Testing: Software testing and its importance, software development life cycle verses software testing life cycle, Deliverables, version and error control.

UNIT II

Testing Techniques and Strategy: Unit testing, Integration testing, System testing, Acceptance testing White-Box testing: Flow Graph notation, Cyclomatic Complexity, Graph matrices, control structure and loop testing. Black-Box testing: Equivalence partitioning, Boundary Value Analysis, Orthogonal Array Testing

UNIT III

Verification and Validation: Requirement verification, Coding standards, Walk through, Formal Inspection, Design validation and verification, Function test, Design metrics, correctness proof and its requirement.

UNIT IV

Building Test Cases and Plans: Format of test cases, Du, dc and other data paths, Test data selection, branch coverage, statement coverage, pre-condition and post-condition, Test schedule and check pointing, suitable exercises for creating test cases for each type of techniques.

UNIT V

Quality Assurance and Standards: Basic software quality parameters and its metrics, Software Configuration Change and types of errors, Quality management models: ISO, SPICE, IEEE, CMM

Debugging Technique and Tools: Integrated development environment, debugging, tracing, data inspection, exception errors, code and data redundancy, unreachable code.

External Source of Errors: Main memory, conflicting dll and unknown interface as source of error and their rectification.

Note: Any open-source Software Tools may be utilized, such as “winrunner”.

Text Books:-

1. Yogesh Singh, Software Testing, Cambridge University Press, 2014
2. Oxford Press Desikan S, Ramesh G, “Software Testing”, Pearson Education, 2008.
3. Tamres L, “Introducing Software Testing”, Pearson Education, 2007.

Reference Books:-

1. Brian Marick, “The Craft of Software Testing”, Pearson Education, 2008.
2. Rajani & Oak, “Software Testing Methodology, Tools and Processes” Tata McGraw-Hill, 2007.
3. R. Pressman, “Software Engineering”, 6th Edition, Tata McGraw-Hill.
4. Dustin E, “Effective Software Testing”, Pearson Education, 2007.
5. Mathur A.P, “Fundamentals of Software Testing”, Pearson Education, 2008.

BTCS703PCT	Web Technologies	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Internet and Programming skills

Learning Objectives

1. Study the technologies, protocols and architectures of the Internet. Explain about the extensible markup language (XML) and associated technologies.
2. Explore the technology used in web services such as web services description language (WSDL).
3. Design and implement an internet database application using existing tools and techniques.

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate the ability to create web pages using HTML, DHTML, Java Scripts, XML
2. Understand range of real world web design approaches and critically evaluate these approaches.
3. Develop web pages that present information, graphics and hypertext links to other web pages in a cohesive manner, and build up with peers a website using CSS structure, while demonstrating awareness of usability and other web design issues

Course Contents

UNIT 1

Collections : Collection Interfaces, Concrete Collections, The Collections Framework Multithreading : Creating thread and running it, Multiple Thread acting on single object, Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of Thread

UNIT 2

Enterprise Java Bean: Preparing a Class to be a JavaBean, Creating a JavaBean, JavaBean Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean

Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures C

UNIT 3

Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession

Java Server Pages (JSP): Introduction, JavaServer Pages Overview, A First JavaServer Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries

UNIT 4

Remote Method Invocation: Defining the Remote Interface, Implementing the Remote Interface, Compiling and Executing the Server and the Client

Common Object Request Broker Architecture (CORBA): Technical/Architectural Overview, CORBA Basics, CORBA services

UNIT 5

Introduction Smart Phone Application Development: Introduction to android platform, Creating application template, adding activity, intent, services to application, using Google map API.

Text Book:-

1. "Advanced Java 2 Platform HOW TO PROGRAM" by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice Hall
2. "Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional" by Antonio Goncalves – Apress publication

Reference Book:-

1. The complete Reference Java 7th Edition , Herbert Schildt., TMH.
2. Java Server Pages,Hans Bergsten, SPD, O'Reilly.
3. Professional Jakarta Struts - James Goodwill, Richard Hightower, Wrox Publishers.
4. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India, rp – 2008.

BTCS750PCP	Linux Programming Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s) and co-requisite:

Operating System and Linux Programming.

Learning Objectives

1. Understand how Networks operating system can be used in the development of application programs, or to build higher level abstractions,
2. Understand the principles of concurrency and synchronization, and apply them to write correct concurrent programs/software,
3. Understand basic resource management techniques (scheduling, time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection.

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate installation, partitioning of Linux operating system
2. Perform basic command and operatins using Linux commands and through scripting
3. Demonstrate ability to design, implement and evaluate a computer-based system, process, components, or program in Linux environment

Course Contents

List of Experiments

1. Write a shell script that accepts a file name, starting and ending numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing the specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
6. Write a shell script to list all of the directory files in a directory.
7. Write a shell script to find factorial of a given number.
8. Implement in C the following Unix commands and System calls.
    a. Implement in C the cat Unix command using system calls
    b. Implement in C the following ls Unix command using system calls
    c. Implement in C the Unix command mv using system calls
9. Write a C program that takes one or more file or directory names as command line input and reports the following information on the file.
    a) file type
    b) number of links
    c) read, write and execute permissions
    d) time of last access
10. Write a C program to emulate the Unix ls – l command.
11. Write a C program that redirects a standard output to a file. Ex: ls >f1.
12. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.
13. Write a C program to create a zombie process.
14. Write a C program that illustrates how an orphan is created.
15. Write a C program that illustrates the following.
    1. Creating a message queue.
    2. Writing to a message queue.
    3. Reading from a message queue.

16. Write a C program that implements a producer-consumer system with two processes.(using semaphores)
17. Write a C program that illustrates inter process communication using shared memory.
18. Write a C program that illustrates file locking using semaphores.
19. Write a C program that counts the number of blanks in a text file using standard I/O.
20. Write a C program that illustrates communication between two unrelated processes using named pipe.

BTCS751PCP	Web Tehnologies Lab	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	0	0	4	2

Prerequisite(s) and Co-requisite:

Internet and Web Technologies

Learning Objectives

1. Study the technologies, protocols and architectures of the Internet. Explain about the extensible markup language (XML) and associated technologies.
2. Explore the technology used in web services such as web services description language (WSDL).
3. Enable the students to understand web-based site planning, management and maintenance. Design and implement an internet database application using existing tools and techniques.

Learning Outcomes

After successful completion of course student shall be able to:

1. Demonstrate the ability to create web pages using HTML, DHTML, Java Scripts, XML
2. Understand range of real world web design approaches and critically evaluate these approaches.
3. Examine and assess the effectiveness of a web design system in a real time environment.

Course Contents

List of Experiments

1. Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com The website should consist the following pages.Home page, Registration and user Login, User profile page, Books catalog, Shopping cart, Payment By credit card, order confirmation.
2. Validate the registration, user login, user profile and payment by credit card pages using JavaScript.
3. Write an XML file which will display the Book information which includes the following:
    a. Title of the book
    b. Author Name
    c. ISBN number
    d. Publisher name
    e. Edition
    f. Price
4. Write a Document Type Definition (DTD) to validate the above XML file.Display the XML file as follows. The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns. Use XML schemas XSL and CSS for the above purpose.
5. Create a simple visual bean with a area filled with a color. The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The color of the area should be changed dynamically for every mouse click.
6. Install TOMCAT web server. While installation assign port number 8080. Make sure that these ports are available i.e., no other process is using this port.
7. Access the above developed static web pages for books web site, using these servers by using the urls :http://localhost:8080/rama/books.html
8. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 And, pwd4 respectively. Write a servelet for doing the following.
    a. Create a Cookie and add these four user id's and passwords to this Cookie.

    Read the user id and passwords entered in the Login form (Program 1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user(i.e., user-name and password match) you should welcome him by name(user- name) else you should display " You are not an authenticated user ".
9. Install a database(Mysql or Oracle).

Create a table which should contain at least the following fields: name,password, email-id, phone number(these should hold the data from the registration form). Practice 'JDBC' connectivity. Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (Program 1).

10. Write a JSP which does the following job:
    Insert the details of the 3 or 4 users who register with the web site (Program 7) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

BTCS701PET	Cloud Computing	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Internet, Data Communications & Computer Networks

Learning Objectives

1. Study cloud computing fundamentals, issues and challenges of cloud computing, Evolution of Cloud Computing , Applications cloud computing, Business models around Cloud, Cloud Computing simulation toolkit such as Eucalyptus - Nimbus - Open Nebula, CloudSim.
2. Study the characteriscs of cloud computing services and models, role of Virtualization, Grids and cluster
3. Explain Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Learning Outcomes

After successful completion of course student shall be able to:

1. Apply any one Cloud Computing simulation toolkit such as Eucalyptus - Nimbus - Open Nebula, CloudSim for coud services
2. Understand cloud computing services and models and role of Virtualization, Grids and cluster
3. Understand Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance and Risk Management

Course Contents

UNIT I

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , Applications cloud computing, Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim.

UNIT II

Cloud Services and File System

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service- Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT III

Collaborating With Cloud

Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing ,Databases Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks s – Collaborating via Blogs and Wikis.

UNIT IV

Virtualization

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

Hardware and Infrastructure

Clients, Security, Networks , Services. Accessing the Cloud – Platforms, Web Applications, Web APIs, Web Browsers. Cloud Storage – Overview, Cloud Storage Providers, Standards – Application, Client, Infrastructure, Service.

UNIT V

Security in the Cloud

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data

Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Text Books:

1. Cloud Computing ”A Practical Approach” Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGraw-Hill.
2. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse and James F.Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2010.

Reference Books:

1. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009. Kumar Saurabh, “Cloud Computing – insights into New -Era Infrastructure”, Wiley India,2011.
2. Ronald L. Krutz, Russell Dean Vines, “Cloud Security – A comprehensive Guide to Secure Cloud Computing”, Wiley – India, 2010.

BTCS702PET	Distributed Computing	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Operating System and Computer Networks

Learning Objectives

1. Familiarize the students with the basics of distributed computing systems.
2. To introduce the concepts of distributed file systems, shared memory and message passing systems, synchronization and resource management.
3. Study Inter–process Communication, API for the Internet Protocols, External Data Representation and Marshalling – Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI – Case Study

Learning Outcomes

After successful completion of course student shall be able to:

1. Verify and analyze the time complexity of the algorithms related to distributed computing.
2. Design and develop various algorithms for different environment like Amoeba, Hadoop, HDFS architecture, setting up the hadoop environment.
3. Understand Map-Reduce Architecture and Map reduce programming

Course Contents

UNIT 1

Basic Concepts

Characterization of Distributed Systems – Examples – Resource Sharing and the Web Challenges System Models – Architectural and Fundamental Models – Networks ing and InterNetworks ing Types of Networks s – Networks Principles – Internet Protocols – Case Studies

UNIT II

PROCESSES AND DISTRIBUTED OBJECTS

Inter–process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI – Case Study

UNIT III

OPERATING SYSTEM ISSUES

The OS Layer – Protection – Processes and Threads – Communication and Invocation – OS Architecture – Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Networks File System – The Andrew File System

UNIT IV

OPERATING SYSTEM ISSUES

Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – X.500 Directory Service – Clocks – Events and Process States – Synchronizing Physical Clocks – Logical Time And Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems

UNIT V

DISTRIBUTED TRANSACTION PROCESSING

Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols – Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery – Overview of Replication And Distributed Multimedia Systems

Text Books

1. 1.George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and
2. Design”, 3rd Edition, Pearson Education, 2002.
3. 2.Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, “Principles and Pardigms”,
4. Pearson Education, 2002.

Reference Books

1. Sape Mullender, "Distributed Systems", 2nd Edition, Addison Wesley, 1993.
2. Albert Fleishman, Distributes Systems, "Software Design and Implementation", Springer, Verlag, 1994.
3. M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.
4. Mugesh Singhal, Niranjan G Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw Hill Edition, 2001.

BTCS703PET	Mobile Computing	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Data Communication and Computer Networks

Learning Objectives

1. Familiarize the students with the basics of mobile computing, and its usage & applications
2. Study various wireless protocols, techniques, SDMA, FDMA, TDMA, and CDMA. Dynamic Host Configuration Protocol (DHCP).
3. Explain Mobile Ad hoc Networks s (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the basics concepts of Mobile Communications, limitations, and architecture. GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.
2. Understand the working principle of SDMA, FDMA, TDMA, and CDMA. Dynamic Host Configuration Protocol (DHCP).
3. Understand the concept of Mobile Ad hoc Networks s (MANETs), and various routing algorithms, security in MANETs

Course Contents

UNIT 1

Introduction to Mobile Communications and Computing: Mobile Computing (MC) : Introduction to MC, novel applications, limitations, and architecture. GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

UNIT 2

(Wireless) Medium Access Control : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA. Mobile Networks Layer : Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

UNIT 3

Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP. Database Issues : Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT 4

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, pushbased mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques. Mobile Ad hoc Networks s (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs

UNIT 5

Protocols and Tools : Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, Networks ing, security, link management) and J2ME.

Textbooks:-

1. Jochen Schiller,"Mobile Communications",Addison-Wesley. (Chapters 4,7,9,10,11),second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks s and Mobile Computing", Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)

Reference books:-

1. Yi-Bing Lin & Imrich Chlamtac, "Wireless and Mobile Networks s Architectures", John Wiley & Sons, 2001.

2. Raj Pandya, "Mobile and Personal Communication systems and services", Prentice Hall of India, 2001.
3. Hansmann, "Principles of Mobile Computing", Wiley Dreamtech, 2004.

BTCS704PET	Software Project Management	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Software Engineering.

Learning Objectives

1. Design and develop software systems (including analysis, design, construction, maintenance, quality assurance and project management) using the appropriate theory, principles, tools and processes.
2. Use appropriate computer science and mathematics principles in the development of software systems.
3. Solve problems in a team environment through effective using various tools, techniques and processes.

Learning Outcomes

After successful completion of course student shall be able to:

1. To apply software engineering theory, principles, tools and processes, as well as the theory and principles of computer science and mathematics, to the development and maintenance of complex software systems.
2. To design and validate various software prototypes and to develop quality software metrics.
3. To participate, productively in software project teams involving students from both software engineering and other majors streams of computer scinec & engineering.

Course Contents

UNIT I

Principles of software engineering, features of good software, Quality Requirement in different Application Areas Software Process and Models, Tools and techniques of Process Modelling, Product and Process.

UNIT II

Introduction to Project Management: Definition of the project, Project specification and parameters, Principles of Project management

Project management life cycle

Software Project Planning. Project activities and Work-Breakdown-Structure(WBS),Criteria for completeness in the WBS, Activity Resource Requirements and Cost, Joint Project Planning Session, Project Management Plan

UNIT III

Project Economics Project Costing, Empirical Project Estimation Techniques, Decomposition Techniques, Algorithmic methods, Automated Estimation Tools

Project Scheduling and Tracking Techniques Why are projects delayed? Effort Estimation Techniques, Task Networks and Scheduling Methods, Monitoring and Control Progress, Graphical Reporting Tools

UNIT IV

Risk Analysis and Management Risk Concepts and Identification, Risk Assessment and Control, Risk Components and Drivers, Risk Tracking and Monitoring, Risk Mitigation and Management

Software Metrics and Project Management Measures, Metrics and Indicators, Process and project metrics, Statistical Metrics and Process Monitoring, Function-point and project management

UNIT V

Project Control and Closure Defect Collection and Audit, Causal and Pareto Analysis, Project Closure Analysis

Project Management Issues with regard to New Technologies Object-oriented Methodology, Web-based Projects, Embedded Systems

Text books:-

1. John J. Rakos, "Software Project Management for Small to Medium Sized Projects", 1998, Prentice Hall, ISBN: 0138261733.
2. Walker Royce, "Software Project Management: A Unified Framework", 2001, AddisonWesley Professional, ISBN-10: 0201309580, ISBN-13: 9780201309584.

3. Pankaj Jalote, "Software Project Management in Practice", 2001, Addison-Wesley Professional, ISBN-10:0-201-73721-3, ISBN-13: 9780201737219.

Reference Books:-

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", 7th Edition, McGraw Hill, ISBN: 0073375977.
2. Ian Sommerville, "Software Engineering", 8th Edition, Pearson Education, 2006.
3. A Guide to the Project Management Body of Knowledge (4^{th} Edition), 2008, Project Management Institute, ISBN-13: 97819306994580.

BTCS705PET	Soft Computing	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Mathematical Foundation in Computer Science

Learning Objectives

1. Familiarize with soft computing techniques and basic concepts.
2. Provide the basic concepts of different methods and tools for processing of uncertainty in intelligent systems, such as, fuzzy models, neural Networks s, probabilistic models, and foundations of its using in real systems.
3. Introduce and use the idea of Neural Networks s, fuzzy logic and use of heuristics based on human experience.

Learning Outcomes

After successful completion of course student shall be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines
2. Recognize the feasibility of applying a soft computing methodology for a particular problem
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems, genetic algorithms to combinatorial optimization problems and neural Networks s to pattern classification and regression problems

Course Contents

Unit- 1

Neural Networks s-1(Introduction & Architecture)

Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural Networks architecture: single layer and multilayer feed forward Networks s, recurrent Networks s. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.

Unit 2

Neural Networks s-II (Back propogation Networks s)

Architecture: perceptron model, solution, single layer artificial neural Networks , multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

Unit 3

Fuzzy Logic-I (Introduction)

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

Unit 4

Fuzzy Logic –II (Fuzzy Membership, Rules)

Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

Unit 5

Genetic Algorithm (GA)

Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

Text Books:

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks s,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.
2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press.

Reference Books:

1. Siman Haykin,"Neural Netowrks"Prentice Hall of India
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.

3. Kumar Satish, "Neural Networks s" Tata Mc Graw Hill
4. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

BTCS801PCT	Networks Security	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS8th October, 2016	3	1	0	4

Prerequisite(s)

Data communication and Computer Networks

Learning Objectives

1. Discuss the fundamentals of computer Networks security concepts and security challenges
2. Understand the classical and modern cryptographic techniques, modular arithmatic, key concepts, Fiestal cipher structure, symmetric and asymmetric key cryptography, factors affecting computer Networks security deployment.
3. Describe emerging technology in the net-centric security areas and assess their current capabilities, limitations and potential applications.

Learning Outcomes

After successful completion of course student shall be able to:

1. Examine and analyze the difference between stagnography and cryptographic techniques, various public and private key algorithms like RSA, Digital signature, protocols like transport-layer concepts: Transport-Layer services -Reliable vs. un-reliable data transfer -TCP protocol
2. Examine and analyze Networks security issues like confidentiality, integrity, availability, authentication and authorization, DoS
3. Examine and analyze different Networks security protocol, Virus, Worms, Trozen Hoarse, Intrusion detection system , Firewall, Private virtual Networks

Course Contents

Unit-I

Introduction to the Concepts of Security: The need for security, Security Approaches, Principles of Security, Types of Attacks. Cryptographic Techniques: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks.

Unit-II

Modular arithmetic, prime numbers, relative prime numbers, Euler's function, GCD. Computer-based Symmetric Key Cryptographic Algorithms: Algorithm Types and Modes, An overview of Symmetric Key Cryptography, DES, International Data Encryption Algorithm (IDEA), RC5, Blowfish, AES, Differential and Linear Cryptanalysis.

Unit-III

Computer-based Asymmetric Key Cryptography: Brief History of Asymmetric Key Cryptography, An overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric and Asymmetric Key Cryptography, Digital Signatures.

Unit-IV

Public Key Infrastructure: Digital Certificates, Private Key Management, The PKI Model, Public Key Cryptography Standards, PKI and Security. Internet Security Protocols: Basic Concepts, Secure Socket Layer, SHTTP, Time Stamping Protocol, Secure Electronic Transaction, SSL versus SET, 3-D Secure Protocol, Electronic Money, E-mail Security

Unit-V

Understanding Session Hijacking, Spoofing vs Hijacking, Steps in Session Hijacking, Types of Session Hijacking, TCP Concepts Sequence numbers. ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing. Wireless 802.11 Networks security standards, Sniffing Traffic, Wireless DOS attacks, DDoS, WLAN Scanners, WLAN Sniffers, Securing Wireless Networks s.

Text Books

1. Cryptography and Networks Security by Behrouz A. Forouzan, 2nd Edition TMH

Reference Books

1. Cryptography and Networks Security, W. Stallings, Prentice Hall, 5th Edition, 20102.
2. Networks Security Essentials, William Stallings ,Prentice Hall, 5th Edition, 2013
3. Firewalls and Internet Security, William R. Cheswick and Steven M. Bellovin, Addison-Wesley Professional, 2ndEdition, 2003.

BTCS801PET	Web Services	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Fundamentals of Internet Technologies

Learning Objectives

1. Enable the students to understand Web Services and Core distributed computing technologies such as client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML
2. Introduce the concept of UDDI, SOAP, WSDL, Web Service Architecture, Developing and deploying web services. Ajax – Improving web page performance using Ajax, Programming in Ajax. CORBA
3. Introduce the technology behind Web services, Web based Information Systems, Search engines, Recommender Systems, Web Mining

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand core omputing technologies for web services
2. Demonstrate client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML
3. Understand the syntax, semantics of UDDI, SOAP, WSDL, Web Service Architecture

Course Contents

UNIT I

Evolution and Emergence of Web Services -Evolution of distributed computing, Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA).

UNIT II

Web Services

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

UNIT III

WEB SERVICES AND SOA:

The Web services framework; Services (as Web Services); Service Registry; Service descriptions (with WSDL); Messaging (with SOAP), Transactions, Coordination, Business Activity, Orchestration, Choreography; Addressing, Reliable Messaging, Policies, Metadata, Security, Notification and Events; Semantic Web Services; REST full Services;

UNIT IV

Web 2.0

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

UNIT V

Web 3.0: Semantic Web, Widgets, drag & drop mashups (iGoogle) - The technology behind these applications- RDF Web based Information Systems, Search engines, Recommender Systems, Web Mining

Text Books

1. Understanding SOA with Web Services – Eric Newcomer, Greg Lomow, Pearson Education, 2005

Reference Books:

1. Developing Enterprise Web Services– An Architect's Guide – Sandeep Chatterjee, James Webber Pearson Education, ISBN 81-297-0491-9
2. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech Joel Sklar.

BTCS802PET	Semantic Web & Social Networks s	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Database Management System and Data Mining

Learning Objectives

1. Enable the students to understand Intelligent Web Applications, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines and Software Agents
2. Explain Ontologies Languages for the Semantic Web and Resource Description Framework (RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.
3. Design Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand Intelligent Web Applications, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines and Software Agents
2. Demonstrate the Languages for the Semantic Web and Resource Description Framework (RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.
3. Understand and analyse Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, XML Based Web Services

Course Contents

UNIT –I

Web Intelligence

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT –II

Knowledge Representation for the Semantic Web

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT-III

Ontology Engineering

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT-IV

Semantic Web Applications, Services and Technology

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT-V

Social Networks Analysis and semantic web.

Development of the social Networks s analysis, Electronic Sources for Networks Analysis – Electronic Discussion Networks s, Blogs and Online Communities, Web Based Networks s. Building Semantic Web Applications with social Networks features.

Text books:-

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks s and the Semantic Web, Peter Mika, Springer, 2007.

BTCS803PET	Scripting Languages	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Internet and Web Technologies

Learning Objectives

1. Introduce scripting language, applications of scripting, non-scripting languages, types of scripting languages.
2. Overview Of Popular Scripting Languages: Important features of and sample code in bash, Ruby, JavaScript, Perl, Python
3. Introduce XML, DTD – Tags – Elements – Attributes – PCDATA – CDATA – Basics of entities – XML Elements – Elements Declaration, Internal Entities – External Entities

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the concept of scripting language, applications of scripting, non-scripting languages, types of scripting languages.
2. Understand important features of scripting language and sample code in bash, Ruby, JavaScript, Perl, Python
3. Write programs and perform simple operations using JavaScript; DHTML Dynamic HTML with Java Script

Course Contents

UNIT I

Introduction: What is a scripting language? Motivation for and applications of scripting; How scripting languages differ from non-scripting languages; Biased, native, and thoughtful position papers and debates on the merits of scripting languages; Types of scripting languages.

Overview Of Popular Scripting Languages: Important features of and sample code in bash, Ruby, JavaScript, Perl, Python, Tcl. A list of other scripting languages with uninformative but possibly interesting synopses.

UNIT II

CLIENT-SIDE WEB SCRIPTING: The DOM; JavaScript; DHTML Dynamic HTML with Java Script: Data validation, Opening a new window, Messages and Confirmations, The status bar, Writing to a different frame, Rollover buttons, Moving images, Multiple pages in a single download, A text-only menu system, Floating logos.

UNIT III

XML –Introduction –Document Type Definition or DTD – uses of DTD – Tags – Elements – Attributes – PCDATA – CDATA – Basics of entities – XML Elements – Elements Declaration –usage of #REQUIRED – usage of #IMPLIED – usage of #FIXED – Internal Entities – External Entities – XML Schema – Defining, Accessing XML Document.

UNIT IV

JAVA SCRIPT – Introduction – Usage of variables – operations – control structures – looping structures – predefined keywords – arrays – predefined functions – user defined functions – arrays and functions – mathematical functions – string functions – objects – expressions –pattern matching using RegEXp Class – String Class – Exception Handling – Built–in objects – Bgcolor/Fgcolor – Date Object – Events and Event Handling – Validations – Window – Confirmation, alert messages.

UNIT V

SERVER-SIDE WEB SCRIPTING: PHP The Building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output. Working with Functions: What is function?, Calling functions, Defining Functions, Returning the values from User-Defined Functions, Variable Scope, Saving state between Function calls with the static statement, more about arguments.

Working with Arrays: What are Arrays? Creating Arrays, Some Array-Related Functions. **Working with Objects:** Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP. Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, Working with File Uploads.

Text Books:

1. David Flanagan, JavaScript: The Definitive Guide, 4th edition, O'Reilly,2001.(ISBN 0596000480)
2. Julie C. Meloni, PHP MySQL and Apache, SAMS Teach yourself, Pearson Education (2007).
3. Chris Bates, Web Programming Building Internet Applications, Second Edition, Wiley (2007)

Reference Books:

1. Programming PHP, 3rd edition. Rasmus Lerdorf, Kevin Tatroe, and Peter MacIntyre. ISBN 1449392776, O'Reilly, 2013.
2. JavaScript: The Definitive Guide, 6th edition. David Flanagan. ISBN 0-596-80552-7, O'Reilly, 2011.

BTCS804PET	Multimedia Systems	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Computer Graphics

Learning Objectives

1. Present a step-by-step approach to multimedia systems design & multimedia applications
2. Introduce multimedia standards, compression and decompression technologies
3. Provide a detailed analysis of the various storage technologies.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand different realizations of multimedia tools and their usage.
2. Implement various multimedia standards and compression technologies
3. Analyze issues in effectively representing, processing, and retrieving multimedia data such as sound and music, graphics, image and video will be addressed.

Course Contents

UNIT I

Multimedia System Design: An Introduction

Multimedia Elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Multimedia Databases.

UNIT II

Multimedia Input and Output Technologies

Key Technology Issues, Pen Input, Video and Image Display Systems, Print Output technologies, Image Scanners, Digital Voice and Audio, Video Images and Animation, Full Motion Video.

UNIT III

Compression and Decompression Techniques

Types of Compression, Binary Image Compression Schemes, Color, gray scale, still-video image compression, Discrete Cosine Transform, Video Image compression, MPEG Coding methodology, Audio Compression, Data and File format standards- RTF, TIFF,RIFF, MIDI, JPEG, AVI, JPEG, TWAIN Architecture.

UNIT IV

Multimedia Application Design

Types of Multimedia systems - Virtual Reality Design - Components of Multimedia system - Distributed Application Design Issues – Multimedia Authoring and User Interface - Hypermedia Messaging – Distributed Multimedia Systems

UNIT V

Storage and Retrieval Technologies

Magnetic Media Technology, RAID-Level-0 To 5, Optical Media, WORM optical drives, Hierarchical Storage Management, Cache Management for storage systems.

Text Books:-

1. Andleigh PK and Thakrar K, *"Multimedia Systems"*, Addison Wesley Longman, 1999.
2. Ralf Steinmetz, Klara Nahrstedt, *"Multimedia, computing, communications and applications"*, Prentice Hall, 1995.

Reference Books:-

1. Fred Halsall, *"Multimedia Communications"*, Addison Wesley, 2000.
2. Tay Vaughan, *"Multimedia making It work"*, TMH 5th Edition 2001.
3. Weixel, Fulton, Barksdale.Morse, *"Multimedia Basics"*, Easwar Press 2004.

BTCS805PET	Artificial Intellegence	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Design and Analysis of Algorithms

Learning Objectives

1. Study and realize the intelligent human behaviors on a computer. The main topics in Artificial intelligence include: problem solving, reasoning, planning, natural language understanding, computer vision, automatic programming, and machine learning.
2. Learn and possess a firm grounding in the existing techniques and component areas of Artificial Intelligence
3. Apply this knowledge to the development of Artficial Intelligent Systems and to the exploration of research problems.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the principles of problem solving and be able to apply them successfully.
2. Be familiar with techniques for computer-based representation and manipulation of complex information, knowledge, and uncertainty.
3. Gain awareness of several advanced AI applications and topics such as intelligent agents, planning and scheduling, machine learning, etc.

Course Contents

Unit-I

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

Unit-II

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

Unit-III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks s.

Unit-IV

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning,

Unit-V

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

Text Books:-

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill

Reference Books:-

1. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education
2. Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India,

BTCS806PET	Adhoc & Sensor Networks	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Data Communication and Computer Networks

Learning Objectives

1. Introduce Ad hoc wireless Internet, MAC protocols for Ad hoc Wireless Networks s Issues in Designing a MAC Protocol for Ad hoc Wireless Networks s
2. Understand the Basics of Wireless, Sensors and Applications: The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications Data Retrieval in Sensor Networks s:
3. Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand adhoc wireless Internet, MAC protocols for Ad hoc Wireless Networks s Issues
2. Analyze Routing Protocol for Ad hoc Wireless Networks s, Classifications of Routing Protocols, Transport Layer for Ad Hoc Wireless Networks s
3. Demonstrate Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

Course Contents

UNIT I

Ad Hoc Wireless Networks s: Introduction, Issues in Ad hoc wireless Networks s, Ad hoc wireless Internet

MAC protocols for Ad hoc Wireless Networks s Issues in Designing a MAC Protocol for Ad hoc Wireless Networks s, Design Goals for a MAC Protocol for Ad hoc Wireless Networks s, Classifications of the MAC Protocols, Other MAC Protocols.

UNIT II

Routing Protocols for Ad Hoc Wireless Networks s Issues in Designing a Routing Protocol for Ad hoc Wireless Networks s, Classifications of Routing Protocols

Transport Layer for Ad Hoc Wireless Networks s Issues in Designing a Transport layer protocol for Ad hoc Wireless Networks s, Design goal s of a Transport layer protocol for Ad hoc Wireless Networks s, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks s.

UNIT III

Security protocols for Ad hoc Wireless Networks s Security in Ad hoc Wireless Networks s, Networks Security Requirements, Issues and Challenges in Security Provisioning, Networks Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks s

UNIT IV

Basics of Wireless, Sensors and Applications: The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications **Data Retrieval in Sensor Networks s:** Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT V

Sensor Networks Hardware: Components of Sensor Mote, **Operating System in Sensors**– TinyOS, LA-TinyOS, SOS, RETOS

Imperative Language: nesC, Dataflow style language: TinyGALS, Node-Level Simulators, ns-2 and its sensor Networks extension, TOSSIM

Text Books:-

1. Carlos de Morais Cordeiro and Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks s : Theory and Applications", Second Edition, World Scientific Publishers, 2011
2. Prasant Mohapatra and Sriramamurtyhy, "Ad Hoc Networks s: Technologies and Protocols", Springer International Edition, 2009

Reference Books:-

1. Kazem Sohraby, Daniel Minoli, Taieb Znati, "Wireless Sensor Networks s', A John Wiley & Sons Inc. Publication, 2007

BTCS807PET	Storage Area Networks s	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Database Management Systems

Learning Objectives

1. Study the overview of storage infrastructure components, Evolution of storage, Information Lifecycle Management concept, Data categorization within an enterprise, Storage and Regulations.
2. Understand the specifications, Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties
3. Introduce JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks s (SAN)

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand Evolution of storage, Information Lifecycle Management concept, Data categorization within an enterprise, Storage and Regulations.
2. Analyze the performance and specifications, Logical partitioning of disks, RAID
3. Understand the working principle of JBOD, DAS, SAN, NAS, & CAS

Course Contents

UNIT-1

Introduction to Storage Technology

Data proliferation and the varying value of data with time & usage, Sources of data and states of data creation, Data center requirements and evolution to accommodate storage needs, Overview of basic storage management skills and activities, The five pillars of technology, Overview of storage infrastructure components, Evolution of storage, Information Lifecycle Management concept, Data categorization within an enterprise, Storage and Regulations.

UNIT-II

Storage Systems Architecture

Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties and algorithms, Front end connectivity and queuing properties, Front end to host storage provisioning, mapping, and operation, Interaction of file systems with storage, Storage system connectivity protocols.

UNIT-III

Introduction to Networks ed Storage

JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks s (SAN): elements & connectivity, Fibre Channel principles, standards, & Networks management principles, SAN management principles, Networks Attached Storage (NAS): elements, connectivity options, connectivity protocols (NFS, CIFS, ftp), & management principles, IP SAN elements, standards (SCSI, FCIP, FCP), connectivity principles, security, and management principles, Content Addressable Storage (CAS): elements, connectivity options, standards, and management principles, Hybrid Storage solutions overview including technologies like virtualization & appliances.

UNIT-IV

Introduction to Information Availability

Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques.

UNIT-V

Managing & Monitoring

Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management metrics (thresholds, availability, capacity, security, performance), Metric analysis methodologies & trend analysis, Reactive and pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools.

Text Books:

1. Information Storage and Management Storing, Managing, and Protecting Digital
2. Information , by EMC, Hopkinton and Massachusetts, Wiley, ISBN: 9788126521470

BTCS808PET	Database Security	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Database Management Systems.

Learning Objectives

1. Introduce the concepts of database security, mechanism, policy and standards
2. Understand Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design
3. Study the Model for the Protection of Object Oriented Systems SORION and Model for the Protection of Object-Oriented Databases

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand the concepts of database security, mechanism, policy and standards
2. Define methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design
3. Design and develop model for the Protection of Object Oriented Systems SORION and Model for the Protection of Object-Oriented Databases

Course Contents

UNIT-I

Introduction

Introduction to Databases Security Problems in Databases Security Controls Conclusions

Security Models -1

Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

UNIT II

Security Models -2

Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion.

Security Mechanisms

Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

UNIT III

Security Software Design

Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design

UNIT IV

Statistical Database Protection & **Intrusion Detection Systems**

Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery.

UNIT V

Models For The Protection Of New Generation Database Systems -1

Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object Oriented Systems SORION Model for the Protection of Object-Oriented Databases

Models For The Protection Of New Generation Database Systems -2

A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

Text Books

1. Database Security and Auditing, Hassan A. Afyouni, India Edition, CENGAGE Learning, 2009.

Reference Books:

1. Database Security, *Castano*, Second edition, Pearson Education.
2. Database security by alfred basta, melissa zgola, CENGAGE learnin

BTCS809PET	Embedded System	L	T	P	C
Version No. 2.0	Date of Approval: 6th February 2017, BOS	3	1	0	4

Prerequisite(s)

Artificial Intelligence

Learning Objectives

1. Study Embedded computing – characteristics of embedded computing applications – embedded system design challenges
2. Explain the process of Real time Embedded system – Selection of processor; Memory; database security, mechanism, policy and standards
3. Introduce RTOS- Inter Process communication, Interrupt driven Input and Output Non-maskable interrupt, Software interrupt; Thread – Single, Multithread concept; Multitasking Semaphores.

Learning Outcomes

After successful completion of course student shall be able to:

1. Understand characteristics of embedded computing applications, embedded system design challenges
2. Demonstrate the process of Selection of processor; Memory; database security, mechanism, policy and standards
3. Understand the mechanism of Inter Process communication, Interrupt driven Input and Output Non- maskable interrupt, Software interrupt;

Course Contents

UNIT I

Embedded System Organization

Embedded computing – characteristics of embedded computing applications – embedded system design challenges; Build process of Real time Embedded system – Selection of processor; Memory; I/O devices-Rs-485, MODEM, Bus Communication system using I^2C, CAN, USB buses, 8 bit –ISA, EISA bus.

UNIT II

Real-Time Operating System

Introduction to RTOS; RTOS- Inter Process communication, Interrupt driven Input and Output Non-maskable interrupt, Software interrupt; Thread – Single, Multithread concept; Multitasking Semaphores.

UNIT III

Interface with Communication Protocol

Design methodologies and tools – design flows – designing hardware and software Interface. system integration; SPI, High speed data acquisition and interface-SPI read/write protocol, RTC interfacing and programming.

UNIT IV

Design of Software for Embedded Control

Software abstraction using Mealy-Moore FSM controller, Layered software development, Basic concepts of developing device driver – SCI – Software - interfacing & porting using standard C & C++ ; Functional and performance Debugging with benchmarking Real-time system software – basics of contemporary RTOS – VXWorks, UC/OS-II

UNIT V

Interfacing with Embedded Controller

Programmable interface with A/D & D/A interface; Digital voltmeter, control- Robot system; - PWM motor speed controller, serial communication interface. Standard single purpose processor's peripherals: timers, counters, watchdog timers, UART, LCD controllers, keypad controllers.

Applications: Digital camera-washing machine-cell phones-home security systems-finger print identifiers-cruise control-printers Automated teller machine.

Text Books:

1. Steven F. Barrett, Daniel J. Pack, "Embedded Systems – Design and Applications with the 68HC 12 and HCS12", Pearson Education, 2008.
2. Raj Kamal, "Embedded Systems- Architecture, Programming and Design" Tata McGraw Hill,2006.

References:

1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey, "PIC Microcontroller and Embedded Systems- Using Assembly and C for PIC18", Pearson Education,2008. Steven F.Barrett, Daniel J.Pack, "Embedded Systems-Design & Application with the 68HC12 & HCS12", Pearson Education, 2008.
2. Daniel W. Lewis, "Fundamentals of Embedded Software", Prentice Hall India, 2004.
3. Jack R Smith "Programming the PIC microcontroller with MBasic" Elsevier, 2007