Shaheed Bhagat Singh State Technical Campus

Moga Road, Ferozepur-152004 (Punjab)

Study Scheme for B.Tech.in CSE (Batch 2015)

Semester – 3

Third Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Mid Semester Assessment	End Semester Assessment	Total Marks	
1.	BTCS-301A	Computer Architecture and Organization	C	3	-	-	40	60	100	3
2.	BTAM-302A	Engineering Mathematics –III	C	3	1	-	40	60	100	4
3.	BTCS-303A	DigitalCircuits &Logic Design	C	3	1	-	40	60	100	4
4.	BTCS-304A	Data Structures	C	3	1	-	40	60	100	4
5.	BTCS-305A	Object Oriented Program mingusing C++	C	3	1	-	40	60	100	4
6.	BTCS-306A	Data Structures Laboratory	C	-	-	3	30	20	50	1
7.	BTCS-307A	Training-I	T	-	-	-	60	40	100	2
8.	BTCS-308A	Digital Circuits &Logic Design Laboratory	C	-	-	2	30	20	50	1
9.	BTCS-309A	Object Oriented Program mingusingC++ Laboratory	C	-	-	3	30	20	50	1
10.	BTHU-301	Professional Skills-I	PS	-	-	2	30	20	50	1
11.		Essentials of IT (Value Added)		2	-	-				
Total				**15**	**4**	**10**	**380**	**420**	**800**	**-**
Total Contact Hours				**29**			**Total Credits**			**25**

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Study Scheme for B.Tech.in CSE (Batch 2015)

Semester – 4

Fourth Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Mid Semester Assessment	End Semester Assessment	Total Marks	
1.	BTCS-401A	Operating System	C	3	1	-	40	60	100	4
2.	BTCS-402A	Discrete Structures	C	3	1	-	40	60	100	4
3.	BTCS-403A	Computer Networks-I	C	3	1	-	40	60	100	4
4.	BTCS-404A	Microprocessor & AssemblyLanguage Programming	C	3	1	-	40	60	100	4
5.	BTCS-405A	System Programming	C	3	1	-	40	60	100	4
6.	BTCS-406A	Operating System Laboratory	C	-	-	2	30	20	50	1
7.	BTCS--407A	Computer Networks-I Laboratory	C	-	-	2	30	20	50	1
8.	BTCS-408A	Microprocessor & AssemblyLanguage Laboratory	C	-	-	2	30	20	50	1
9.	BTCS-409A	System Programming Laboratory	C	-	-	2	30	20	50	1
10.	BTHU-401	Professional Skills- II	OE	-	-	2	30	20	50	1
Total				**15**	**5**	**10**	**350**	**400**	**750**	**-**
Total Contact Hours				**30**			**Total Credits**			**25**

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Study Scheme for B-Tech. CSE (Batch 2015)

Semester – 5

Fifth Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Mid Semester Assessment	End Semester Assessment	Total Marks	
1.	BTCS-501A	Computer Networks-II	C	3	-	-	40	60	100	3
2.	BTCS-502A	Database Management System	C	3	1	-	40	60	100	4
3.	BTCS-503A	Algorithm Analysis and Design	C	3	1	-	40	60	100	4
4.	BTCS-504A	Theory of Computation	C	4	1	-	40	60	100	5
5.	BTCS-DE1A	Departmental Elective-I	E	3	-	-	40	60	100	3
6.	BTCS-505A	Computer Networks –II Laboratory	C	-	-	2	30	20	50	1
7.	BTCS-506A	DBMS Laboratory	C	-	-	3	30	20	50	1
8.	BTCS-507A	Algorithm Analysis and Design laboratory	C	-	-	3	30	20	50	1
9.	BTCS-DE1A	Departmental Elective-I Laboratory	E	-	-	2	30	20	50	1
10.	BTCS-508A	Training-II *	T	-	-	-	40	60	100	3
11.	BTHU-501A	Professional Skills-III		-	-	2	30	20	50	1
Total				**16**	**3**	**12**	**390**	**460**	**850**	**-**
Total Contact Hours				**31**			**Total Credits**			**27**

***CBCS: Choice Based Credit System**
C-Core; E-Elective; OE-Open Elective; T-Training; P-Project; PS-Professional Skills

*** The marks will be awarded on the bases of 06 weeks Training-II in Industry after 4nd semester.**

Semester – 6

Sixth Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Mid Semester Assessment	End Semester Assessment	Total Marks	
1.	BTCS-601A	Compiler Design	C	3	1	-	40	60	100	4
2.	BTCS-602A	Computer Graphics	C	3	1	-	40	60	100	4
3.	BTCS-603A	Software Engineering	C	3	1	-	40	60	100	4
4.	BTCS-604A	Data Warehouse & Mining	C	3	1	-	40	60	100	4
5.	BTCS-DE2A	Departmental Elective –II	E	3	-	-	40	60	100	3
6.	BTCS-605A	Computer Graphics Laboratory	C	-	-	2	30	20	50	1
7.	BTCS-606A	Software Engineering Laboratory	C	-	-	2	30	20	50	1
8.	BTCS-607A	Data Warehouse & Mining Laboratory	C	-	-	2	30	20	50	1
9.	BTCS-DE2A	Departmental Elective –II Laboratory	C	-	-	2	30	20	50	1
10.	BTHU-601A	Professional Skills-IV		-	-	2	30	20	50	1
Total				**15**	**4**	**11**	**350**	**400**	**750**	**-**
Total Contact Hours				**30**			**Total Credits**			**24**

***CBCS: Choice Based Credit System**
C-Core; E-Elective; OE-Open Elective; T-Training; P-Project; PS-Professional Skills

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Study Scheme for B-Tech. CSE (Batch 2015)

Semester – 7

Seventh Semester										
Sr. No.	**Course Code**	**Course Name**	**Schedule of Teaching**				**Evaluation Scheme**			**Credits**
			CBCS*	**L**	**T**	**P**	**Mid Semester Assessment**	**End Semester Assessment**	**Total Marks**	
1.	BTCS-701A	Object Oriented Analysis & Design	C	3	-	-	40	60	100	3
2.	BTCS -702A	Minor Project	P	-	-	8	40	60	100	4
3.	BTCS-DE3A	Departmental Elective –III	E	3	-	-	40	60	100	3
4.	BTCS-OE1A	Open Elective-I	OE	3	-	-	40	60	100	3
5.	BTCS-703A	Training-III *	T	-	-	-	40	60	100	4
Total				**9**	**-**	**8**	**200**	**300**	**500**	**-**
Total Contact Hours				**17**			**Total Credits**			**17**

***CBCS: Choice Based Credit System**
C-Core; E-Elective; OE-Open Elective; T-Training; P-Project; PS-Professional Skills

*** The marks will be awarded on the bases of 08 weeks Training-III in Industry after 6nd semester.**

Semester – 8

Eighth Semester										
Sr. No.	**Course Code**	**Course Name**	**Schedule of Teaching**				**Evaluation Scheme**			**Credits**
			CBCS*	**L**	**T**	**P**	**Mid Semester Assessment**	**End Semester Assessment**	**Total Marks**	
1.	BTCS-801A	Major Project	P	-	-	12	40	60	100	6
2.	BTCS-DE4A	Departmental Elective-IV	C	3	-	-	40	60	100	3
3.	BTCS-OE2A	Open Elective-II	OE	3	-	-	40	60	100	3
Total				**6**	**-**	**12**	**120**	**180**	**300**	**-**
Total Contact Hours				**18**			**Total Credits**			**12**

***CBCS: Choice Based Credit System**
C-Core; E-Elective; OE-Open Elective; T-Training; P-Project; PS-Professional Skills

Training	**Duration**	**Remarks**
Training-I	In house 4-weeks training during summer vacation after 2nd semester	MOM of HODs meeting dated 17/05/2016 under chairmanship of Director
Training-II	In house/Indl. 6-weeks training during summer vacation after 4th semester	
Training-III	In house/Indl. 8-weeks during summer vacation after 6th semester	

Departmental Elective-I (BTCS-DE1A) (5th Semester)

1. BTCS-511A : Java Programming
2. BTCS-512A : Network Programming
3. BTCS-513A : Linux Server Administration
4. BTCS-514A : Python Programming

Departmental Elective-I Laboratory (BTCS-DE1A Lab) (5th Semester)

1. BTCS-515A : Java Programming Laboratory
2. BTCS-516A : Network Programming Laboratory
3. BTCS-517A : Linux Server Administration Laboratory
4. BTCS-518A : Python Programming Laboratory

Departmental Elective-II (BTCS-DE2A) (6th Semester)

1. BTCS-611A : Mobile Application Development
2. BTCS-612A : Cloud Computing
3. BTCS-613A : Information Security
4. BTCS-614A : Artificial Intelligence

Departmental Elective-II Laboratory (BTCS-DE2A Lab) (6th Semester)

1. BTCS-615A : Mobile Application Development Laboratory
2. BTCS-616A : Cloud Computing Laboratory
3. BTCS-617A : Information Security Laboratory
4. BTCS-618A : Artificial Intelligence Laboratory

Departmental Elective-III (BTCS-DE3A) (7th Semester)

1. BTCS-711A : Agile Software Development
2. BTCS-712A : Parallel Architecture Computing
3. BTCS-713A : Ethical Hacking
4. BTCS-714A : Soft Computing
5. BTCS-715A : Business Intelligence

Departmental Elective-IV (BTCS-DE4A) (8th Semester)

1. BTCS-811A : Building Enterprise Applications
2. BTCS-812A : Software Architecture
3. BTCS-813A : Software Testing
4. BTCS-814A : Information Theory

Open Electives offered by CSE department

1. BTCS-901A : Essentials of IT
2. BTCS-902A : IT Tools for Engineers
3. BTCS-903A : Data Structures
4. BTCS-904A : Operating System

Syllabus of 3rd Semester CSE (Scheme 2015)

Shaheed Bhagat Singh State Technical Campus, Ferozepur

Department of Computer Science & Engineering

[Batch 2015 onwards]

BTCS-301A Computer Architecture & Organization

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives:

This course offers a good understanding of the various functional units of a computer system and prepares the student to be in a position to design a basic computer system.

Course Outcomes:

After undergoing this course students will be able

I. To understand how computer hardware has evolved to meet the needs of multi-processing systems.
II. To understand the design of control unit.
III. To study the major components of a computer including CPU, memory, I/O and storage.
IV. To understand design principles in instruction set design including RISC architectures
V. To understand parallelism both in terms of a single processor and multiple processors.

Unit I: Register Transfer and Micro operations

Register transfer language operations, arith metic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit. Design of a complete basic computer and it's working.

Unit II: Basic Computer Organization and Design Instruction codes, Computer registers, ComputerInstructions,Timingandcontrol,InstructionCycle,Memoryreferenceinstructions,Input/Output and Interrupt, Design of basic Computer, Design of Accumulator Logic.

Unit III: Design of Control Unit

Control memory, design of control unit–micro programmed, hardwired, and their comparative study.

Unit IV: Central Processing Unit

General Register Organization, Stack Organization, Instruction formats, Addressing Modes, Data transfer and manipulations, Program control, RISC and CISC architecture.

Unit V: Input-Output Organization

Peripheral devices, I/O Interface, asynchronous data transfer, modes of transfer, priority interrupt, DMA,I/O processor, serial communication.

Unit VI: Memory Organization

Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

Unit VII: Advanced concepts of Computer Architecture

Concept of pipeline, Arithmetic pipeline, Instruction, vector processors and array processors. Introduction to parallel processing, Inter processor communication & synchronization.

Recommended Text and Reference Books

1. M. Moris Mano, Computer System Architecture, Pearson Education.
2. William Stallings, Computer Organisation and Architecture, Pearson Education.
3. David A Patterson, Computer Architecture, Pearson Education.
4. P. Pal Choudhri, Computer Organisation and Design, PHI.
5. J. P. Hayes, Computer System Architecture, Pearson Education.
6. Kai Hawang,Advanced Computer Architecture, Tata McGraw Hill.
7. Riess. Assembly Language and Computer Architecture and using C++ and JAVA, Cengage Learning.

Shaheed Bhagat Singh State Technical Campus, Ferozepur

Department of Computer Science & Engineering

[Batch 2015 onwards]

BTAM-302A	Mathematics-III

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

To teach computer based Engineering Mathematics to students. After this course the student will be able to solve complex computer oriented problems.

Course Outcomes:

After undergoing this course students will be able

I. Calculate the coefficients of both the complex and the real Fourier series for a variety functions, and to use Laplace transform to solve ordinary differential equations.

II. Understand formation of Partial Differential Equations, linear Partial Differential Equations, and Homogeneous Partial Differential Equations with constant coefficients and Apply standard techniques of linear algebra, complex analysis and calculus.

III. Solve the Laplace, heat and wave equations for a variety of boundary conditions in domains of simple geometry and with simple boundary conditions; the techniques available will include, separation of variables, Laplace and Fourier Transform methods.

IV. Understand Gauss – elimination method, gauss- Jordan method, Gauss- Seidel iteration method, Rayleigh's Power method for Eigen values and Eigenvectors and Solutions of Initial values problems using Eulers, modified Eulers method and Runge- kutta (upto fourth order) methods.

V. Apply various probability distributions to solve practical problems and construct confidence intervals using sampling analysis and testing of hypothesis.

Unit I: Fourier series

Periodic Functions, Euler's Formula. Even and oddFunctions, Half range expansions, Fourierseriesofdifferentwaveforms.

Unit II: Linear Systems and Eigen-Values

Gauss-elimination method, Gauss-Jordan method, Jacobi's Method, Gauss-Seidel iteration method, Rayleigh's Power method for Eigen values and Eigen vectors

Unit III: Differential Equations

Solutions of Initial values problems using Euler's, modified Euler's method and Runge-kutta (up to fourth order) methods.

Unit IV: Probability

Mean, median, mode and standard deviation, Random variables. Uniform, normal, exponential, Poisson and binomial distributions, Conditional probability and Bayes theorem.

Unit V: Sampling Distribution& testing of Hypothesis

Sampling, Distribution of means and variance, Chi- Square distribution, t-distribution, F- distribution. General concepts of hypothesis, Testing a statistical Hypothesis, One and two tailed tests, critical region, Confidence interval estimation. Single and two sample tests on proportion, mean and variance.

Recommended Text and Reference Books

1. E. Kreyszig, Advanced Engineering Mathematics, 5th Edition, Wiley Enstern 1985.
2. 2. P. E. Danko, A. G. Popov, T. Y. A. Kaznevnikova, Higher Mathematics in Problems and Exercise, Part 2, Mir Publishers, 1983.
3. Bali, N. P., A Text Book on Engineering Mathematics, Luxmi Pub., New Delhi.
4. S.C Gupta, V. Kapoor, "Fundamentals of Mathematical Statistics: A Modern Approach", S Chand & Sons educational Publishers, 10th Ed.
5. Grewal B.S, "Higher Engineering Mathematics 43rd Edition.

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Department of Computer Science & Engineering

[Batch 2015 onwards]

BTCS-303A	Digital Circuits & Logic Design

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

Demonstrate the operation of simple digital gates, identify the symbols, develop the truth table for those gates; combine simple gates into more complex circuits; change binary, hexadecimal, octal numbers to their decimal equivalent an vice versa, demonstrate the operation of a flip-flop. Design counters and clear the concept of shift resisters. Study different types of memories and their applications. Convert digital into analog and vice versa.

Course Outcomes:

After undergoing this course students will be able to

I. Understand the significance and use of different number systems, weighted & non-weighted codes along with their conversions. Learn Boolean algebra& its laws.

II. Minimize Boolean expressions using different techniques: Algebraic method, K- Map Technique and QM Methods, develop basic understanding of Logic gates and universal behavior of NAND/NOR gates.

III. Obtain knowledge of combinational circuits and design procedure of various combinational logic circuits like Adder, Sub tractor, Comparator, MUX/DEMUX, Parity checker etc. Classification of memory devices and to develop understanding about their Organization.

IV. Know about different sequential circuits like Flip-flops, Counters & their types. To design counters and know about working of shift registers.

V. Know need of signal conversion, Study different types of signal convertors: ADC and DAC along with their working.

Unit I: Number Systems

Binary, Octal, Decimal, And Hexadecimal. Numberbaseconversions,1's,2's,nth'scomplements, signedBinarynumbers.BinaryArithmetic,Binarycodes:WeightedBCD,Greycode,Excess3code, ASCII–conversion from onecodeto another.

Unit II: Boolean Algebra

Boolean postulates and laws– De-Morgan's Theorem, Principle of Duality, Boolean expression– Boolean function, Minimization of Boolean expressions– SumofProducts(SOP),ProductofSums(POS),Minterm,Maxterm,Canonicalforms,Conversionbetweencanonicalforms, Karnaughmap Minimization, Quine-McCluskey method-Don't care conditions.

Unit III: Logic GATES

AND,OR,NOT,NAND, NOR ,Exclusive-ORand Exclusive-NOR, Implementations of Logic Functions using gates, NAND-NOR implementations, Study of logic families like RTL,DTL, DCTL,TTL, MOS, CMOS,ECL and their characteristics.

Unit IV: Combinational Circuits Design procedure– Adders, Subtractors, Serial adder/Sub tractor, Parallel adder/Subtractor Carry look ahead adder, BCD adder, Magitude Comparator, Multiplexer/ DE multiplexer, encoder/decoder , parity checker, code converters. Implementation of combinational logic using MUX.

Unit V: Sequential Circuits Flip flops SR, JK,T,D and Master slave, Excitation table, Edge triggering Level Triggering, Realization of one flipflop using other flip flops. Asynchronous/Ripple counters, Synchronous counters, Modulo-n counter, Ring Counters. Classification of sequential circuits- Moore and Mealy, Design of Synchronous counters: state diagram, Circuit implementation, Shift registers

Unit VI: Memory Devices:
Classification of memories, RAM organization, Write operation, Read operation, Memory cycle,
Static RAM Cell-Bipolar, RAM cell,MOSFET RAM cell, Dynamic RAM cell, ROM organization, PROM, EPROM, EEPROM , Field Programmable Gate Arrays(FPGA).

Unit VII: Signal Conversions:
Analog& Digital signals, A/D and D/ A conversion techniques(Weightedtype,R-2RLaddertype, Counter Type,Dual Slope type, Successive Approximation type).

Recommended Text and Reference Books

1. Morris Mano, Digital Design, Prentice Hall of India Pvt. Ltd
2. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 5 ed., Tata McGraw Hill Publishing Company
3. Limited, New Delhi, 2003.
4. R.P.Jain, Modern Digital Electronics, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.
5. Thomas L. Floyd, Digital Fundamentals, Pearson Education, Inc, New Delhi, 2003
6. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, Digital System -Principles and Applications, Pearson Education.
7. Ghosal ,Digital Electronics, Cengage Learning.

Shaheed Bhagat Singh State Technical Campus, Ferozepur

Department of Computer Science & Engineering

[Batch 2015 onwards]

BTCS-304A	Data Structures

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

This course should provide the students with a fairly good concept of the fundamentals of different types of data structures and also the ways to implement them. Algorithm for solving problems like sorting, searching, insertion & deletion of data etc. related to data structures should also be discussed. After completion of this subject student should be able to choose an appropriate data structure for a particular problem.

Course Outcomes:

After undergoing this course students will be able to

I. Understand how various data structures are represented in memory and are used by algorithms.
II. Understand the concept of time and space complexity and analyze them for different algorithms and also the ability to estimate programming time using Big O notation.
III. Assess how the choice of data structures impact the performance of program.
IV. Design and employ appropriate data structures for solving computing problems;
V. Implement searching and sorting algorithms in solving larger problems.

Unit I: Dynamic Memory Management

Understanding pointers, usage of pointers, arithmetic on pointers, memory allocation, memory management functions and operators, debugging pointers-dangling pointers, memory leaks, etc.

Unit II: Introduction to Data Types

Concept of data type, definition and brief description of various data structures, data structures versus data types, operations on data structures, algorithm complexity, Big O notation.

Unit III: Arrays

Linear and multi-dimensional arrays and their representation, operations on arrays, sparse matrices and their storage.

Unit IV: Linked

Linear linked list, operations on linear linked list, doubly linked list, operations on doubly linked list,application of linked lists.

Unit V Stacks

Sequential and linked representations, operations on stacks, application of stacks such as parenthesis checker, evaluation of post fix expressions, conversion from in fix to post fix representation, implementing recursive functions.

Unit VI: Queues

Sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, linked representation of a queue and operations on it, deque, priority queue, applications of queues.

Unit VII: Trees

Basic terminology, sequential and linked representations of trees, traversing a binary tree using recursive and non-recursive procedures, inserting a node, deleting a node, brief introduction to threaded binary trees, AVL trees and B-trees.

Unit VIII: Heaps

Representing a heap in memory, operations on heaps, and application of heap in implementing priority queue and heap sort algorithm.

Unit IX: Graphs

Basic terminology, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth-first search and depth-first search), and applications of graphs.

Unit X: Hashing & Hash Tables

Comparing direct address tables with hash tables, hash functions, concept of collision and its resolution using opened dressing and separate chaining, double hashing, rehashing.

Unit XI: Searching & Sorting

Searching an element using linear search and binary search techniques, Sorting arrays using bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, shell sort and radix sort, complexities of searching & sorting algorithms.

Recommended Text and Reference Books

1. SartajSahni, Data Structures, Algorithms and Applications in C++, Tata McGraw Hill.
2. Tenenbaum, Augenstein, &Langsam, Data Structures using C and C++, Prentice Hall of India.
3. R. S. Salaria, Data Structures & Algorithms Using C++, Khanna Book Publishing Co. (P) Ltd.
4. Seymour Lipschutz, Data Structures, Schaum's Outline Series, Tata McGraw Hill
5. Kruse, Data Structures & Program Design, Prentice Hall of India.
6. Michael T. Goodrich, Roberto Tamassia, & David Mount, Data Structures and Algorithms in C++ (Wiley India)

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Department of Computer Science & Engineering

[Batch 2015 onwards]

BTCS-305A Object Oriented Programming Using C++

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

To understand the basic concepts of object oriented programming languages and to learn the techniques of software development in C++.

Course Outcomes:

After undergoing this course students will be able to

I. Gain the basic knowledge on Object Oriented concepts and to demonstrate the differences between traditional imperative design and object-oriented design.

II. Apply the concepts of class and object, data encapsulation, inheritance, operator overloading, Type Conversion and polymorphism to large-scale software

III. Understand the basics of exception handling, Template concepts, Function templates, class templates, File streams, hierarchy of file stream classes, error handling during file operations

IV. Declare and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators

V. Design and develop object-oriented computer programs. Ability to implement features of object oriented programming to solve real world problems

Unit I: Object-Oriented Programming Concepts

Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object-oriented programming concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation,datahiding,inheritance,overloading,polymorphism,messaging.

Unit II: Standard Input/ Output

Concept of streams, hierarchy of console stream classes, input /output using overloaded operators >> and << and member functions of i/o stream classes, formatting output, formatting using ios class functions and flags, formatting using manipulators.

Unit III: Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifiers, static members, use of *const* keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes**.**

Unit IV: Pointers and Dynamic Memory Management Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation(static dynamic),dynamic memory management using new and delete operators, pointer to an object, this pointer pointer related problems-dangling/wild pointers, null pointer assignment, memory leak and allocation failures.

Unit V: Constructors and Destructors

Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initialize lists.

Unit VI: Operator Overloading and Type Conversion
Overloading operators, rules for overloading operators, overloading of various operators, type conversion-basic type to class type, class type to basic type, class type to another class type.

Unit VII: Inheritance Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multi path in heritance, virtual base class, objects licing, overriding member functions, object composition and delegation, order of execution of constructors and destructors

Unit VIII: Virtual functions & Polymorphism
Concept of binding-early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors.

Unit IX: Exception Handling Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, ethrowing an exception, specifying exceptions.

Unit X: Templates and Generic Programming
Templateconcepts,Functiontemplates,classtemplates,illustrativeexamples.

Unit XI: Files
Filestreams,hierarchyoffilestreamclasses,errorhandlingduringfileoperations,reading/writingoffiles,accessing records randomly, updating files

Recommended Text and Reference Books

1. Lafore R., Object Oriented Programming in C++, Waite Group.
2. E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill.
3. R. S. Salaria, Mastering Object-Oriented Programming with C++, Salaria Publishing House.
4. BjarneStroustrup, The C++ Programming Language, Addison Wesley.
5. Herbert Schildt, The Complete Reference to C++ Language, McGraw Hill-Osborne.
6. Lippman F. B, C++ Primer, Addison Wesley.
7. Farrell- Object Oriented using C++, Cengage Learning.

Shaheed Bhagat Singh State Technical Campus, Ferozepur

Department of Computer Science & Engineering

[Batch 2015 onwards]

BTCS306A Data Structures Lab

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	-	-	3	1

Course Objectives:

The objective of this course is to teach students various data structures and to explain them algorithms for performing various operations on these data structures.

Course Outcomes:

After undergoing this course students will be able to

I. Implement basic data structures such as arrays and linked list.
II. Programs to demonstrate fundamental algorithmic problems including tree traversals, graph traversals and shortest path.
III. Implement various searching and sorting algorithms.
IV. Programs to demonstrate the implementation of various operations on stack and queue.

List of Experiments

1. Write a menu driven program that implements following operations (using separate functions) on a linear array:
   Insert a new element at end as well as at a given position
   Delete an element from a given whose value is given or whose position is given
   To find the location of a given element
   To display the elements of the linear array.
2. Write a menu driven program that maintains a linear linked list whose elements are stored in on ascending order and implements the following operations (using separate functions): Insert a new element
   Delete an existing element
   Search an element
   Display all the elements
3. Write a program to demonstrate the use of stack (implemented using linear array) in converting arithmetic expression from infix notation to postfix notation.
4. Program to demonstrate the use of stack (implemented using linear linked lists) in evaluating arithmetic expression in postfix notation.
5. Program to demonstration the implementation of various operations on a linear queue represented using a linear array.
6. Program to demonstration the implementation of various operations on a circular queue represented using a linear array.
7. Program to demonstration the implementation of various operations on a queue represented Using a linear linked list (linked queue).

8. Program to illustrate the implementation of different operations on a binary search tree.
9. Program to illustrate the traversal of graph using breadth-first search.
10. Program to illustrate the traversal of graph using depth-first search.
11. Program to sort an array of integers in ascending order using bubble sort.
12. Program to sort an array of integers in ascending order using selection sort.
13. Program to sort an array of integers in ascending order using insertion sort.
14. Program to sort an array of integers in ascending order using radix sort.
15. Program to sort an array of integers in ascending order using merge sort.
16. Program to sort an array of integers in ascending order using quick sort.
17. Program to sort an array of integers in ascending order using heap sort.
18. Program to sort an array of integers in ascending order using shell sort.
19. Program to demonstrate the use of linear search to search a given element in an array.
20. Program to demonstrate the use of binary search to search a given element in a sorted array in ascending order.

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[Batch 2015 onwards]

BTCS-308A	Digital Circuits & Logic Design Lab

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	-	-	2	1

Course Objectives:

The objectives of this course is to Introduce the concept of digital and binary systems and to be able to design and analyze combinational logic circuits and be able to design and analyze sequential logic circuits.

Course Outcomes:

After undergoing this course students will be able to

I. Develop basic understanding of Logic gates and universal behaviour of NAND/NOR gates.
II. Obtain knowledge of combinational circuits and design procedure of various combinational logic circuits
III. Obtain knowledge of different Flip-flops, their working and Truth Table Verification.
IV. Obtain knowledge of Synchronous and Asynchronous Counters and their heir working.
V. Study different types of ADC and DAC along with their working.

List of Experiments

1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Half Adder / Full Adder: Realization using basic and XOR gates.
3. Half Subtractor / Full Subtractor: Realization using NAND gates.
4. 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter: Realization using XOR gates.
5. 4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.
6. Multiplexer: Truth-table verification and realization of half adder and Full adder using IC74153 chip.
7. DE multiplexer: Truth-table verification and realization of half subtractor and Full subtractor using IC74139 chip.
8. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.
9. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.
10. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter using IC74192 & IC74193 chip.
11. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.
12. DAC Operation: Study of 8-bit DAC (IC 08/0800 chip), obtain staircase waveform using IC7493 chip.
13. ADC Operations: Study of 8-bit ADC.

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[Batch 2015 onwards]

BTCS-309A Object Oriented Programming Using C++ Lab

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	-	-	3	1

Course Objectives:

The objectives of this course is to familiarize the students with language environment and to implement various concepts related to language.

Course Outcomes:

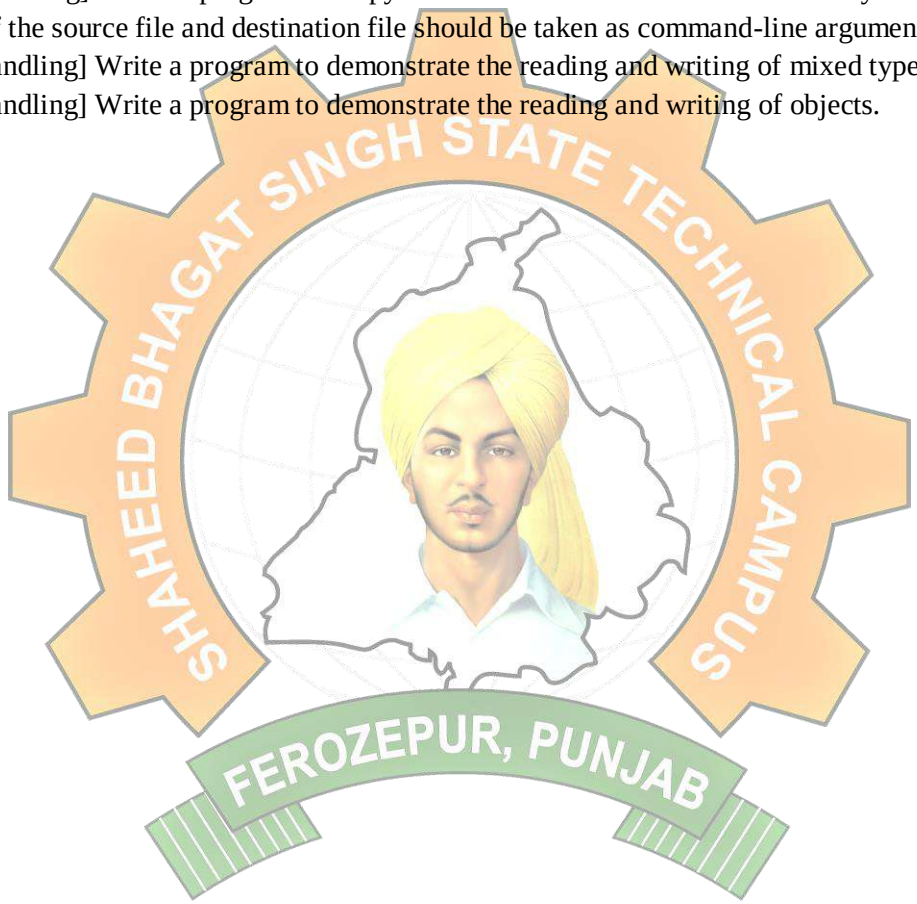
After undergoing this course students will be able to

I. Able to apply an object oriented approach to programming and identify potential benefits of object-oriented programming over other approaches
II. Able to reuse the code(Inheritance) and write the classes which work like built-in types(Integer, Float, Character)
III. Able to design applications which are easier to debug, maintain and extend.
IV. Able to apply object-oriented concepts (inheritance, data abstraction, encapsulation, operator overloading and polymorphism etc) in real world applications.
V. Able to design small level project using object oriented programming concepts(Class template, file stream, error handling)

List of Experiments

1. [Classes and Objects] Write a program that uses a class where the member functions are defined inside a class.
2. [Classes and Objects] Write a program that uses a class where the member functions are defined outside a class.
3. [Classes and Objects] Write a program to demonstrate the use of static data members.
4. [Classes and Objects] Write a program to demonstrate the use of const data members.
5. [Constructors and Destructors] Write a program to demonstrate the use of zero argument and parameterized constructors.
6. [Constructors and Destructors] Write a program to demonstrate the use of dynamic constructor.
7. [Constructors and Destructors] Write a program to demonstrate the use of explicit constructor.
8. [Initializer Lists] Write a program to demonstrate the use of initializer list.
9. [Operator Overloading] Write a program to demonstrate the overloading of increment and decrement operators.
10. [Operator Overloading] Write a program to demonstrate the overloading of binary arithmetic operators.
11. [Operator Overloading] Write a program to demonstrate the overloading of memory management operators.
12. [Typecasting] Write a program to demonstrate the typecasting of basic type to class type.
13. [Typecasting] Write a program to demonstrate the typecasting of class type to basic type.

14. [Typecasting] Write a program to demonstrate the typecasting of class type to class type.
15. [Inheritance] Write a program to demonstrate the multilevel inheritance.
16. [Inheritance] Write a program to demonstrate the multiple inheritance.
17. [Inheritance] Write a program to demonstrate the virtual derivation of a class.
18. [Polymorphism] Write a program to demonstrate the runtime polymorphism.
19. [Exception Handling] Write a program to demonstrate the exception handling.
20. [Templates and Generic Programming] Write a program to demonstrate the use of function template.
21. [Templates and Generic Programming] Write a program to demonstrate the use of class template.
22. [File Handling] Write a program to copy the contents of a file to another file byte by byte. The name of the source file and destination file should be taken as command-line arguments
23. [File Handling] Write a program to demonstrate the reading and writing of mixed type of data.
24. [File Handling] Write a program to demonstrate the reading and writing of objects.



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[Batch 2015 onwards]

BTCS-401A Operating System

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

This course should provide the students with good understanding of Operating System including its architecture and all its components. Good conceptions on all the subjects like processes, inter-process communication, semaphore, message passing, classical IPC problems, scheduling, memory management, file systems, security and protection mechanism, I/O hardware and software, deadlocks, etc. should be provided.

Course Outcomes:

After undergoing this course students will be able to

I. Identify the role of Operating System.To understand the design of control unit.
II. Understanding CPU Scheduling, Synchronization, Deadlock Handling and Comparing CPU Scheduling Algorithms. Solve Deadlock Detection Problems
III. Describe the role of paging, segmentation and virtual memory in operating systems. Generation of logical and physical addresses for problems related to memory management.
IV. Defining I/O systems,Device Management Policies and Secondary Storage Structure a nd Evaluation of various Disk Scheduling Algorithms.
V. Description of protection and security and also the Comparison of UNIX and Windows based OS.

Unit I: Introduction

Introduction to Operating system, Role of Operating System as resource manager, function of kerne land shell, operating system structures, views of an operating system.

Unit II: Process Management

CPU scheduling, Scheduling Algorithms, PCB, Process synchronization, Deadlocks, Prevention, Detection and Recovery

Unit III: Memory Management

Overlays, Memory management policies, Fragmentation and its types, Partitioned memory managements, Paging, Segmentation, Need of Virtual memories, Page replacement Algorithms, Concept of Thrashing.

Unit IV: Device Management

I/O system and secondary storage structure, Device management policies, Role of I/O traffic controller, scheduler.

Unit V: File Management

File System Architecture, Layered Architecture, Physical and Logical File Systems, Protection and Security:

Unit VI: Brief study to multiprocessor and distributed operating Systems.

Unit VII: Case Studies

LINUX / UNIX Operating System and Windows based operating systems. Recent trends in Operating system.

Recommended Text and Reference Books

1. A Silberschatz and Peter B. Galvin, "Operating System Concepts" Addison Wesley Publishing Company
2. Dhamdhere, ―Systems Programming & Operating Systems" Tata McGraw Hill
3. Gary Nutt, "Operating Systems Concepts", Pearson Education Ltd. 3 rd Edition
4. Operating System by Madnick Donovan
5. Operating System by Stallings
6. Ida M.Flynn Understanding Operating Systems -, Cengage Learning

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[Batch 2015 onwards]

BTCS-402A	Discrete Structures

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

The objective of this course is to provide the necessary back ground of discrete structures with particular reference to the relationships between discrete structures and their data structure counterparts including algorithm development.

Course Outcomes:

After undergoing this course students will be able to

I. Understand the necessary back ground of discrete structures with particular reference to the relationships between discrete structures and their data structure counterparts including algorithm development and use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, Hashing functions and integers.

II. Model, analyse and apply computational processes using analytic and combinatorial methods such as permutations and combinations and understand Recurrence relations, generating functions and applications.

III. Understand elementary properties of modular arithmetic and explain their applications in Computer Science and apply graph theory models of data structures, trees to solve computer science problems.

IV. Remember elementary mathematical arguments, logic and identify fallacious reasoning and understand concepts of Boolean algebra.

V. Understand and apply principles of abstract algebra viz., group, ring and field.

Unit I: Sets, relations and functions

Introduction, Combination of Sets, ordered pairs, proofs of general identities of sets, relations, operations on relations, properties of relations and functions, Hashing Functions, equivalence relations, compatibility relations, and partial order relations.

Unit II: Rings and Boolean algebra

Rings, Subrings, morphism of rings ideals and quotient rings. Euclidean domains Integral domains and fields Boolean Algebra direct product morphisms Boolean sub-algebra Boolean Rings Application of Boolean algebra (Logic Implications, Logic Gates, Karnaugh- map).

Unit III: Combinatorial Mathematics

Basic counting principles Permutations and combinations Inclusion and Exclusion Principle Recurrence relations, Generating Function, Application.

Unit IV: Monoids and Groups

Groups Semigroups and monoids Cyclic semi graphs and sub monoids, Subgroups and Cosets. Congruence relations on semigroups. Morphisms. Normal subgroups. Dihedral groups.

Unit V: Graph Theory

Graph- Directed and undirected, Eulerian chains and cycles, Hamiltonian chains and cycles Trees, Chromatic number Connectivity, Graph coloring, Plane and connected graphs, Isomorphism and Homomorphism. Applications.

Recommended Text and Reference Books

1. Discrete Mathematics (Schaum series) by Lipschutz (McGraw Hill).
2. Applied Discrete Structures for Computer Science by Alan Doerr and Kenneth Levarseur.
3. Discrete Mathematics by N Ch SN Iyengar, VM Chandrasekaran.
4. Discrete Mathematics and Graph Theory(Cengage Learning) by Sartha
5. Discrete Mathematics and its Applications. Kenneth H Rosen.(McGraw Hill)
6. Elements of discrete mathematics. C L Liu (McGraw Hill)

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[Batch 2015 onwards]

BTCS-403A	Computer Network-I

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

This course provides knowledge about computer network related hardware and software using a layered architecture.

Course Outcomes:

After undergoing this course students will be able

I. To study, analyze and understand the terminologies involved in networking by exploring insight to layers, interface, protocol, service, type of networks, hardware technologies used, signals and Models: OSI and TCP/IP.

II. To explain and analyze the preparation and transmission of Data, understand the protocols and procedures of flow control, error and access control.

III. To interpret the concept of IPv4 addressing and subnetting, subsequently applying the same for subnet design as per requirement of an enterprise.

IV. To study routing, congestion, connection establishment, connection termination and Crash recovery protocols.

V. To identify and study the protocols that are involved in web access, file sharing, name.

Unit I: Introduction to Computer Networks

Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

Unit II: Physical Layer

Concept of Analog& Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits : Nyquist formula, Shannon Formula, Multiplexing : Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media : Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons.

Unit III: Data Link Layer

Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP.

Unit IV: Medium Access Sub-Layer

Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

Unit V: Network Layer

Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms

Unit VI: Transport Layer

Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison.

Unit VII: Application Layer

World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security

Recommended Text and Reference Books

1. Computer Networks, 4 th Edition, Pearson Education by Andrew S. Tanenbaum
2. Data Communication & Networking, 4th Edition, Tata McGraw Hill. By Behrouz A. Forouzan.
3. Computer Networking, 3 rd Edition, Pearson Education by James F. Kurose and Keith W. Ross
4. Internetworking with TCP/IP, Volume-I, Prentice Hall, India by Douglas E. Comer.
5. Guide to Networking Essentials, 5 th Edition, Cengage Learning by Greg Tomsho,
6. Handbook of Networking, Cengage Learning by Michael W. Graves.

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[Batch 2015 onwards]

BTCS-404A	Microprocessor and Assembly Language Programming

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

The course is intended to give students good understanding of internal architectural details and functioning of microprocessors.

Course Outcomes:

After undergoing this course students will be able to

I. Draw a block diagram and pin diagram of 8085 microprocessors, 8086 microprocessors. Discuss instruction cycle (i.e., fetch/decode/execute) and relate the instruction cycle to what actions occur for various instruction types using a block diagram of a microprocessor.

II. Explain basic binary operations, buses, registers, ALU, Timing controls, flags, addressing modes and interrupt control that interconnect with each other.

III. Perform the programs using the various addressing modes and data transfer instructions of the 8085 microprocessor and run their program on the training boards

IV. Design timing diagrams, analyse the different data transfer modes, 8251 I/O processor and peripheral interfacing of 8255.

V. Evaluate the real-world control problems such as traffic light signal, stepper motor controller, temperature control, Motorola 68000 and all Pentium and keyboard 7 segment display.

Unit I: Introduction

Introduction to Microprocessors, history, classification, recent microprocessors.

Unit II: Microprocessor Architecture

8085 microprocessor Architecture. Bus structure, I/O, Memory& Instruction execution sequence & Data Flow, Instruction cycle. System buses, concept of address Bus, Data Bus & Control Bus, Synchronous & Asynchronous buses.

Unit III: I/O memory interface

Data transfer modes: Programmable, interrupt initiated and DMA. Serial& parallel interface, Detail study of 8251 I/O Processor & 8255 programmable peripheral interfaces.

Unit IV: Instruction set &Assembly Languages Programming

Introduction, instruction & data formats, addressing modes, status flags, 8085 instructions, Data transfer operations, Arithmetic operations, Logical operations, Branch operations.

Unit V: Case structure & Microprocessor application

Interfacing of keyboards and seven segment LED display, Microprocessor controlled temperature system (MCTS), Study of traffic light system, stepper motor controller, Microprocessor based microcomputers.

Unit VI: Basic architecture of higher order microprocessors

Basic introduction to 8086 family, Motorola 68000, Pentium processors.

Recommended Text and Reference Books

1. Ramesh Gaonkar, "8085 Microprocessor ",PHI Publications.
2. Daniel Tabak, "Advanced Microprocessors", McGraw- Hill, Inc., Second Edition 1995.
3. Douglas V. Hall, "Microprocessors and Interfacing: Programming and Hardware", Tata McGraw Hill Edition,1986.
4. Charles M.Gilmore," Microprocessors: Principles and Applications", McGraw Hill.
5. Ayala Kenneth, "The 8086 Microprocessor Programming and Interfacing", Cengage Learning
6. Handbook of Networking, Cengage Learning by Michael W. Graves.

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[Batch 2015 onwards]

BTCS-405A	System Programming

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

This course provides knowledge to design various system programs. Although not the primary focus of this course, instruction shall be done within the context of C/C++ and Linux/Unix.

Course Outcomes:

After undergoing this course students will be able to

I. To identify the role of different types of software in system programming.
II. To understand and compare single pass and two pass assembler. Show the use of SYMTAB and OPTAB.
III. To understand the design of macro processor. USE LEX and YACC tools. IV. To identify the compiler phases. Construct small/part of compiler.
V. To understand and compare various types of editors, linkers and loaders.

Unit I: Introduction

Introduction to system programming and different types of system programs –editors, assemblers, macro-processors, compilers, linkers, loader, debuggers.

Unit II: Assemblers

Description of single pass and two pass assemblers, use of data structures like OPTAB and SYMTAB, etc.

Unit III: Microprocessors

Description of macros, macro expansion, conditional and recursive macro expansion.

Unit IV: Compilers

Various phases of compiler – lexical, syntax and semantic analysis, intermediate code generation, code optimization techniques, code generation, Case study : LEX and YACC

Unit V: Loaders

Concept of linking, different linking schemes, concept of loading and various loading schemes.

Unit VI: Editors

Line editor, full screen editor and multi window editor, Case study MS-Word, DOS Editor and vi editor.

Unit VII: Debuggers

Description of various debugging techniques

Recommended Text and Reference Books

1. Donovan J.J., "Systems Programming", New York, Mc-Graw Hill, 1972.
2. Dhamdhere, D.M., "Introduction to Systems Software", Tata Mc-Graw Hill, 1996.
3. Aho A.V. and J.D. Ullman ,"Principles of compiler Design" Addison Wesley/ Narosa 1985.
4. Kenneth C. Louden," Compiler Construction", Cengage Learning.

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[Batch 2015 onwards]

BTCS-406A	Operating System Lab

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	-	-	2	1

Course Objectives:

To make students able to implement CPU scheduling algorithms and Bankers algorithm used for deadlock avoidance and prevention. Students will also be able to implement page replacement and memory management algorithms.

Course Outcomes:

After undergoing this course students will be able to

I. Perform Installation process of various operating systems.
II. Demonstrate virtualization, installation of virtual machine software and installation of operating systems on virtual machines.
III. Ability to create, view file directories and process related commands in linux.
IV. Understand the basics of shell programming.

List of Experiments

1. Installation Process of various operating systems
2. Virtualization, Installation of Virtual Machine Software and installation of Operating System on Virtual Machine
3. Commands for files & directories: cd, ls, cp, md, rm, mkdir, rmdir. Creating and viewing files using cat. File comparisons. Disk related commands: checking disk free spaces. Processes in linux, connecting processes with pipes, background processing, managing multiple processes. Manual help. Background process: changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, cal, banner, touch, file. File related commands ws, sat, cut, grep.
4. Shell Programming: Basic of shell programming, various types of shell, Shell Programming in bash, conditional & looping statement, case statements, parameter passing and arguments, shell variables, shell keywords, creating shell programs for automate system tasks, report printing management policies, Role of I/O traffic controller, scheduler

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[Batch 2015 onwards]

BTCS-407A	Computer Network-I Lab

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	-	-	2	1

Course Objectives:

To make students aware about various types of cables used in guided media like coaxial cable, optical fiber cable, twisted pair cables and its categories. To understand the working of LAN Card, Hub, TELNET and to understand the working difference between straight cable and cross over cable. To be able to analyze different protocols used for packet communication like ALOHA Protocol.

Course Outcomes:

After undergoing this course students will be able to

I. To understand components of desktop, laptop and write latest specifications of desktop and laptop.
II. To familiarize with various transmission media and prepare straight and cross cables using crimping tool and connectors.
III. To have an exposure of network components devices and implement various topologies such as Ring, Bus, Star etc. physically using trainer kit.
IV. To configure TCP/IP protocol in Windows, Linux and implement resource sharing.
V. To perform subnet planning as per requirements of an enterprise and implement the same with proper testing.

List Of Experiments:

1. Write specifications of latest desktops and laptops.
2. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc.
3. Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.
4. Preparing straight and cross cables.
5. Study of various LAN topologies and their creation using network devices, cables and computers.
6. Configuration of TCP/IP Protocols in Windows and Linux.
7. Implementation of file and printer sharing.
8. Designing and implementing Class A, B, C Networks
9. Subnet planning and its implementation
10. Installation of ftp server and client

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[Batch 2015 onwards]

BTCS-408A	Microprocessor and Assembly Language Programming Lab

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	-	-	2	1

Course Objectives:

This course provide practical hands-on experience with microprocessor applications and interfacing techniques. Understand 8085 microprocessor kit, knowledge of 8085 instruction set and ability to utilize it in assembly language programming. Understand real mode Memory addressing and ability to interface various devices to the microprocessor.

Course Outcomes:

After undergoing this course students will be able to

I. Identify the basic element and functions of microprocessor.
II. Describe the architecture of microprocessor and its peripheral devices.
III. Demonstrate fundamental understanding on the operation between the microprocessor.
IV. Demonstrate fundamental understanding on the operation interfacing devices.
V. Complete the experiments in laboratory and present the technical report.

List Of Experiments:

1. Introduction to 8085 kit.
2. Addition of two 8 bit numbers, sum 8 bit.
3. Subtraction of two 8 bit numbers.
4. Find 1's complement of 8 bit number.
5. Find 2's complement of 8 bit number.
6. Shift an 8 bit no. by one bit.
7. Find Largest of two 8 bit numbers.
8. Find Largest among an array of ten numbers (8 bit).
9. Sum of series of 8 bit numbers.
10. Introduction to 8086 kit.
11. Addition of two 16 bit numbers, sum 16 bit.
12. Subtraction of two 16 bit numbers.
13. Find 1's complement of 16 bit number.
14. Find 2's complement of 16 bit number

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[Batch 2015 onwards]

BTCS-409A	System Programming Lab

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	-	-	2	1

Course Objectives:

The purpose of this course is to provide the students with an introduction to system-level programming. Although not the primary focus of this course, instruction shall be done within the context of C/C++ and Linux/Unix.

Course Outcomes:

After undergoing this course students will be able to

I. Create a menu driven interface for displaying contents of a file.
II. To create symbol table for high level language.
III. Implementation of single pass assembler on a limited set of instructions.
IV. Exploring various features of debug command.
v. Understand the use of LEX and YACC tools.

List Of Experiments:

1. Create a menu driven interface for a) Displaying contents of a file page wise b) Counting vowels, characters, and lines in a file. c) Copying a file
2. Write a program to check balance parenthesis of a given program. Also generate the error report.
3. Write a program to create symbol table for a given assembly language program.
4. Write a program to create symbol table for a given high-level language program.
5. Implementation of single pass assembler on a limited set of instructions.
6. Exploring various features of debug command.
7. Use of LAX and YACC tools.

Fifth Semester

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[Batch 2015 onwards]

BTCS-501A	Computer Networks-II

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives: This course offers a good understanding of Computer network concepts and prepares the student to be in a position to use and design various network based technologies for different applications.

Course Outcomes:

After undergoing this course students will be able to

1. Implement inter switch communication and VLANs.
2. Implement various routing protocols for IPv4 and IPv6.
3. Implement traffic filtering using ACL.
4. Implement and understand adhoc networks.
5. Design and understand cellular system.

Unit I

Introduction to Switching Technologies, Configuration, verify and troubleshooting of VLAN(normal/extended), Spanning tree protocol and its types, types of ports (access and trunk), configuration, verification and troubleshooting of inter witch connectivity, DTP and VTP, STP Features, Layer 2 and Layer 3 Ether channel, Mitigation techniques. [6]

Routing Technologies: introduction to routing protocols and their comparison, configure and verify OSPF (v1 and v2), EIGRP for IPv4 and IPv6. [5]

Unit II

WAN Technologies: WAN topology, WAN access connectivity- MPLS, Metro Ethernet, Broadband PPPoE, Internet VPN (DMVPN, site-to-site VPN, client VPN), configure, verify and troubleshooting of MLPPP, PPPoE [6]

ACL: introduction, Configuration and troubleshooting ACL for traffic filtering. [4]

Unit III

Adhoc networks: Features, advantages and applications, Adhoc versus Cellular networks, Network architecture, Protocols: MAC protocols, Routing protocols, Technologies. [5]

Unit- IV

Cellular Networks: Evolution, 1G, 2G, 2.5G,3G,4G-LTE

Cellular System Design: Introduction, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.[6]

Recommended Text and Reference Books

1. Todd Lammle, CCNA Routing and Switching Complete Study Guide: Exam 100-105, Exam 200-105, Exam 200-125, Wiley India Pvt. Ltd.
2. Theodore S. Rappaport, Wireless Communication: Principles and Practices , Pearson Education.
3. Mischa Schwartz, Mobile Wireless Communications Cambridge University Press.
4. C. Siva Ram Murthy, B.S.Manoj, Ad Hoc Wireless Networks, Prentice Hall.
5. Wendell Odom, CCNA Routing and Switching ICND2 200-101 Official Cert Guide, CISCO Press.

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[Batch 2015 onwards]

BTCS-502A	Data Base Management System

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives: This course offers a good understanding of database systems concepts and prepares the student to be in a position to use and design databases for different applications.

Course Outcomes:
After undergoing this course students will be able to

1. Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
2. Understand File Organization & Indexing and apply Relational Model in Database design, structured query language (SQL) and PL/SQL for database definition and database manipulation.
3. Understanding Normalization Concepts and apply various Normal forms in good Database Design.
4. Understanding different transaction processing concepts and use different concurrency control techniques.
5. Understand Database Protection and apply various Database security techniques.

Unit 1: Introduction to Database Systems: File Systems Versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data Independence. **[6]**

Unit 2: Physical Data Organization: File Organization and Indexing, Index Data Structures, Hashing, B-trees & B+ Trees, Clustered Index, Sparse Index, Dense Index, Fixed length and Variable Length Records. **[6]**

Unit 3: Data Models: Relational Model, Network Model, Hierarchical Model, ER Model: Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Database Design with the ER Model, Comparison of Models**.[5]**

Unit 4:The Relational Model: Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing Integrity Constraints, Relational Algebra, Relational Calculus: Tuple Calculus & Domain Calculus Querying Relational Data. **[5]**

Unit 5: Relational Query Languages: SQL: Basic SQL Query, Creating Table and Views, SQL as DML, DDL and DCL, SQL Algebraic Operations, Nested Queries, Aggregate Operations, Introduction to Pl/SQL: Procedures & Functions Cursors, Dynamic SQL, Integrity Constraints in SQL, Triggers and Active Database, Relational Completeness, Basic Query Optimization Strategies, Algebraic Manipulation and Equivalences. **[7]**

Unit 6 : Database Design: Functional Dependencies, Reasoning about Functional Dependencies, Normal Forms, Schema Refinement, First, Second and Third Normal Forms, BCNF, Multi-valued Dependency, Join Dependency, Fourth and Fifth Normal Forms, Domain Key Normal Forms, Decompositions. **[5]**

Unit 7 :Transaction Management: ACID Properties, Serializability, Two-phase Commit Protocol, Concurrency Control, Lock Management, Lost Update Problem, Inconsistent Read Problem , Read-Write Locks, Deadlocks Handling, 2PL protocol. **[6]**

Unit 8: Database Protection: Threats, Access Control Mechanisms, Discretionary Access Control, Grant and Revoke, Mandatory Access Control, Bell LaPadula Model, Role Based Security, Firewalls, Encryption and Digital Signatures. **[5]**

Unit 9: Introduction to Distributed Databases and Temporal Databases. **[5]**

Recommended Text and Reference Books

1. Ramez Elmasri, Shamkant Navathe ,Fundamentals of Database Systems, Fifth Edition, Pearson Education, 2007.
2. C.J. Date , An Introduction to Database Systems, Eighth Edition, Pearson Education.
3. Alexis Leon, Mathews Leon , Database Management Systems, Leon Press.
4. S. K. Singh, Database Systems Concepts, Design and Applications, Pearson Education.
5. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill.
6. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Tata McGrawHill.

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BTCS-503A	Algorithm Analysis and Design

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

To learn the ability to distinguish between the tractability and intractability of a given computational problem. To be able to devise fast and practical algorithms for real-life problems using the algorithm design techniques and principles learned in this course.

Course Outcomes:

After undergoing this course students will be able to

1. Understand and learn the basics of design and analysis of an algorithm.
2. Use the concept of Dynamic programming, Backtracking, Branch and Bound, Greedy algorithm to solve computing problems.
3. Ability to estimate programming time using Asymptotic notations.
4. Understanding the algorithms application in solving real life problems
5. Interpretation of the basics of the NP-completeness and analyse NP-complete by using polynomial time reductions

Unit I: Introduction

What is an algorithm? Time and space complexity of an algorithm. Comparing the performance of different algorithms for the same problem. Different orders of growth. Asymptotic notation. Polynomial vs. Exponential running time. [5]

Unit II: Basic Algorithm Design Techniques

Divide-and-conquer, greedy, randomization, and dynamic programming. Example problems and algorithms illustrating the use of these techniques. [4]

Unit III: Graph Algorithms

Graph traversal: breadth-first search (BFS) and depth-first search (DFS). Applications of BFS and DFS. Topological sort. Shortest paths in graphs: Dijkstra and Bellman-Ford. Minimum spanning trees. [5]

Unit IV: Sorting and searching

Binary search in an ordered array. Sorting algorithms such as Merge sort, Quick sort, Heap sort, Radix Sort, and Bubble sort with analysis of their running times. Lower bound on sorting. Median and order statistics. [5]

Unit V: **NP-completeness**

Definition of class NP. NP-hard and NP-complete problems. 3SAT is NP-complete. Proving a problem to be NP-complete using polynomial-time reductions. Examples of NP-complete problems. [4]

Unit VI: Coping with NP-completeness

Approximation algorithms for various complete problems. [3]

Unit VII: Advanced topics

Pattern matching algorithms: Knuth-Morris-Pratt algorithm. Algorithms in Computational Geometry: Convex hulls. Fast Fourier Transform (FFT) and its applications. [4]

Recommended Text and Reference Books

1. Algorithm Design by J. Kleinberg and E. Tardos. Addison Wesley.
2. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.
3. Algorithms by S. Dasgupta, C.H. Papadimitriou, and U.V. Vazirani.
4. Algorithm Design: Foundations, Analysis, and Internet Examples by Michael T. Goodrich and Roberto Tamassia.
5. The Design and Analysis of Computer Algorithms by A. V. Aho, J. E. Hopcroft, and J. D. Ullman.
6. The Art of Computer Programming, Volumes 1, 2, and 3, by Donald Knuth. Addison Wesley Longman

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BTCS-504A	Theory of Computation

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	4	1	0	5

Course Objectives: To give the students knowledge of number of areas in theoretical computer Science and their interconnections.

Course Outcomes:

After undergoing this course students will be able to

1. Understanding of the basic kinds of finite automata's and their capabilities.
2. Determine the relation between regular expressions, automata, languages and grammar with formal mathematical methods.
3. Understanding of regular and context-free languages. Languages and grammar with formal mathematical methods, as well as the use of formal languages and reduction in normal forms.
4. Design push down automata and Turing machines performing tasks of moderate complexity.

Unit I: Basics of Strings and Alphabets, Finite Automata – DFA, transition graphs, regular languages, non-deterministic FA, equivalence of DFA and NDFA. [6]

Unit II: Regular grammars, regular expressions, equivalence between regular languages, properties of regular languages, pumping lemma. [6]

Unit III: Context Free Languages – Leftmost and rightmost derivation, parsing and ambiguity, ambiguity in grammar and languages, normal forms. [5]

Unit IV: Pushdown Automata – NDPDA, DPDA, and context free languages and PDA, comparison of deterministic and non-deterministic versions, closure properties, and Pumping lemma for CFL. [5]

Unit V: Turing Machines, variations, halting problem, PCP. [4]

Unit VI: Chomsky Hierarchy, LR (k) Grammars, properties of LR (k) grammars, Decidability and Recursively, Enumerable Languages. [4]

Recommended Text and Reference Books

1. K.L.P. Mishra and N. Chandrasekaran, “Theory of Computer Science”, Third Edition, PHI Learning Private Limited, 2011.
2. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, “Introduction to Automata Theory”, Languages and Computation, Pearson Education.
3. M. Sipser, “Introduction to the Theory of Computation”, Second Edition, Cengage Learning.
4. K. V. N. Sunitha , N. Kalyani, “Formal Languages and Automata Theory”, McGraw-Hill, 2010.
5. Stephen Wolfram, “Theory and Applications of Cellular Automata”, World Scientific, 1986.
6. G.E. Revesz, “Introduction to Formal Languages”, Dover Publications, 1991.
7. M. A. Harrison, “Introduction to Formal Language Theory”, Addison-Wesley, 1978.
8. R.K. Shukla,” Theory of Computation”, Cengage Learning.

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Departmental Elective-I (BTCS-DE1A)

BTCS-511A Java Programming

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives: This course will provide the knowledge of Java and prepare students to be in a Position to write object oriented programs in Java.

Course Outcomes:

After undergoing this course students will be able to

1. Understand the use of data types, variables and various control statements.
2. Understand methods, classes and inheritance and its use.
3. Understand the multithreaded programming
4. Understand development of JAVA applets Vs. applications.
5. Understand the connection control and database connectivity

Unit-I

Overview of Java: Object oriented programming, Two paradigms, abstraction, the three OOP principles, Java class libraries. [2]

Date types, Variables and Arrays: Integers, floating-point types, characters, Boolean, Iterates, Variable, Data types and casting, automatic type promotion in expressions, arrays. [3]

Operators and Control Statements: Arithmetic operators, bit wise operators, relational operators, Boolean logical operators, the ? Operator, operator precedence, Java's selection statements, iteration statements, jump statements. [4]

Unit-II

Introduction to Classes: Class fundamentals, declaring object reference variable, Introducing methods, method, constructors, this keyword, garbage collection, the finalize () method. [3]

Methods and Classes: Overloading methods, using objects as parameters, recursion. [2]

Inheritance: Inheritance basics, using super, method overriding, dynamic method dispatch, using abstract Classes, Using final with inheritance, Package and Interfaces, Package access protection, importing packages. [3]

Unit-III

Exception Handling: Exception handling fundamentals, Exception types, Uncaught Exceptions Using try and catch, multiple catch clauses, nested try statements, throw, finally Java's built-in exceptions, creating your own exception sub classes, using exceptions. [4]

Multithreaded Programming: The Java thread model, the main thread, creating thread, creating multiple threads, using is alive and join, Thread priorities, synchronization, Inter thread communications, suspending resuming and stopping threads. [4]

Unit-IV

String Handling: The string constructors, string length, special string operations, character extraction, string comparison, searching string, modifying string, data conversion, changing the case of characters, string buffer. [3]

I/O and Applets: I/O Basics, Reading Console Input, Writing Console Output, Reading and Writing Files, Applet Fundamentals, Applet Architecture, The HTML Applet tag, passing parameters to Applets. [3]

Unit-V

Networking: Networking basics, Java and the Net, TCP/IP Client Sockets URL, URL Connection, TCP/IP Server Sockets, Database connectivity. [3]

Recommended Text and Reference Books

1 Herbert Schildt, The Complete Reference Java2, McGraw-Hill.
2 Joyce Farrell, Java for Beginners, Cengage Learning.
3 Deitel and Deitel, Java: How to Program, 6th Edition, Pearson Education.
4 James Edward Keogh, Jim Keogh, J2EE: The complete Reference, McGrawHill
5 Khalid A. Mughal, Torill Hamre, Rolf W. Rasmussen, Java Actually, Cengage Learning.
6 Shirish Chavan, Java for Beginners, 2nd Edition, Shroff Publishers.

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BTCS-512A	Network Programming

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives: To familiarize students with advanced concepts of networks, network programming in UNIX environment.

Course Outcomes:

After undergoing this course students will be able to

1. Understand TCP/IP protocol.
2. Understand environment variables.
3. Understand and implement IPC under UNIX environment.
4. Understand and implement socket programming.

Unit I

OSI model, client server model, TCP/IP protocols, Introduction to Unix; Process, groups, job control and non-job control shells, reliable and unreliable signals, shell Programming. [7]

Unit II

Inter process communication in Unix, pipes, half duplex and full duplex pipes, FIFOs, properties of pipes and FIFOs, POSIX message queues, system V message queues, semaphores, shared memory, mmap function and its use, RPC, authentication, timeout and retransmission, call semantics, XDR. [8]

Unit III

Communication Protocol – Introduction, TCP, IP, XNS, SNA, NetBIOS, OSI protocols, comparisons. Introduction to Berkeley sockets, socket addressing, TCP and UDP socket functions, sockets and Unix signals, socket implementation, client and server examples for TCP and UDP and their behavior under abnormal conditions. [8]

Unit- IV

Socket options, IPv4, IPv6, TCP, I/O multiplexing, Unix I/O models, select and poll functions,System V Transport Layer, interface – Introduction Transport End Point address, TLI. [7]

Recommended Text and Reference Books

1 W. R. Stevens, B. Fenner & A. M. Rudoff, Unix Network Programming, Vol. I, 3rd Ed., Pearson Education

2 W. R. Stevens , Unix Network Programming, Vol. II, 2nd Ed., Pearson Education

3 Comer and Stevens, Internetworking with TCP/IP, Vol. I, II and III, PHI

4 Christian Benvenuti, Understanding Linux Network Internals, O'Reilly

5 W. R. Stevens , Advanced Programming in Unix Environment, Pearson Education

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BTCS-513A	Linux Server Administration

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives:

- **To develop a strong command line based administration skill in Linux based OS.**
- **To develop the knowledge of working principles, installation and configuration of different servers.**

Course Outcomes:

After undergoing this course students will be able to

1. Being able to install Linux based OS in machines
2. Become proficient in command line based system administration in Linux
3. Gain the ability to create and manipulate permissions for different users in a Linux based OS
4. Get clear concept of the file system structure of Linux based OS
5. Effectively learn to install and configure a number of different servers in a Linux based OS learn to troubleshoot different server problems

Unit I

Introduction to Linux - History, Architecture, Comparison with UNIX, Features and Facilities of Linux, Basic commands in Linux, Files and File Structure - Linux File System, Boot block, Super block, Inode table, Data blocks, Linux standard directories. File naming Conventions, Path, Types of file names and Users, File Commands in Linux, file comparisons, Directory Commands, Text Editors-Functions of a Text Editor, vi Editor, Locating Files, File Access Permissions [FAP], Viewing and Changing FAPs, Redirection, Filters, Pipes. [8]

Unit II

Basics of shell programming, various types of shell available in Linux, comparisons between various shells, shell programming in bash - Conditional and looping statements, Iterations, Command Substitution - expr command, arithmetic expansion, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automating system tasks. [8]

Unit III

Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding &deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of users accounts, creating and mounting file system. [7]

Unit IV

Communication in Linux - mesg, who- T, talk, write, wall, finger, chfn, ping, traceroute utilities, email facilities . Configuration of servers- Telnet, FTP, DHCP,NFS, SSH, Proxy Server(Squid), Web server (Apache), Samba. Daemons- init, crond, atd, xinetd, inetd, the services file. named, sshd, httpd.[7]

Recommended Text and Reference Books

1. Operating System - Linux, NUT Press, PHI Publisher, 2006 Edition
2. Red Hat Linux Bible, Cristopher Negus, Wiley Dreamtech India
3. UNIX Shell Programming by YeswantKanetkar, BPB
4. Linux Administration Handbook, EviNemeth,Garth Snyder, Trent KHein -Pearson Education.
5. Beginning Linux Programming by Neil Mathew & Richard Stones, Wiley Dreamtech India

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BTCS-514A	Python Programming

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives:

This course will provide the in-depth knowledge of basic and advanced Programming skills in Python language.

Course Outcomes:

After undergoing this course students will be able to

1. To develop proficiency in creating applications using basic constructs of Python.
2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To be able to do testing and debugging of code written in Python.
4. To be able to understand OOP concepts and text filtering with regular expressions.
5. To be able to understand network traffic analysis and use of Python in this domain.

Unit I: Introduction

Introduction: History, Features, Installation and setting up path, working with Python, Basic Syntax, Variable and Data, Types, Operator, **Control Structures:** Conditional Statements: If, If-else, Nested if-else, Loops: For, While, Nested loops, Control Statements: Break, Continue, Pass. [6]

Unit II: Data Structures, Lists, Tuples, Dictionaries and Functions

Data Structures: String Manipulation: Accessing Strings, Basic Operations, String slices, Function and Methods, **Lists:** Introduction, accessing list, operations, working with lists, Function and Methods. **Tuples:** Introduction, accessing tuples, operations, working, Functions and Methods, **Dictionaries:** Introduction, accessing values in dictionaries, Working with dictionaries, Properties. **Functions:** Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables. [7]

Unit III: Modules, Input-Output and Exception Handling

Modules: Importing module, Math module, Packages, **Input-Output:** Printing on screen, reading data from keyboard, Opening and closing file, Reading and writing files, Functions, **Exception Handling:** Exception, Exception Handling, except clause, Try clause, user defined exceptions. [6]

Unit IV: OOPs concepts and Regular expressions

OOPs concepts: Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, **Regular expressions:** Match function, Search function, Matching VS Searching, Modifiers, Patterns. [6]

Unit V:**Advance applications of Python**

Advance applications of Python: Network Analysis using Python, concept of Packet stream, Introduction to Wireshark, T-Shark network analysis tools, PCAP format, Statistical analysis of PCAP files. [5]

Recommended Text and Reference Books

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.
2. R. Nageswara Rao, “Core Python Programming”, Dreamtech.
3. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India.

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BTCS-505A	Computer Networks-II Laboratory

Mid-Se	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives: The objective of the course is to offer good understanding of the concepts of network security, wireless, Adhoc and various emerging network technologies.

Course Outcomes:

After undergoing this course students will be able to

1. Design network and implement server.
2. Design and implement inter switch communication.
3. Configure router for routing, PPP and MLPPP and PPPoE access.
4. Implement traffic filtering using ACL
5. Configure wireless adhoc networks.

List of Practicals

1. Installation of CISCO packet tracer.
2. To Implementation of web server in CISCO packet tracer.
3. To configure, verify and troubleshooting of VLANs,
4. To configure, verify and troubleshooting of interswitch connectivity
5. To configure, verify, and troubleshoot STP protocols
6. To configure, verify, and troubleshoot single area and multi area OSPFv2, OSPFv3, for IPv4 and IPv6.
7. To configure, verify, and troubleshoot single area and multi area EIGRP for IPv4 and IPv6.
8. To configure and verify PPP and MLPPP on WAN interfaces using local authentication
9. To configure, verify, and troubleshoot PPPoE client-side interfaces using local authentication
10. To demonstrate the traffic filtering using access control list.
11. To configure Adhoc networks.

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BTCS-506A	DBMS Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	3	1

Course Objectives:

To learn practical aspects of Relational database design using SQL for different applications. also understand about triggers, cursors and stored procedures etc.

Course Outcomes:

After undergoing this course students will be able to

1. Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
2. Understand and apply structured query language (SQL) for database definition and database manipulation.
3. Understanding of normalization theory and apply such knowledge to the normalization of a database
4. Understand various transaction processing, concurrency control mechanisms and database protection mechanisms
5. Understand Distributed Databases, Techniques for Distributed Database design and types of Recovery Techniques.

List of Practicals

1. Introduction to SQL and installation of SQL Server / Oracle.
2. Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements.
3. .Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements.
4. Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.
5. PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
6. Stored Procedures and Exception Handling., Triggers and Cursor Management in PL/SQL.
7. Case studies on normalization.
8. Study and usage of open source data mining tool: Weka
9. Study of web databases
10. Development of a project by making use of tools studied above.

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[Batch 2015 onwards]

BTCS-507A	Algorithm Analysis and Design Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	3	1

Course Objectives:

- **To get a first-hand experience of implementing well-known algorithms in a high-level language.**
- **To be able to compare the practical performance of different algorithms for the same problem.**

Course Outcomes:

After undergoing this course students will be able to

1. Identify the problem given and design the algorithm using various algorithm design techniques.
2. Implement various algorithms in a high level language.
3. Analyze the performance of various algorithms.
4. Compare the performance of different algorithms for same problem

List of Practicals

1. Code and analyze to compute the greatest common divisor (GCD) of two numbers.
2. Code and analyze to find the median element in an array of integers.
3. Code and analyze to find the majority element in an array of integers.
4. Code and analyze to sort an array of integers using Heap sort.
5. Code and analyze to sort an array of integers using Merge sort.
6. Code and analyze to sort an array of integers using Quick sort.
7. Code and analyze to find the edit distance between two character strings using dynamic programming
8. Code and analyze to find an optimal solution to weighted interval scheduling using dynamic programming.
9. Code and anlayze knapsack problem using Greedy method.
10. Code and analyze to do a depth-first search (DFS) on an undirected graph.
11. Code and analyze to do a breadth-first search (BFS) on an undirected graph.
12. Code and analyze to find shortest paths in a graph with positive edge weights using Dijkstra's algorithm.
13. Code and analyze to find shortest paths in a graph with arbitrary edge weights using Bellman-Ford algorithm.
14. Code and analyze to find the minimum spanning tree in a weighted, undirected graph.
15. Code and analyze to find all occurrences of a pattern P in a given string S.

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[Batch 2015 onwards]

Departmental Elective-I Laboratory (BTCS-DE1A Lab)

BTCS-515A	Java Programming Laboratory

Mid-em	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

o Course Objectives: This course will provide the knowledge of Java programs and prepare students t be in a Position to write object oriented programs in Java.

Course Outcomes: After undergoing this course students will be able to

1. Develop problem-solving and programming skills using object orient programming concept.
2. Design and implement a well bounded application to demonstrate the methods of threa and string handling.
3. Implement the networking features and database connectivity. Design and implement mou and keyboard events. Implement various string and exception handling methods

List of Practicals

1. Implementation of classes.
2. Implementation of inheritance.
3. Implementation of packages and interfaces.
4. Implementation of threads.
5. Using exception handling mechanisms.
6. Implementation of Applets.
7. Implementation of mouse events, and keyboard events.
8. Implementing basic file reading and writing methods.
9. Using basic networking features.
10. Connecting to Database using JDBC
11. Develop some basic Java Application Project.

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[Batch 2015 onwards]

BTCS-516A	Network Programming Laboratory

Mid-Se	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives: This course will provide the knowledge of Network programs and prepare students to be in a Position to write network programs.

Course Outcomes:

A After undergoing this course students will be able to

1. Implement network management commands.
2. Understand system calls and implement enter process communication, message queues.
3. Implement pipes and process control.
4. Implement file handling.
5. Implement socket programming.

List of Practicals

1. To study and implement various network commands like telnet, ftp, etc.
2. To study various system calls.
3. Programs related to interprocess communication
5. Programs related to message queues
6. Programs related to pipes
7. Programs related to file handling
8. Programs related to process control
9. Programs using Socket Programming

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[Batch 2015 onwards]

BTCS-517A	Linux Server Administration Laboratory

Mid-Se	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives: This course will provide the knowledge of Linux commands and Installation and prepare students to be in a Position to write Linux programs.

Course Outcomes:

After undergoing this course students will be able to

1. Practically able to install Linux based OS in machines
2. Understand the command line based system administration in Linux with practical example.
3. Able to create and manipulate permissions for different users in a Linux based OS
4. Understand the better view of file system structure of Linux based OS
5. Practically learn to install and configure a number of different servers in a Linux based OS learn too troubleshoot different server problems

List of Practicals

1 Installation of Linux over the machines, network based installation.

2. Basic Overview of various commands- cal, pwd, cd, ls, mv, cd, cp, rm, mkdir, rmdir, more, less, touch . Creating and viewing files using cat, file comparisons, disk related commands, checking disk free spaces. Batch commands, kill, ps, who, Printing commands, find, sort, touch, file, file processing commands- wc, cut, paste etc - mathematical commands - expr, factor etc.

3. Filter commands- pr, head, tail, cut, sort, uniq, tr - Filter using regular expression grep, egrep, sed, a wk, etc.

4. Shell Programming -Shells, Scripting Rationale Creating a bash Script, bash Start up Files, A Script' s Environment, Exporting Variables, Exit Status, Programming the Shell, Parameter Passing, Operators, looping, Input and Output.

5. Process Management with Linux, File System management, User Administration, Linux Start up and Shutdown, Software package Management, Network Administration.

6. LAN Card configuration, Server Configuration- DHCP, DNS, FTP, Telnet, SSH, NFS, Web Server, SQUID Proxy server.

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BTCS-518A	Python Programming Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives: This course will provide the knowledge of Python commands and Installation and prepare students to be in a Position to write Python Programs.

Course Outcomes:

After undergoing this course students will be able to

1. Understand different types of control structures of python.
2. Understand and working of exception handling and assertions.
3. Design and implement python programs with different types of protocols

List of Practicals

1. Develop programs to understand the control structures of python.
2. Develop programs to learn different types of structures (list, dictionary, tuples) in python.
3. Develop programs to learn concept of functions scoping, recursion and list mutability.
4. Develop programs to understand working of exception handling and assertions.
5. Develop programs for data structure algorithms using python – searching and sorting.
6. Develop programs to learn regular expressions using python.
7. Develop programs to learn OOP concepts.
8. Develop programs to understand the concepts of packet and its structure.
9. Develop programs to display different types of protocols, packets, count no. of packets, packet analysis, time series analysis using time and packet windows.
10. Develop programs to compute several statistical measures like Shannon entropy, standard deviation, median, variance etc.

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[Batch 2015 onwards]

BTCS-508A	Training -II

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	0	0	0	3

The student will undergo 6 weeks industrial training for making various projects

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[Batch 2015 onwards]

BTHU-501A	Professional Skills-III

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives: This course will provide the knowledge of Professional skills topics and prepare Students to be in a Position to understand various terms of Professional skills.

Course Outcomes:

After undergoing this course students will be able to

1. Understand nuances of group dynamics and team-work and also to develop ability for effective conflict management.
2. Sharpen and demonstrate Verbal Ability, Spatial Ability and Memory skills..
3. Understand the linkage between attitude and behaviour and its role in professional and personal well- being.
4. Develop and demonstrate oral and written communication skills such as Oral presentations, Group discussion, Resume writing, job application writing, email
5. writing

Unit I

Concepts of Groups and Teams: Groups and Group dynamics, Group cohesiveness, compliance and Conformity. Team building, Team work, Conflict: types and resolutions.

Unit II

Mental Abilities: Verbal Ability, Spatial Ability, Memory.

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Unit III

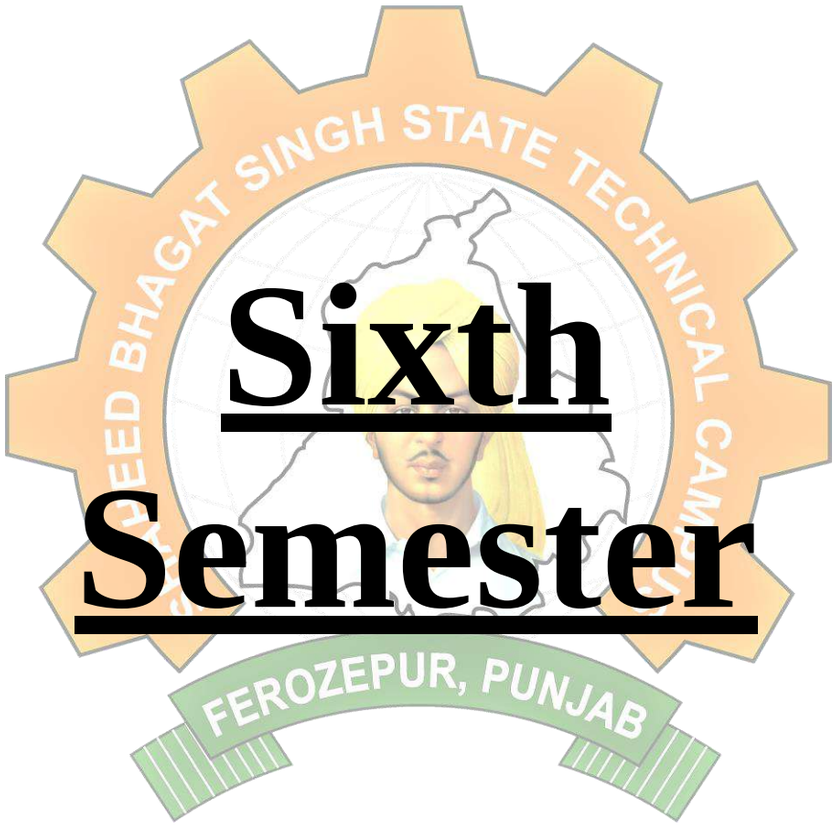
Attitude: Meaning of attitude, link between attitude and behavior, Persuasion, attitude towards work environment, Work-force Diversity. Significance of Happiness, Optimism, Wellbeing.
ACL: introduction, Configuration and troubleshooting ACL for traffic filtering.

Unit IV

Communication Skills: Job Application Writing, Resume Writing, email writing, Group Discussion, Power Point Presentation.

Recommended Text and Reference Books

1. Organizational Behaviour by Stephen Robbins, Pearson Education
2. Positive Psychology: The Scientific and Practical Explorations of Human Strengths, C R Snyder and Shane J. Lopez, Jennifer, Pedrotti, Sage Publications.
3. Social Psychology by Robert Baron and Donn Irwin Byron , Prentice Hall India.
4. Handbook of Practical Communication Skills by Chrissie Wright, Jaico Publications, Mumbai.
5. Effective Technical Communication by M. Ashraf Rizvi, Tata McGraw Hill.
6. Model Business Letters, E-mails & Other Business Documents, 6th Edition, by Shirley Taylor, Pearson Education.
7. Communication skills for Engineers by Sunita Mishra and C. Muralikrishna, Pearson Education, 2004.



Sixth Semester

Shaheed Bhagat Singh State Technical Campus, Ferozepur
Department of Computer Science& Engineering
[Batch 2015 onwards]

BTCS-601A	Compiler Design

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

This course will provide the in-depth knowledge of different concepts involved while designing a compiler.

Course Outcomes:

After undergoing this course students will be able to

1. Introduce the major concept areas of Language translation and compiler design.
2. Understand the concepts of Syntax Analysis and Semantic Analysis.
3. Learn the concepts of Parsing.
4. Understand, design code generation schemes.
5. Understand optimization of codes and runtime environment.

Unit I: Overview of compilation

The structure of a compiler and applications of compiler technology; Lexical analysis - The role of a lexical analyzer, specification of tokens, recognition of tokens, hand-written lexical analyzers, LEX, examples of LEX programs. [4]

Unit II: Introduction to syntax analysis

Role of a parser, use of context-free grammars (CFG) in the specification of the syntax of programming languages, techniques for writing grammars for programming languages (removal left recursion, etc.), non- context-free constructs in programming languages, parse trees and ambiguity, examples of programming language grammars. [5]

Unit III: Top-down parsing

FIRST & FOLLOW sets, LL(1) conditions, predictive parsing, recursive descent parsing, error recovery. LR-parsing - Handle pruning, shift-reduce parsing, viable prefixes, valid items, LR(0) automaton, LR-parsing algorithm, SLR(1), LR(1), and LALR(1) parsing. YACC, error recovery with YACC and examples of YACC specifications. [5]

Unit IV: Syntax-directed definitions (attribute grammars)

Synthesized and inherited attributes, examples of SDDs, evaluation orders for attributes of an SDD, dependency graphs. S-attributed and L-attributed SDDs and their implementation using LR-parsers and recursive descent parsers respectively. [4]

Unit V: **Semantic analysis**

Symbol tables and their data structures. Representation of “scope”. Semantic analysis of expressions, assignment, and control-flow statements, declarations of variables and functions, function calls, etc., using S-attributed and L-attributed SDDs (treatment of arrays and structures included). Semantic error recovery. [4]

Unit VI: Intermediate code generation

Different intermediate representations –quadruples, triples, trees, flow graphs, SSA forms, and their uses. Translation of expressions (including array references with subscripts) and assignment statements. Translation of control-flow statements – it- then-else, while-do, and switch. Short-circuit code and control-flow translation of Boolean expressions. Back patching. Examples to illustrate intermediate code generation for all constructs. [5]

Unit VII: Run-time environments

Stack allocation of space and activation records. Access to non-local data on the stack in the case of procedures with and without nesting of procedures. [3]

Unit VIII: Introduction to machine code generation and optimization

Simple machine code generation, Examples of machine-independent code optimizations. [3]

Recommended Text and Reference Books

1. Aho, Ullman:Principles of Compiler Design. Narosa Publication.
2. Dhamdhere:Compiler Construction- Principles and Practice,Macmillan, India
3. K.D. Cooper, and Linda Torczon, Engineering a Compiler, Morgan Kaufmann, 2004.
4. Holub:Compiler Design in C, PHI.
5. K.C. Louden, Compiler Construction: Principles and Practice, Cengage Learning, 1997.
6. D. Brown, J. Levine, and T. Mason, LEX and YACC, O'Reilly Media, 1992.
7. Compilers: Principles, Techniques and Tools, Pearson Education.

Shaheed Bhagat Singh State Technical Campus, Ferozepur

Department of Computer Science& Engineering

[Batch 2015 onwards]

BTCS-602A	Computer Graphics

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives:

Understanding the fundamental Graphical operations and implementing them on computer system, get a glimpse of recent advances in computer graphics, understanding the graphical user interface issues that make the computer easy to use.

Course Outcomes:

After undergoing this course students will be able

1. To gain the basic knowledge on computer graphics and its various elements, video display devices such as raster and random scan systems.
2. To understand the scan conversion for generating point, line, circle and ellipse structures.
3. To understand the theory of 2D and 3D transformations and clipping techniques.
4. To analyse and implement the Filling techniques and to understand the plane projection and its types.
5. Detailed knowledge of visible surface detection methods and surface shading algorithms.

Unit I: Introduction

Computer Graphics and its applications, Elements of a Graphics, Graphics Systems: Video display devices, Raster scan systems, Random scan systems, various Input / Output devices. [3]

Unit II: Basic Raster Graphics

Scan conversion- Point plot, Line drawing, Circle generating and Ellipse generating algorithms. [3]

Unit III: Two-dimensional Geometric Transformations

Basic Transformations-Translation, Rotation and Scaling, Matrix representation and Homogeneous co-ordinates, Composite Transformations, Reflection and Shearing transformations. [4]

Unit IV: Clipping

Window to viewport transformation, Clipping Operations- Point Clipping, Line Clipping, Polygon Clipping and Text Clipping. [5]

Unit V: Filling Techniques

Scan Line algorithm, Boundary-fill algorithm, Flood-fill algorithm, Edge-fill and Fence-fill algorithms. [4]

Unit VI:Elementary 3D Graphics

Plane projections and its types, Vanishing points, Specification of a 3D view. [4]

Unit VII:Visibility

Image and object precision, Hidden edge/surface removal or visible edge/surface determination techniques; z buffer algorithms, Depth sort algorithm, Scan line algorithm and Floating Horizon technique. [4]

Unit VIII: Advance Topics

Introduction of Rendering, Raytracing, Antialiasing, Fractals, Gourard and Phong shading. [4]

Recommended Text and Reference Books

1. Donald Hearn and M.Pauline Baker, “Computer Graphics”, Second Edition, PHI/Pearson Education.
2. Zhigand xiang, Roy Plastock, Schaum’s outlines, “Computer Graphics Second Edition”, Tata Mc-Grawhill edition.
3. C, Foley, VanDam, Feiner and Hughes, “Computer Graphics Principles & Practice”, Second Edition,Pearson Education

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Department of Computer Science& Engineering
[Batch 2015 onwards]

BTCS-603A	Software Engineering

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives: In this course students will gain a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

Course Outcomes:

After undergoing this course students will be able to

1. Understand a software engineering process life cycle , including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements .
2. Analyse and specify software requirements through a productive working relationship with various stakeholders of the project.
3. Analyse and translate a specification into a design, and then realize how to develop the code from the design using an appropriate software engineering methodology.
4. Apply relevant standards and perform testing, and quality management and practice.
5. Understanding how to use modern engineering tools necessary for software project management, time management and software reuse.

Unit I

Evolution and impact of Software engineering, software life cycle models: Waterfall, prototyping, Evolutionary, and Spiral models. Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification. [7]

Unit II

Basic issues in software design, modularity, cohesion, coupling and layering, function-oriented software design: DFD and Structure chart, object modelling using UML, Object-oriented software development, user interface design. Coding standards and Code review techniques. [8]

Unit III

Fundamentals of testing, White-box, and black-box testing, Test coverage analysis and test case design techniques, mutation testing, Static and dynamic analysis, Software reliability metrics, reliability growth modelling. [7]

Unit IV

Software project management, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts, cost-time relations: Rayleigh-Norden results, quality management, ISO and SEI CMMI, PSP and Six Sigma. Computer aided software engineering, software maintenance, software reuse, Component-based software development. [8]

Recommended Text and Reference Books

1 Roger Pressman, "Software Engineering: A Practitioners Approach, (6th Edition), McGraw Hill, 1997.

2 Sommerville," Software Engineering, 7th edition", Adison Wesley, 1996

3 Watts Humphrey," Managing software process", Pearson education, 2003.

4 James F. Peters and Witold Pedrycz, "SoftwareEngineering – An Engineering Approach", Wiley.

5. Mouratidis and Giorgini. "Integrating Security and Software Engineering–Advances and Future", IGP. ISBN – 1-59904-148-0.

5 Pankaj Jalote, "An integrated approach to Software Engineering", Springer/Narosa.

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[Batch 2015 onwards]

BTCS-604A	Data Warehouse & Mining

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	1	0	4

Course Objectives: This course offers a good understanding of Data Warehousing and mining concepts and prepares the student to be in a position to use and design various Data Warehousing and mining based technologies for different applications.

Course Outcomes:

After undergoing this course students will be able to

1. Grasp basic knowledge about the Data warehouse, architecture and relationships.
2. In-depth knowledge of Temporal data warehouse
3. Describe about data mining, its issues, processing models
4. Classification of various measures, presentation and visualization of patterns.
5. Apply the various association rules, association mining classification and clustering.

Unit I

Review of Data Warehouse: Need for data warehouse, Big data, Data Pre-Processing, Three tier architecture; MDDM and its schemas, Introduction to Spatial Data warehouse, Architecture of Spatial Systems, Spatial: Objects, data types, reference systems; Topological Relationships, Conceptual Models for Spatial Data, Implementation Models for Spatial Data, Spatial Levels, Hierarchies and Measures Spatial Fact Relationships. [7]

Unit II

Introduction to temporal Data warehouse: General Concepts, Temporality Data Types, Synchronization and Relationships, Temporal Extension of the Multi-Dimensional Model, Temporal Support for Levels, Temporal Hierarchies, Fact Relationships, Measures, Conceptual Models for Temporal Data Warehouses: Logical Representation and Temporal Granularity. [7]

Unit III

Introduction to Data Mining, Kind of Data to be mined, Data Mining Functionalities, Pattern Interestingness, Classification of Data Mining System, Major Issues in Data Mining, Data Processing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept hierarchy generate Data Mining Architecture: Data Mining primitives, Task relevant data, interestingness measures, presentation and visualization of patterns, Concept Description, Data Generalization and Summarization, Attributed oriented induction, Analytical characterization, Mining class comparisons. [8]

Unit IV

Association Rules: Association rules mining, Mining Association rules from single level, multilevel transaction databases, multi-dimensional relational databases and data warehouses, Correlational analysis, Constraint based association mining Classification and Clustering: Classification and prediction, Decision tree induction, Bayesian classification, k-nearest neighbor classification, Cluster analysis, Types of data in clustering, categorization of clustering methods. [8]

Recommended Text and Reference Books

1. Data Mining: Concepts and Techniques By J.Han and M. Kamber Publisher Morgan Kaufmann Publishers
2. Advanced Data Warehouse Design (from conventional to spatial and temporal applications) by Elzbieta Malinowski and Esteban Zimányi Publisher Springer
3. Modern Data Warehousing, Mining and Visualization by George M Marakas, Publisher Pearson
4. Dunham: Data Mining Introductory and Advance Topics, Pearson Education, Latest Edition
5. Berson: Data Mining By TMH

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[Batch 2015 onwards]

Departmental Elective-II(BTCS-DE2A)

BTCS-611A	Mobile Application Development

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives: This course offers a good understanding of Mobile application and Development concepts and prepares the student to be in a position to use and design various Mobile application based technologies for different applications.

Course Outcomes:
After undergoing this course students will be able to

1. Appreciate the Mobility landscape
2. Familiarize with Mobile apps development aspects
3. Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
4. Appreciation of nuances such as native hardware play, location awareness, graphics, and multimedia.
5. Perform testing, signing, packaging and distribution of mobile apps

Unit 1: Getting started with Mobility
Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development. [6]

Unit II: Building blocks of mobile apps
App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity-states and life cycle, interaction amongst activities.
App functionality beyond user interface - Threads, Async task, Services – states and life cycle, Notifications, Broadcast receivers.

Telephony and SMS APIs

Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet). [6]

Unit III: Sprucing up mobile apps
Graphics and animation – custom views, canvas, animation APIs, multimedia – audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope). [6]

Unit IV: Testing mobile apps
Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk. [6]

Unit V: Taking apps to Market
Versioning, signing and packaging mobile apps, distributing apps on mobile market place. [5]

Recommended Text and Reference Books

1. Anubhav Pradhan, Anil V Deshpande, " Mobile Apps Development" Edition: I
2. Jeff McWherter, Scott Gowell "Professional Mobile Application Development", John Wiley & Sons, 2012.
3. Barry Burd, "Android Application Development All in one for Dummies", Edition: I
4. Teach Yourself Android Application Development In 24 Hours, Edition: I, Publication: SAMS
5. Neal Goldstein, Tony Bove, "iPhone Application Development All-In-One For Dummies", John Wiley & Sons
6. Henry Lee, Eugene Chuvyrov, "Beginning Windows Phone App Development", Apress, 2012.
7. Jochen Schiller,"Mobile Communications", Addison-Wesley, 2nd edition, 2004.
8. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.

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[Batch 2015 onwards]

BTCS-612A	Cloud Computing

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives:
Upon completion of this course, students will have gained knowledge of Cloud Computing concepts and understanding of Cloud Computing principles and approaches.

Course Outcomes:
After undergoing this course students will be able to

1. Articulate the main concepts, underlying key technologies, strengths and limitations of cloud computing
2. Identify the architecture of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc
3. Identify the problems and explain, analyze and evaluate various cloud computing solutions..
4. Explain the core issues of cloud computing such as security and privacy.
5. Provide the appropriate cloud computing solutions and recommendations according to the application used.

Unit I: Overview of cloud computing : What is a cloud, Definition of cloud, characteristics of cloud ,Why use clouds, How clouds are changing , Driving factors towards cloud, Comparing grid with cloud and other computing systems, workload patterns for the cloud, "Big Data", [6]

Unit II: Cloud computing concepts: Concepts of cloud computing, Cloud computing leverages the Internet, Positioning cloud to a grid infrastructure, Elasticity and scalability, Virtualization, Characteristics of virtualization, Benefits of virtualization, Virtualization in cloud computing, Hypervisors, Multitenancy, Types of tenancy, Application programming interfaces (API), Billing and metering of services , Economies of scale, Management, tooling, and automation in cloud computing, Management: Desktops in the Cloud, Security. [6]

Unit III: Cloud service delivery: Cloud service , Cloud service model architectures, Infrastructure as a service (IaaS) architecture, Infrastructure as a service (IaaS) details, Platform as a service (PaaS) architecture, Platform as a service (PaaS) details, Platform as a service (PaaS) , Examples of PaaS software, Software as a service (SaaS) architecture, Software as a service (SaaS) details, Examples of SaaS applications, Trade-off in cost to install versus , Common cloud management platform reference architecture: Architecture overview diagram, Common cloud management platform. [7]

Unit IV: Cloud deployment scenarios: Cloud deployment models, Public clouds, Hybrid clouds, Community, Virtual private clouds, Vertical and special purpose, Migration paths for cloud, Selection criteria for cloud deployment. [5]

Unit V: Security in cloud computing : Cloud security reference model, How security gets integrated , Cloud security , Understanding security risks, Principal security dangers to cloud computing, Virtualization and multitenancy, Internal security breaches, Data corruption or loss, User account and service hijacking, Steps to reduce cloud security breaches, Steps to reduce cloud security breaches, Reducing cloud security, Identity management: Detection and forensics, Identity management: Detection and Identity management, Benefits of identity, Encryption techniques, Encryption & Encrypting data , Symmetric key encryption, Asymmetric key encryption, Digital signature, What is SSL. [6]

Recommended Text and Reference Books

1. Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, Cloud Computing: Principles and
2. paradigms, 2011 2. Michael Miller, Cloud Computing, 2008.
3. Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, Cloud Computing for dummies, 2009.
4. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, Cloud Computing: A practical Approach ,McGraw Hill, 2010.
5. Barrie Sosinsky, Cloud Computing Bible, Wiley, 2011.
6. Borko Furht, Armando Escalante (Editors), Handbook of Cloud Computing, Springer, 2010.

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BTCS-613A	Information Security

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives:
Upon completion of this course, students will have gained knowledge of information security concepts and understanding of Information Security principles and approaches.

Course Outcomes:
After undergoing this course students will be able to

1. Understand and learn the basics of Symmetric Ciphers.
2. Explain the concepts of Public key encryption and Digital Signatures.
3. Use the concepts of Authentication Protocols.
4. Understand the concepts of network security.
5. Describe the concepts of System Security.

Unit I: Symmetric Ciphers
Overview: Services, Mechanisms and Attacks, The OSI Security Architecture, A Model of Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. Block Cipher and the Data Encryption Standard: Simplified DES, Block Cipher Principles, The DES, The Strength of DES, Differential and Linear Cryptanalysis. Symmetric Ciphers: Triple DES, Blowfish. Confidentiality using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation. [7]

Unit II: Public Key Encryption, Digital Signatures
Number Theory, Prime Numbers Formats and Euler's Theorems, Testing for Primality. Public Key Cryptography and RSA: Principles of Public Key Cryptosystems, The RSA Algorithms, Key Management, Diffie Hellman Key Exchange. [6]

Unit III: Authentication Protocols
Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithms, Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standards. [6]

Unit IV: Network Security
Authentication Applications: Kerberos, X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload. Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction. [6]

Unit V: **System Security**
Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and its Design Principles. [5]

Recommended Text and Reference Books

1. William Stallings, Network Security Essentials, Applications and Standards Pearson Education.
2. William Stallings, Cryptography and Network Security Principles and practice. 2/e,Pearson Education.
3. Bishop, Matt, Introduction to Computer Security. Addison-Wesley, Pearson Education, Inc. ISBN: 0- 321-24744-2. (2005)
4. Michael. E. Whitman and Herbert J. Mattord Principles of Information Security, Cengage Learning Punjab Technical University B.Tech. Computer Science Engineering (CSE) 41 41
5. Atul Kahate Cryptography & Network Security, TMH, 2nd Edition
6. Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security: Private Communication in Public World, 2nd Edition, 2011, Pearson Education.

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[Batch 2015 onwards]

BTCS-614A	Artificial Intelligence

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives:

Upon completion of this course, students will have gained knowledge of Artificial Intelligence concepts and understanding of Artificial Intelligence principles and approaches.

Course Outcomes:

After undergoing this course students will be able to

1. Understand and learn the basics of Artificial Intelligence.
2. Define the concepts of BFS and DFS.
3. Use the concepts of Reasoning, Planning and Uncertainty.
4. Understand the concepts of applications of AI.

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Unit I: Introduction- What is intelligence? Foundations of artificial intelligence (AI). History of AI; Problem Solving- Formulating problems, problem types, states and operators, state space, search strategies, Introduction to Expert System. [4]

Unit II: Uninformed strategies-BFS,DFS, Iterative deepening DFS, Informed Search Strategies- Best first search, A* algorithm, Hill climbing, Constraint satisfaction, heuristic functions, Iterative deepening A*(IDA), small memory A*(SMA); Game playing - Perfect decision game, imperfect decision game, evaluation function, alpha-beta pruning . [5]

Unit III: Reasoning-Representation, Inference, Propositional Logic, predicate logic (first order logic), logical reasoning, forward chaining, backward chaining, Resolution and Unification. [5]

Unit IV: Planning- Basic representation of plans, partial order planning, planning in the blocks world, hierarchical planning, conditional planning. [4]

Unit V: Uncertainty - Basic probability, Bayes rule, Belief networks, Default reasoning, Fuzzy sets and fuzzy logic; Decision making- Utility theory, utility functions. [4]

Unit VI: Inductive learning - decision trees, rule based learning, current-best-hypothesis search, Supervised and Unsupervised learning, least commitment search , neural networks, reinforcement learning, Monte Carlo Process. [4]

Unit VII: Applications of AI: Genetic Algorithm, Speech Recognition, Motion Detection, Character Recognition, Natural Language Processing etc. [4]

Recommended Text and Reference Books

1. Stuart Russell and Peter Norvig. Artificial Intelligence – A Modern Approach, Pearson Education Press, 2001.
2. Kevin Knight, Elaine Rich, B. Nair, Artificial Intelligence, McGraw Hill, 2008.
3. George F. Luger, Artificial Intelligence, Pearson Education, 2001.
4. Nils J. Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kauffman, 2002.

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[Batch 2015 onwards]

BTCS-605A	Computer Graphics Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives:

Understanding the fundamental graphical operations and the implementation on computer get a glimpse of recent advances in computer graphics, Understanding user interface issues that make the computer easy for the novice to use.

Course Outcomes:

After undergoing this course students will be able to

1. Understand and explain the mathematical and theoretical principles of computer graphics eg: To draw basic objects like lines, triangles and polygons.
2. Implementation of fundamental algorithms and transformations involved in viewing models.
3. Implementation of projection models, illumination models and handling of hidden surfaces and clipping in computer graphics
4. Analyze and evaluate the use of computer graphics methods in practical applications and describe effects such as texture mapping and ant aliasing

List of Practicals

1. To plot a point (pixel) on the screen.
2. To draw a straight line using DDA Algorithm.
3. To draw a straight line using Bresenham's Algorithm
4. Implementation of mid-point circle generating Algorithm
5. Implementation of ellipse generating Algorithm.
6. To translate an object with translation parameters in X and Y directions.
7. To scale an object with scaling factors along X and Y directions.
8. To rotate an object with a certain angle about origin.
9. Perform the rotation of an object with certain angle about an arbitrary point.
10. To perform composite transformations of an object.
11. To perform the reflection of an object about major axis.
12. clip line segments against windows using Cohen Sutherland Algorithm.
13. Perform the polygon clipping against windows using Sutherland Hodgeman technique.
14. Fill a rectangle with a specified color using scan line algorithm.
15. Implementation of flood-fill and boundary-fill algorithms.

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[Batch 2015 onwards]

BTCS-606A Software Engineering Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives:

In this course students will gain a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

Course Outcomes:

After undergoing this course students will be able to

1. Understand the working and efficiency of the tools for estimation of project work
2. Understand the division of tasks to different persons among teams.
3. Draft and design the documents related to functional and non-functional requirements.
4. Design the test cases for testing software or a project.
5. Real time manual testing of a website and understand various parameters associated with it.

List of Practicals

1. Study and usage of OpenProj or similar software to draft a project plan.
2. Study and usage of OpenProj or similar software to track the progress of a project.
3. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents for some problems.
4. Preparation of Software Configuration Management and Risk Management related documents.
5. Study and usage of any Design phase CASE tool.
6. To perform unit testing and integration testing.
7. To perform various white box and black box testing techniques.
8. Testing of a web site.

Suggested Tools - Visual Paradigm, Rational Software Architect. Visio, Argo UML, Rational Application Developer etc. platforms.

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BTCS-607A	Data Warehouse & Mining Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives:

In this course students will gain a broad understanding of the discipline of Data Warehousing & Mining Laboratory and its application to the development of Data Warehousing & Mining Programs

Course Outcomes:

After undergoing this course students will be able to

1. Understand the working and efficiency of Weka tool.
2. Understand the classification of Mining techniques.
3. Draft and design the Classification and Visualization techniques.
4. Implement Data Cleansing.
5. Implement various Data Mining tools.

List of Practicals

1. Introduction about launching the Weka tool.
2. Introduction to the classification of Mining techniques and Attribute Relation File Format (ARFF)
3. To perform Preprocessing, Classification and Visualization techniques on various datasets.
4. To perform Clustering and Association technique on various datasets.
5. Introduction to Data Cleansing.
6. To implement Data Cleansing by removing redundancy from given dataset in any programming language.
7. To study and implement Filters in Weka.
8. To study AR Miner Tool.
9. To study the usage of AR Miner Tool for Data Warehouse.
10. To study DB Miner Tool.

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[Batch 2015 onwards]

BTCS-608A	Web and Open Source Technologies

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	3	1

Course Objectives:

In this course students will gain a broad understanding of the discipline of Web and Open Source Technologies Laboratory and its application to the development of Web and Open Source Technologies Programs

Course Outcomes:

After undergoing this course students will be able to

1. Understand the working and HTML and DHTML.
2. Understand the concepts of CSS and Java Script.
3. Draft and design the Ajex based applications.
4. Implement various PHP programs.
5. Implement various Validation techniques of ASP.

List of Practicals

1. Introduction to HTML and XHTML.
2. Basic Tags in HTML.
3. Write a program to create lists.
4. Introduction to CSS.
5. Write a program to create menu using HTML and CSS.
6. Introduction to JavaScript.
7. Write a program to print date using JavaScript.
8. Write a program to Sum and Multiply two numbers using JavaScript.
9. Write a program to Show use of alert, confirm and prompt box.
10. Write a program to redirect, popup and print function in JavaScript.
11. Create validation Form in JavaScript.
12. Introduction to Ajax
13. Write a program to change content of web page using Ajax.
14. Write a program to create XML Http Request.
15. Introduction to PHP.
16. Write a program to Addition of two numbers using PHP.
17. Write a program to show data types in PHP.
18. Write a program to use arithmetic operator in PHP.
19. Write a program to using class in PHP.
20. Write a program to connect to database.
21. Write a program to insert data in database.
22. Introduction to asp.
23. Write a program to generate login control.
24. Write a program to perform validation operation.

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Department of Computer Science& Engineering

[Batch 2015 onwards]

BTHU-601A	Professional Skills-IV

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Outcomes:

After undergoing this course students will be able to

1 Understand implications of varied aspects of Motivation and its assessment.
2 Understand and imbibe leadership skills and various styles of leadership.
3 Sharpen and demonstrate problem solving abilities, logical reasoning skills, verbal and numerical reasoning, Pictorial comparison, shapes and symbols.
4 Develop and Demonstrate oral and written communication Skills such as Negotiation Skills, Meeting Skills, Interview Skills, Report Writing

Unit I

Motivation: Introduction to Motivation, Relevance and Intrinsic and Extrinsic Motivation, Achievement motivation, Assessment of Motivation.

Unit II

Leadership: Characteristics of a good leader. Styles of leadership (Transformational, Transactional, Charismatic).

. **Unit III**

Aptitude: Meaning and measurement, problem solving abilities, logical reasoning skills, verbal and numerical reasoning, Pictorial comparison, shapes and symbols.

Unit IV

Communication Skills: Report Writing, Negotiation Skills, Meeting Skills, Interview Skills.

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Recommended Text and Reference Books

1. Organizational Behaviour by Stephen Robbins, Pearson Education.
2. Organizational Behaviour by Fred Luthans, Tata McGraw Hill.
3. Handbook of Technical Writing by David A.McMurrey and Joanne Buckley by Cengage Learning.
4. Handbook of Practical Communication Skills by Chrissie Wright, Jaico Publications, Mumbai.
5. Effective Technical Communication by M. Ashraf Rizvi, Tata McGraw Hill.
6. Model Business Letters, E-mails & Other Business Documents, 6th Edition, by Shirley Taylor, Pearson Education.
7. Communicative English for Engineers and Professionals by Nitin Bhatnagar and Mamta Bhatnagar, Pearson Education.

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[Batch 2015 onwards]

BTCS-615A	Mobile Application Development Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives:

This course offers a good understanding of Mobile application and Development concepts and prepares the student to be in a position to use and design various Mobile application based technologies for different applications.

Course Outcomes:

After undergoing this course students will be able to

1. Hands-on on Android Studio and Eclipse IDE.
2. Implement and design various key concepts of Android.
3. Design Apps to send and receive SMS, phone calls and other broadcast receivers

List of Practicals

1. Setup Android Environment for Development
2. Using Eclipse IDE for Android App Development
3. Setting up Android Studio
4. Creating Android Virtual Device with AVD Manager
5. Steps to create a Simple Android Application Project
6. Introduction to Gradle for Android Studio
7. Introduction to Android Views and ViewGroups
8. Introduction to Toast in Android
9. Introduction to Layouts or Viewgroups
10. Introduction to Android Tables
11. Introduction to Adapter, Adapterview and Grid View
12. Introduction to activities and Intents in Android
13. Design a Mobile App to send a SMS.
14. Design an application to demonstrate the concept of Alert Dialog Boxes.
15. Project: Science Quiz Android application

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[Batch 2015 onwards]

BTCS-616A	Cloud Computing Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives:

Upon completion of this course, students will have gained knowledge of Cloud Computing concepts and understanding of Cloud Computing principles and approaches. Also students can develop application on public cloud and private cloud.

Course Outcomes:

After undergoing this course students will be able to

1. Understanding Cloud Computing Concepts and Architecture.
2. Create and Run Virtual Machine on Open Source OS and on Cloud.
3. Implement Infrastructure and Storage as a Service.
4. Understand various security features of Cloud.
5. Hands-on for developing application on public cloud using AWS.

List of Practicals

1. Study of Cloud Computing & Its Architecture.
2. Virtualization in Cloud.
3. Study and implementation of Infrastructure as Service.
4. Study and installation of Storage as a Service.
5. Securing Servers in Cloud.
6. Design your application by understanding the nuances of public/private/hybrid cloud.
7. Design, development and implementation of a given business application on Public Cloud using AWS.
8. Migrate an existing on premise web hosting environment onto public cloud using AWS.

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[Batch 2015 onwards]

BTCS-617A	Information Security Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives:

Upon completion of this course, students will have gained knowledge of information security concepts and understanding of practical knowledge of Information Security principles and approaches.

Course Outcomes:

After undergoing this course students will be able to

1. Understand and implement Symmetric Ciphers.
2. Implement Public key encryption and Digital Signatures.
3. Implement the concepts of Authentication Protocols.
4. Understand and implement the concepts of network security.

List of Practicals

1. Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.
2. Study of System threat attacks - Denial of Services.
3. Study of IP based Authentication.
4. Study of Techniques uses for Web Based Password Capturing.
5. Study of Symmetric Encryption Scheme – RC4.
6. Implementation of DES algorithm for data encryption
7. Implementation of Asymmetric Encryption Scheme – RSA.
8. Study of different attacks causes by Virus and Trojans.
9. Study of Anti-Intrusion Technique – Honey pot.
10. Study of Sniffing and Spoofing attacks.
11. Study and implementation of basic Firewall principles.

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[Batch 2015 onwards]

BTCS-618A	Artificial Intelligence Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	2	1

Course Objectives:

Upon completion of this course, students will have gained knowledge of Artificial Intelligence concepts and understanding of Artificial Intelligence principles and approaches.

Course Outcomes:

After undergoing this course students will be able to

1. Explore basic features of Expert System.
2. Explore and use Prolog.
3. Practically implement the same using C/C++.

List of Practicals

1. Introduction to various applications of AI.
2. Write a program in prolog for deleting and replacing an element from the list
3. Represent a graph in prolog and apply breath first search and depth first search on it.
4. Write a prolog program to depict the functioning of cuts.
5. Write a prolog program to implement travelling salesman problem.
6. Write a program to implement A* algorithm.
7. Write a program in prolog to implement hill climbing algorithm.
8. Write a program in prolog to reverse a list of names.
9. Write a program in prolog for sorting a list.
10. Implementation of LISP.

Seventh Semester

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[Batch 2015 onwards]

BTCS-701A	Object Oriented Analysis and Design

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- **Awareness of basics concepts of OOPs concepts.**
- **Basic Knowledge of RDBMS concepts.**

Course Objectives: This course offers a good understanding of Object oriented analysis and design and prepares the student to be in a position to use and design various UML Diagrams.

Course Outcomes:

After undergoing this course students will be able to

1. To understand Object Oriented Analysis & Design and its comparison with structured paradigm.
2. To familiarize with the UML things, relationships, diagrams & Models
3. To understand the role of UML models throughout lifecycle of application development and solving real time problems.
4. To explore various object oriented architectural & design patterns.
5. To assess and evaluate design quality using software metrics.

Unit-1: Introduction to object oriented systems, Classes, Objects, Abstraction, Inheritance, Polymorphism, Encapsulation, Message Sending, Association, Aggregation, Iterative development and the Unified Process (UP), UP phases: Inception, Elaboration, Construction and Transition, Object-oriented metrics. [5]

Unit-2: Introduction to UML, Use Cases and functional requirements, Identifying and writing Use Cases, Decomposition of use cases, Modeling System Workflows using Activity Diagrams, Modeling a System's Logical Structure using Classes and Class Diagrams, Modeling Interactions using Sequence Diagrams and Communication Diagrams, Timing Diagrams, Interaction Overview Diagrams, Component Diagram, Package diagram, State Machine Diagrams, Deployment Diagrams. [5]

Unit-3: Introduction to Patterns, GoF Patterns, Creational Patterns, Structural Patterns, Behavioral Patterns, Software Architectural patterns, The Observer Pattern, The Template Method Pattern , Factory Patterns: Factory Method and Abstract Factory , The Singleton Pattern , The Iterator Pattern , The Composite Pattern , The Facade Pattern , The State and Strategy patterns , Command Pattern , The Adapter Pattern , The Proxy Pattern , The Decorator Pattern, The Visitor Pattern , AntiPatterns, Patterns for Assigning Responsibilities: GRASP Patterns [15]

Unit-4: Domain modeling, assigning responsibility using sequence diagrams, mapping design to code, CASE tools, Unit, Cluster and System-level testing of Object-oriented programs, Aspect-oriented and Service-oriented software. [5]

Recommended Text and Reference Books

1. Grady Booch, James Rumbaugh, Ivar Jacobson ,"The Unified Modeling Language User Guide", Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, "UML 2 Toolkit", WILEY-Dreamtech India Pvt. Ltd.
3. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson Education.
4. Pascal Roques, "Modeling Software Systems Using UML2", WILEY- Dreamtech India Pvt. Ltd
5. Atul Kahate, "Object Oriented Analysis & Design", The McGraw-Hill Companies.
6. John W. Satzinger, Robert B Jackson and Stephen D Burd, "Object-Oriented Analysis and Design with the Unified Process", Cengage Learning
7. Gamma, et. al., Design Patterns - Elements of Reusable Object-Oriented Software, , Addison-Wesley.(1994)
8. Craig Larman, Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development, Pearson Education. (1998)

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[Batch 2015 onwards]

BTCS-711A	Agile Software Development

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- **Awareness of basics of software engineering concepts and waterfall methodology**
- **Exposure to any object oriented programming language such as Java, C#.**

Course Objectives: This course offers a good understanding of Agile Software Development concepts and prepares the student to be in a position to use and design Software using Agile Technology.

Course Outcomes:
After undergoing this course students will be able to

1. Understand the background and driving forces for taking an Agile approach to software development.
2. Understand the business value of adopting Agile approaches and Agile development practices.
3. Drive development with unit tests using Test Driven Development.
4. Apply design principles and refactoring to achieve Agility.
5. Understand various Industry trends Deploy automated build tools, version control and continuous integration.

Unit-1: Fundamentals of Agile: The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools. [6]

Unit-2: Agile Scrum Framework: Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management. [8]

Unit-3: Agile Testing: The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester. [8]

Unit-4: Agile Software Design and Development: Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control. [10]

Unit-5: Industry Trends: Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies. [4]

Recommended Text and Reference Books

1. Agile Software Development with Scrum By Ken Schawber, Mike Beedle Publisher: Pearson.
2. Agile Software Development, Principles, Patterns and Practices By Robert C. Martin Publisher: Prentice Hall.
3. Agile Testing: A Practical Guide for Testers and Agile Teams By Lisa Crispin, Janet Gregory Publisher: Addison Wesley.
4. User Stories Applied: For Agile Software By Mike Cohn.
5. Agile Software Development: The Cooperative Game By Alistair Cockburn Publisher: Addison Wesley.

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[Batch 2015 onwards]

BTCS-712A	PARALLEL ARCHITECTURE AND COMPUTING

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- Computer Architecture.

Course Objectives: This course offers a good understanding of the various functional units of a computer system and prepares the student to be in a position to design a basic computer system.

Course Outcomes:

After undergoing this course students will be able to

1. To understand how computer hardware is evolved to meet the needs of Parallel processing systems.
2. To understand design principles and usages of pipelined processing
3. To understand parallelism both in terms of a single processor and multiprocessor.
4. To Implement and understand Importance of PRAM Model.
5. Design and understand various parallel algorithms.

COURSE CONTENTS:-

Unit-1 Introduction and Classification of Parallel Computer, Parallel processing terminology, Flynn's and Hndler's classifications, Amdahl's law. [4]

Unit-2 Pipelined and Vector Processors, Instruction pipelining, Reservation table, Data and control hazards and methods to remove them. [4]

Unit-3 SIMD or Array Processors Various interconnection networks, Data routing through various networks, Comparison of Various networks, Simulation of one networks another. [4]

Unit-4 MIMD and Multi-Processor Systems, Uniform and non-uniform memory access multi processors, Scheduling in multiprocessors systems, Load balancing in multi processors systems. [4]

Unit-5 PRAM model of Parallel Computing and Basic Algorithms, PRAM model and its variations, Relative powers of various PRAM models. [5]

Unit-6 Parallel Algorithms for Multi-Processor Systems Basic construction for representing PRAM algorithm, Parallel reduction algorithm, Parallel prefix computing, Parallel list ranking, Parallel merge, Brent's theorem and cost optimal algorithm, NC class of parallel algorithms.[6]

Unit-7 Parallel Algorithms for SIMD and Multi-Processor System, Introduction to parallel algorithms for SIMD and Multi-Processor System [4]

Recommended Text and Reference Books

1. K. Hwang and F.A. Briggs: computer Architecture and Parallel Processing, McGraw Hill New York 1984
2. Michael Quinn Parallel Computing Theory and Practice Mc Graw Hill International Edition, Computer Science Series, 2nd Edition 1994 Supplementary Reading.
3. S. G. Akl: Design and Analysis of Parallel algorithms Prentice Hall Edglewood Cliff NJ
4. S Lakshmivarahan and S. K. Dhall: Analysis and Design of Parallel Arithmetic-Arithmetic and Matrix Problems, McGraw Hill.
5. Kai Hwang: Advance Computer Architecture-Parallelism, Scalability and programmability, Mc Graw Hill International.

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[Batch 2015 onwards]

BTCS-713A	ETHICAL HACKING

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- Basics of Internet and Networking.

Course Objectives: The mission of this course is to educate, introduce and demonstrate hacking tools for penetration testing purposes only.

Course Outcomes:
After undergoing this course students will be able to

1. Introduction of Ethical hacking, issues and network scanning tools and techniques.
2. Gain knowledge of system hacking and various Malware threats.
3. Gain knowledge of various packet sniffing techniques, different types of DDoS attacks and Botnets.
4. Illustrate the concept of a Firewall and various evasion techniques.

Course Contents:
Unit-1 Ethical Hacking: Introduction to Ethical Hacking, Foot-printing and Reconnaissance, Network Scanning Techniques, Enumeration techniques and enumeration countermeasures.

Unit-2 System Hacking: Methodology, steganography, steganalysis attacks, and covering tracks.

Unit-3 Malware Threats: Working of viruses, virus analysis, computer worms, malware analysis procedure, and countermeasures, Different types of Trojans, Trojan analysis, and Trojan Countermeasures.

Unit-4 Packet Sniffing: Techniques and how to defend against sniffing, Social Engineering techniques, identify theft, and social engineering countermeasures.

Unit-5 DoS/DDoS attacks: Techniques, Botnets, DDoS attack tools, and countermeasures.

Unit-6 Hacking Webservers: Different types of webserver attacks, attack methodology, and Countermeasures, Hacking Web Applications, SQL Injection.

Unit-7 Evasion Techniques: Firewall, IDS and honeypot evasion techniques, evasion tools, and countermeasures.

Recommended Text and Reference Books

1. Ethical Hacking For Beginners - Practical Approach by Toshendra Sharma
2. Learning Ethical Hacking from Scratch by Zaid Sabih
3. The complete Ethical hacking course by Ermin Kreponic

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[Batch 2015 onwards]

BTCS-714A	SOFT COMPUTING

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

PREREQUISITES:- NIL

COURSE OBJECTIVES: - The course offers understanding of concepts and techniques of various soft computing frameworks. It aims to prepare the students to be in position to develop and design the applications in area of machine intelligence.

Course Outcomes:

Upon completion of the course, the student should be able to:

1. Comprehend techniques and applications of Soft Computing in real world problems
2. Know the concepts of fuzzy logic and inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
3. Understand the fundamental theory and concepts of neural networks, its various learning/training algorithms, several neural network paradigms and its applications.
4. Understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.
5. Integrate the various soft computing techniques.

COURSE CONTENTS:

Unit-1 Introduction to Computing: Evolution of Computing, Soft Computing Constituents: From Conventional AI to Computational Intelligence, soft computing vs. hard computing, Machine Learning Basics.

Unit-2 Fuzzy Logic: Crisp set and Fuzzy set, Basic concepts of fuzzy sets, membership functions, Basic operations on fuzzy sets, Properties of fuzzy sets, Fuzzy relations., fuzzy If-Then rules, fuzzy mapping rules and fuzzy implication functions, Applications.

Unit-3 Neural Networks: Basic concepts of neural networks, Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference b/w ANN and human brain, characteristic and applications of ANN, single layer network. Neural network architectures, Learning methods: Widrow & Hebb's learning rule/Delta rule, ADALINE, MADALINE, Architecture of a back propagation network, Applications.

Unit-4 Genetic Algorithms: Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modelling: selection operator, cross over, mutation operator, Stopping Condition and GA flow, Constraints in GA, Applications of GA, Classification of GA.

Unit-5 Hybrid Systems: Integration of neural networks, fuzzy logic and genetic algorithms.

REFERENCE BOOKS:

1. S.Rajasekaran & G.A. Vijayalakshmi Pai, 'Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications', 1st Edn.,PHI Publication, 2003.
2. S.N. Sivanandam& S.N. Deepa, 'Principles of Soft Computing', 2nd Edn., Wiley Publications, 2008.
3. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', 3rd Edn.,Wiley, 2011.
4. J.S.R.Jang, C.T.Sun and E.Mizutani, Neuro-Fuzzy and Soft Computing, PHI, 2004, Pearson Education (2004).

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[Batch 2015 onwards]

BTCS-715A	Business Intelligence

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- **Basic knowledge of RDBMS (relational database management system) concepts with hands-on exposure (includes design & implementation of table structures).**

Course Objectives: This course offers a good understanding of business intelligence domain and prepares the student to be in a position to use BI terminologies and framework and basics of data integration

Course Outcomes:

After undergoing this course students will be able to

1. Differentiate between Transaction Processing and Analytical applications and describe the need for Business Intelligence
2. Demonstrate understanding of technology and processes associated with Business Intelligence framework
3. Demonstrate understanding of Data Warehouse implementation methodology and project life cycle
4. Given a business scenario, identify the metrics, indicators and make recommendations to achieve the business goal
5. Design an enterprise dashboard that depicts the key performance indicators which helps in decision making
6. Demonstrate application of concepts in Microsoft BI suite

Unit 1: Introduction to Business Intelligence

Introduction to OLTP and OLAP, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities. [4]

Unit 2: Basics of Data Integration (Extraction Transformation Loading)

Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL using SSIS, Introduction to data quality, data profiling concepts and applications. [12]

Unit 3: Introduction to Multi-Dimensional Data Modelling**:** Introduction to data and dimension modelling, multidimensional data model, ER Modelling vs. multi-dimensional modelling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using SSAS. [6]

Unit 4: Basics of Enterprise Reporting

Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, introduction to SSRS Architecture, enterprise reporting using SSRS. [12]

Recommended Text and Reference Books

1. Business Intelligence by David Loshin.
2. Business intelligence for the enterprise by Mike Biere.
3. Business intelligence roadmap by Larissa Terpeluk Moss, Shaku Atre.
4. Successful Business Intelligence: Secrets to making Killer BI Applications by Cindi Howson.
5. Delivering business intelligence with Microsoft SQL server 2008 by Brain, Larson.
6. Foundations of SQL Server 2005 Business Intelligence by Lynn Langit
7. Information dashboard design by Stephen Few

Eighth Semester

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[Batch 2015 onwards]

BTCS-811A	Building Enterprise Applications

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Outcomes:

After undergoing this course students will be able to

1. Familiarize with concept of Enterprise Analysis and Business Modelling.
2. Understand requirements, validation, planning and estimation.
3. Design and document the application architecture.
4. Understand the importance of application framework and designing other application components. Perform Code review, Code analysis, build process.
5. Building Enterprise Applications, understand different testing involved with enterprise application and the process of rolling out an enterprise application.

Course Contents:

Unit-1 (6 hours)

Introduction to enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications.

Unit-2 (7 hours)

Inception of enterprise applications, enterprise analysis, business modelling, requirements elicitation, use case modelling, prototyping, non-functional requirements, requirements validation, planning and estimation.

Unit-3 (8 hours)

Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture - design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design.

Unit-4 (7 hours)

Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage.

Unit-5 (7 hours)

Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.

Recommended Text and Reference Books:

1. Anubhav Pradhan, Satheesha B. Nanjappa et. al., Raising Enterprise Applications, Wiley India.

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[Batch 2015 onwards]

BTCS-812A	SOFTWARE ARCHITECTURE

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- ***Write if Any**

Course Objectives: ---

Course Outcomes:

After undergoing this course students will be able to

1. To understand the need of Software architecture.
2. To understand various quality attributes of software.
3. To understand various Software Architectural Patterns.
4. To understand few Design Patterns.
5. To understand the design and documentation of software architecture.

Unit – 1

Introduction: The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a "good" architecture? What software architecture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.

Unit – 2

Architectural styles: Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures.

Unit – 3

Quality: Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles.

Unit – 4

Architectural patterns – 1: Introduction; from mud to structure: Layers, Pipes and Filters. Distributed Systems: Broker; Interactive Systems: MVC. Adaptable Systems: Microkernel.

Unit – 5

Some design patterns: Structural decomposition: Whole – Part; Organization of work: Master – Slave;

Unit – 6

Designing and documenting software architecture: Architecture in the life cycle; Designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; Choosing the relevant views; Documenting a view; Documentation across views.

Recommended Text and Reference Books

1. **Software Architecture in Practice -**Len Bass, Paul Clements, Rick Kazman, 2nd Edition, Pearson Education, 2003.
2. **Pattern-Oriented Software Architecture A System of Patterns, Volume-1** Frank Buschmann, Regine Meunier, Hans Rohnert, PeterSommerlad, Michael Stal, John Wiley and Sons, 2006.

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[Batch 2015 onwards]

BTCS-813A	SOFTWARE TESTING

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- Software Engineering

Course Objectives: The objective of this course is to impart understanding of techniques for software testing and quality assurance. To help students to develop skills that will enable them to construct software of high quality - software that is reliable, and that is reasonably easy to understand, modify and maintain**.**

Course Outcomes:

Upon completion of the course, the student should be able to:

1. Describe different approaches to testing software applications.
2. Design and implement the strategies of test cases generation
3. Understand the testing techniques for Object oriented Software.
4. Comprehend the testing techniques at different phases of SDLC and for software developed different environments/applications.
5. To understand the basics of software quality and learn various metrics of software quality.

Unit-1 Software Testing: Testing, Verification and Validation, Test Strategies for Conventional and Object Oriented Software, Unit Testing, Integration Testing, Validation Testing, Alpha and Beta Testing, System Testing, Recovery Testing, Security Testing, Stress Testing, Performance Testing, Metrics for Source Code, Metrics for Testing, Debugging Process, Debugging Strategies.

Unit-2 Testing Techniques: Software Testing Fundamentals, Black Box and White Box Testing, Basis Path Testing, Flow Graph Notation, Independent Program Paths, Graph Matrices, Control Structure Testing, Condition Testing, Data Flow Testing, Loop Testing, Graph Based Testing Methods, Equivalence Partitioning, Boundary Value Analysis.

Unit-3 Object Oriented Testing Methods: Applicability of Conventional Test Case Design Methods, Issues in Object Oriented Testing, Fault-Based Testing, Scenario-Based Testing, Random Testing and Partition Testing for Classes, InterClass Test Case Design.

Unit-4 Testing Process and Specialized Systems Testing: Test Plan Development, Requirement Phase, Design Phase and Program Phase Testing, Testing Client/Server Systems, Testing Web based Systems, Testing Off the-Shelf Software, Testing in Multiplatform Environment, Testing for Real Time Systems, Testing Security.

Unit-5 Software Quality Assurance Concepts and Standards: Quality Concepts, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Formal Technical Reviews, Review Guidelines, Software Reliability, Software Safety, Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126 Quality Factors, CMM, TQM, Six Sigma, SPICE, Software Quality Assurance Metrics.

Recommended Text and Reference Books

1. Aditya P Mathur: Foundations of Software Testing, Pearson Education, 2008.
2. Srinivasan Desikan, Gopalaswamy Ramesh: Software Testing Principles and Practices, 2nd Edition, Pearson Education, 2007.
3. Patton .R (2009).Software Testing, 2nd ed. Pearson Education.
4. J.S.R.Jang, C.T.Sun and E.Mizutani, Neuro-Fuzzy and Soft Computing, PHI, 2004, Pearson Education (2004).
5. Roger S Pressman, 'Software Engineering Concepts and Practices', 7th Edn., TMG, 2009.

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[Batch 2015 onwards]

BTCS-814A	INFORMATION THEORY

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- This course requires knowledge of Probability and Random Processes, Digital Communications.

Course Objectives: The aim of this subject is to introduce the concepts of information theory, Probabilistic (stochastic) systems and various coding theorems.

Course Outcomes:

After undergoing this course students will be able to

1. Introduce information theory, Probabilistic (stochastic) systems, reasoning under uncertainty, Quantifying information, State and discuss coding theorems.
2. Give an overview of coding theory and practice, Data compression.
3. Give an overview of Error-control coding, automatic learning and data mining.
4. Illustrate ideas with a large range of practical applications of these codes.

Course Contents:

Unit 1 Entropy, Relative Entropy, and Mutual Information: Entropy, Joint Entropy and Conditional Entropy, Relative Entropy and Mutual Information, Chain Rules, Data-Processing Inequality, Fano's Inequality.

Unit 2 Typical Sequences and Asymptotic Equipartition Property: Asymptotic Equipartition Property Theorem, Consequences of the AEP: Data Compression, High-Probability Sets and the Typical Set.

Unit 3 Source Coding and Data Compression: Kraft Inequality, Huffman Codes, Optimality of Huffman Codes.

Unit 4 Channel Capacity: Symmetric Channels, Properties of Channel Capacity, Jointly Typical Sequences, Channel Coding Theorem, Fano's Inequality and the Converse to the Coding Theorem.

Unit 5 Differential Entropy and Gaussian Channel: Differential Entropy, AEP for Continuous Random Variables, Properties of Differential Entropy, Relative Entropy, and Mutual Information, Coding Theorem for Gaussian Channels.

Unit 6 Linear Binary Block Codes: Introduction, Generator and Parity-Check Matrices, Repetition and Single-Parity-Check Codes, Binary Hamming Codes, Error Detection with Linear Block Codes, Weight Distribution and Minimum Hamming Distance of a Linear Block Code, Hard-decision and Soft-decision Decoding of Linear Block Codes, Cyclic Codes, Parameters of BCH and RS Codes, Interleaved and Concatenated Codes.

Unit 7 Convolutional Codes: Encoder Realizations and Classifications, Minimal Encoders, Trellis representation, MLSD and the Viterbi Algorithm, Bit-wise MAP Decoding and the BCJR Algorithm.

Recommended Text and Reference Books

1. Elements of Information Theory by Thomas Cover, Joy Thomas
2. Channel Codes: Classical and Modern by William Ryan, Shu Lin
3. Information Theory and Reliable Communication by Robert Gallager

Open Electives offered by CSE Department

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[Batch 2015 onwards]

BTCS-901A	Essentials of IT

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- No prerequisites are needed for enrolling into the Course.

Course Objectives: This course offers a good understanding and basic concepts of Information Technology and learn various Problem Solving Techniques**.**

Course Outcomes:
After undergoing this course students will be able to

1. Do Problem Solving using Programming and algorithms
2. Design and test simple programs in C language
3. Document artifacts using common quality standards
4. Design simple data store using RDBMS concepts and implement

Unit 1: Introduction to Computer Systems - Basics of computer systems - Various hardware components Data storage and various Memory units - Central Processing Unit - Execution cycle - Introduce to software and its classifications. Operating system concepts– Introduction – Memory management - Process management- Interposes Communication – Deadlocks - File management - Device management. [6]

Unit 2: Problem Solving Techniques - Introduction to problem solving - Computational problem and its classification - Logic and its types - Introduction to algorithms - Implementation of algorithms using flowchart - Flowcharts implementation through RAPTOR tool - Searching and sorting algorithms - Introduction and classification to Data Structures - Basic Data Structures - Advanced Data Structures. [6]

Unit 3: Programming Basics - Introduction to Programming Paradigms and Pseudo Code - Basic programming• concepts - Program Life Cycle - Control Structures - Introduction and Demonstration of 1-D Array and 2-D Array - Searching and Sorting techniques - Demonstration Concept of memory references in arrays –Strings - Compiler Concepts - Code Optimization techniques. [6]

Structured Programming – Functions – Structures - File Handling - Introduction to Software Development Life Cycle - Industry Coding Standards and Best Practices - Testing and Debugging - Code Review. [6]

Unit 4: Project Specification - Preparation of High level design and Detailed design document, Unit Test Plan and Integrated Test Plan - Coding and Unit Testing activities - Integration Testing . [8]

Unit 5:

- RDBMS- data processing – the database technology – data models.
- ER modeling concept –notations – Extended ER features.
- Logical database design – normalization.
- SQL – DDL statements – DML statements – DCL statements.
- Joins - Sub queries – Views.
- Database design Issues. [8]

Recommended Text and Reference Books

1. Andrew S. Tanenbaum , : Structured Computer Organization , PHI, 4th edition, 1999
2. John L. Hennessy, David Goldberg, David A. Patterson, Computer Architecture : A Quantitative Approach, 2nd Edition Published by Morgan Kaufman Publishers, 1996 .
3. Silberschatz and Galvin, Operating System Concepts, John Wiley & Sons, Sixth edition.
4. Andrew Tanenbaum, Modern Operating Systems, Pearson Education.
5. Milan Milenkovic, "Operating Systems: concepts and design", McGraw-Hill.
6. Charles Crowley, "Operating Systems: A Design-Oriented Approach".
7. Dromey, R.G., How to solve it by computers, Prentice Hall, 2005
8. Alfred V.Aho, Ullman, Hopcroft, Data Structures and Algorithms, Addison-wesely.
9. Lipschutz, Seymour & G A V Pai, Data Structures, Tata McGraw – Hill
10. Baldwin, Douglas & Scragg, Greg W., Algorithms and Data Structures The Science of Computing, Dreamtech
11. Kernighan., Ritchie, ANSI C Language, Prentice Hall of India, New Delhi, 1992.
12. Yashwant Kanitker, Let Us C, by Yashwant Kanitker, Second Edition
13. Schaum series, Programming in C, Third Edition
14. Programming Pearls , by Jon Bentley, Pearson Education publication
15. Aho, Alfred V,Compiler Principles, Techniques and Tools,Pearson Education
16. Tharp Alan L, File Organization and Processing, John Willey and Sons
17. Henry F Korth, Abraham Silberschatz, "Database system concepts", Second ed., McGraw-Hill International editions, Computer Science series, 1991
18. Elmasri, Navathe, "Fundamentals of Database Systems", Third ed, Addison Wesley
19. C.J.Date ,"An introduction to Database Systems", Sixth ed, Narosa Publications

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[Batch 2015 onwards]

BTCS-902A	IT TOOLS for Students

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- **Write if Any**

Course Objectives: Write if Any

Course Outcomes:

After undergoing this course students will be able to

1. To understand and practice various features of MS Word.
2. To understand and practice various features of MS Excel.
3. To understand and practice editing and protecting Documents using PDF.
4. To understand and practice MATLAB programming.
5. To understand the basics of connecting your PC to Internet

Unit-1: MS Word:

Getting start, Text Basics, Formatting Text, Using Find and Replace, Indents and Tabs, Line and Paragraph Spacing, Lists, Hyperlinks Page Layout, Page Breaks, Page Numbers, Columns, Header and Footers Picture and Text Wrapping, Format Pictures, Shapes, Tables Spell Check & Grammar, Track Changes and Comments, Protecting and sharing documents. Working with Templates.

Unit-2: MS Excel

Getting Start, Creating and Opening Workbooks

Cell Basics, Modify, Format Cells, Working with Multiple sheets, Page Layout and Printing

Basic Formula, Complex Formula, Relative and absolute cell reference, Freezing Panes and View options, Sort data, Filter data, Groups and Subtotal, Table and charts

Pivot Table, What if Analysis

Track Changes and Comments, Protecting Workbook.

Unit-3: Adobe Acrobat

Creating and Editing PDF, signing document, Protecting document.

Unit-4: MATLAB

Basics of MATLAB, Programming in MATLAB, Functions, Plots, Toolbox.

Unit-5: Connectivity to Internet

Concept of IP address, DHCP, static IP address, Enabling Security on Routers in SOHO Segment.

Recommended Text and Reference Books

1. Online E-books available on Office.support.com
2. An Introduction to Matlab by Krister Ahlersten

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BTCS-903A	DATA STRUCTURES

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- C++, OOPS.

Course Objectives: This course should provide the students with a fairly good concept of the fundamentals of different types of data structures and also the ways to implement them. Algorithm for solving problems like sorting, searching, insertion & deletion of data etc. related to data structures should also be discussed. After completion of this subject student should be able to choose an appropriate data structure for a particular problem.

Course Outcomes:

After undergoing this course students will be able to

1. Analyze Dynamic Memory Management Representation of various data structures.
2. Understand the concept of time and space complexity and analyze them for different algorithms and also the ability to estimate programming time using Big O notation. Design and employ approximate data structures for solving computing problems.
3. Ability to implement algorithms for the creation, insertion, deletion, searching and sorting of linear data structures.
4. Understand the concept of trees, graphs and heaps with their algorithms and analysis.
5. Implement searching and sorting algorithms in solving larger problems. Study of hashing techniques in detail.

Course Contents:

Unit-1 Dynamic Memory Management

Understanding pointers, usage of pointers, arithmetic on pointers, memory allocation, memory management functions and operators, debugging pointers-dangling pointers, memory leaks, etc. [2]

Unit-2 Introduction to Data Types

Concept of data type, definition and brief description of various data structures, data structures versus data types, operations on data structures, algorithm complexity, Big O notation. [4]

Unit-3 Arrays

Linear and multi-dimensional arrays and their representation, operations on arrays, sparse matrices and their storage. [5]

Unit-4 Linked List

Linear linked list, operations on linear linked list, doubly linked list, operations on doubly linked list, application of linked lists. [4]

Unit-5 Stacks

Sequential and linked representations, operations on stacks, application of stacks such as parenthesis checker, evaluation of post fix expressions, conversion from in fix to post fix representation, implementing recursive functions. [4]

Unit-6 Queues
Sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, linked representation of a queue and operations on it, deque, priority queue, applications of queues. [4]

Unit-7 Trees
Basic terminology, sequential and linked representations of trees, traversing a binary tree using recursive and non-recursive procedures, inserting a node, deleting a node, brief introduction to threaded binary trees, AVL trees and B-trees. [4]

Unit-8 Heaps
Representing a heap in memory, operations on heaps, and application of heap in implementing priority queue and heap sort algorithm. [3]

Unit-9 Graphs
Basic terminology, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth-first search and depth-first search), and applications of graphs. [3]

Recommended Text and Reference Books

1. SartajSahni, Data Structures, Algorithms and Applications in C++, Tata McGraw Hill.
2. Tenenbaum, Augenstein, &Langsam, Data Structures using C and C++, Prentice Hall of India.
3. R. S. Salaria, Data Structures & Algorithms Using C++, Khanna Book Publishing Co. (P) Ltd.
4. Seymour Lipschutz, Data Structures, Schaum's Outline Series, Tata McGraw Hill
5. Kruse, Data Structures & Program Design, Prentice Hall of India.
6. Michael T. Goodrich, Roberto Tamassia, & David Mount, Data Structures and Algorithms in C++ (Wiley India)

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BTCS-904A	OPERATING SYSTEM

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Prerequisites:

- Nil

Course Objectives: This course should provide the students with good understanding of Operating System including its architecture and all its components. Good conceptions on all the subjects like processes, inter-process communication, semaphore, message passing, classical IPC problems, scheduling, memory management, file systems, security and protection mechanism, I/O hardware and software, deadlocks, etc. should be provided.

Course Outcomes:

After undergoing this course students will be able to

1. Identify the role and design issues of Operating System. Study of microprocessor and distributed operating system.
2. Understanding CPU Scheduling, Synchronization, Deadlock Handling and Comparing CPU Scheduling Algorithms. Solve Deadlock Detection Problems.
3. Describe the role of paging, segmentation and virtual memory in operating systems. Generation of logical and physical addresses for problems related to memory management.
4. Defining I/O systems, Device Management Policies and Secondary Storage Structure and Evaluation of various Disk Scheduling Algorithms. File system architectures and issues related to file system and implementation.
5. Description of protection and security and also the Comparison of UNIX and Windows based OS.

Course Contents:

Unit-1 Introduction

Introduction to Operating system, Role of Operating System, Resource Manager, function of kernel and shell, operating system structures, views of operating system. [5]

Unit-2 Process management

CPU scheduling, Scheduling Algorithms, PCB, Process synchronization, Deadlocks, Prevention, Detection and Recovery. [5]

Unit-3 Memory Management

Overlays, Memory management policies, Fragmentation and its types, Partitioned memory managements, Paging, Segmentation, Need of Virtual memories, Page replacement Algorithms, Concept of Thrashing. [8]

Unit-4 Device Management

I/O system and secondary storage structure, Device management policies, Role of I/O traffic controller, scheduler. [5]

Unit-5 File Management

File System Architecture, Layered Architecture, Physical and Logical File Systems, Protection and Security. [5]

Unit-6 Brief study to multiprocessor and distributed operating systems.

[4]

Recommended Text and Reference Books

1. A Silberschatz and Peter B. Galvin, “Operating System Concepts" Addison Wesley Publishing Company.
2. Dhamdhere, ―Systems Programming & Operating Systems” Tata McGraw Hill.
3. Gary Nutt, “Operating Systems Concepts”, Pearson Education Ltd. 3 rd Edition.
4. Operating System by Madnick Donovan.
5. Operating System by Stallings.
6. Ida M.Flynn Understanding Operating Systems -, Cengage Learning.