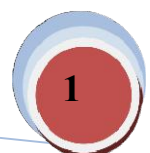# PUNJAB TECHNICAL UNIVERSITY

Scheme& Syllabus of
B. Tech. Information Technology [IT]

5th to 8th Semester for affecting Batch 2011
3rd to 8th Semester for affecting Batch 2012

By
Board of Studies Computer Science Engineering/ Information Technology

Third Semester   **Contact Hours: 30 Hrs.**

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTCS301	Computer Architecture	3	1	-	40	60	100	4
BTAM302	Mathematics –III	3	1	-	40	60	100	4
BTCS303	Digital Circuits & Logic Design	3	1	-	40	60	100	4
BTCS304	Data Structures	3	1	-	40	60	100	4
BTCS305	Object Oriented Programming using C++	3	1	-	40	60	100	4
BTCS306	Data Structures Lab	-	-	4	30	20	50	2
BTCS307	Institutional Practical Training#	-	-	-	60	40	100	1
BTCS308	Digital Circuits & Logic Design Lab	-	-	2	30	20	50	1
BTCS309	Object Oriented Programming using C++ Lab	-	-	4	30	20	50	2
	Total	15	5	10	350	400	750	26

The marks will be awarded on the basis of 04 weeks Institutional Practical training conducted after 2nd semester

Fourth Semester   **Contact Hours: 30 Hrs.**

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTCS401	Operating Systems	3	1	-	40	60	100	4
BTCS402	Discrete Structures	3	1	-	40	60	100	4
BTCS403	Computer Networks-I	3	1	-	40	60	100	4
BTCS404	Microprocessor& Assembly Language Programming	3	1	-	40	60	100	4
BTCS405	System Programming	3	1	-	40	60	100	4
BTCS406	Operating System Lab	-	-	2	30	20	50	1
BTCS407	Computer Networks-I Lab	-	-	4	30	20	50	2
BTCS408	Microprocessor& Assembly Language Programming Lab	-	-	2	30	20	50	1
BTCS409	System Programming Lab	-	-	2	30	20	50	1
General Fitness					100	-	100	-
	Total	15	5	10	420	380	800	25

Fifth Semester   **Contact Hours: 29 Hrs.**

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTIT501	System Analysis and Design	3	1	-	40	60	100	4
BTIT502	Programming in Java	3	1	-	40	60	100	4
BTIT503	Database Management Systems	3	1	-	40	60	100	4
BTCS501	Computer Networks –II	3	1	-	40	60	100	4
BTIT504	Cyber Laws and IPR	3	-	-	40	60	100	3
BTIT505	Database Management Systems Lab	-	-	4	30	20	50	2
BTIT506	Programming in Java Lab	-	-	4	30	20	50	2
BTCS507	Computer Networks –II Lab	-	-	2	30	20	50	1
BTIT507	Industrial Training	-	-	-	60	40	100	1
	Total	15	4	10	350	400	750	25

*The marks will be awarded on the basis of 06 weeks industrial training conducted after 4th semester

Sixth Semester   **Contact Hours: 29 Hrs.**

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTIT601	Network Programming	3	1	-	40	60	100	3
BTIT602	Information Security and Risk Management	3	-	-	40	60	100	4
BTIT603	Web Technologies	3	-	-	40	60	100	3
BTCS603	Software Engineering	3	1	-	40	60	100	4
BTXXX	Elective –I	3	1	-	40	60	100	4
BT***	Open Elective	3	1	-	40	60	100	4
BTIT604	Network Programming Lab	-	-	2	30	20	50	1
BTCS606	Software Engineering Lab	-	-	2	30	20	50	1
BTIT605	Web Technologies Lab	-	-	4	30	20	50	2
General Fitness					100	-	100	
Total		18	03	08	430	420	850	26

Seventh Semester / Eighth Semester   **Contact Hours: 22 Hrs.**

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTIT701	Building Enterprise Applications	3	-	-	40	60	100	3
BTIT702	Software Project Management	3	1	-	40	60	100	4
BTIT 703	Project	-	-	12	150	150	300	6
BTYYY	Elective –II	3	1	-	40	60	100	4
BTZZZ	Elective –III	3	1	-	40	60	100	4
BTIT704	Building Enterprise Applications Lab	-	-	2	30	20	50	1
General Fitness					100	-	100	
Total		15	03	04	370	380	750	22

Course Code	Course Name	Marks Distribution		Total Marks	Credits
		Internal	External		
BTIT801	Software Training	150	100	250	8
BTIT802	Industry Oriented Project Training	300	200	500	10
Total		450	300	750	18

Elective –I BT XXX

- BTIT 901 Storage Management
- BTIT 902 Multimedia Databases
- BTIT 903 Mobile Computing
- BTCS 904 Information Security
- BTCS 912 Cloud Computing

Elective –II BT YYY

- BTIT 904 Theory of Computation
- BTCS 906 Object Oriented Analysis and Design
- BTCS 908 Business Intelligence
- BTCS 909 Agile software Development
- BTCS 905 Software Testing and Quality Assurance

Elective –III BT ZZZ

- BTCS 913 Compiler Design
- BTIT 905 Modeling and Simulation
- BTIT 906 Advanced Java
- BTCS 910 Multimedia and Applications
- BTCS 916 Enterprise Resource Planning
- BTIT 907 Mobile Application Programming

Third Semester

BTCS 301 Computer Architecture

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.

1. Register Transfer and Microoperations: Register transfer language & operations, arithmetic microoperations, logic microoperations, shift microoperations, arithmetic logic shift unit. Design of a complete basic computer and its working. **[5]**

2. Basic Computer Organisation and Design: Instruction codes, Computer registers, Computer Instructions, Timing and control, Instruction Cycle, Memory reference instructions, Input/ Output and Interrupt, Design of basic Computer, Design of Accumulator Logic. **[6]**

3. Design of Control Unit: Control memory, design of control unit – microprogrammed, hardwired, and their comparative study. **[3]**

4. Central Processing Unit: General Register Organisation, Stack Organisation, Instruction formats, Addressing Modes, Data transfer and manipulations, Program control, RISC and CISC architecture. **[6]**

5. Input-Output Organisation: Peripheral devices, I/O Interface, asynchronous data transfer, modes of transfer, priority interrupt, DMA, I/O processor, serial communication. **[5]**

6. Memory Organisation: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware. **[6]**

7. Advanced concepts of Computer Architecture: Concept of pipeline, Arithmetic pipeline, Instruction , vector processors and array processors. Introduction to parallel processing, Interprocessor communication & synchronization. **[5]**

Suggested Readings/ 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**.**

BTAM302 Mathematics-III

Objective/s and Expected Outcome: To teach computer based Engineering Mathematics to students.

After this course the student will be able to solve complex computer oriented problems.

1. **Fourier series**: Periodic Functions, Euler's Formula. Even and odd Functions, Half range
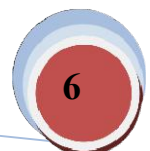
expansions, Fourier series of different waveforms. **[4]**

2. **Laplace transformations:** Laplace transforms of various standard functions, properties of Laplace transform **[4]**

3. **Partial Differential Equations:** Formation of Partial Differential Equations, linear Partial Differential Equations, Homogeneous Partial Differential Equations with constant coefficients. **[5]**

4. **Functions of complex variables:** Limits, continuity and derivatives of the function of complex variables, Analytic function, Cauchy- Riemann equations, conjugate functions. **[5]**

5. **Linear Systems and Eigen- Values:** Gauss – elimination method, gauss- Jordan method, Gauss-Seidel iteration method, Rayleigh's Power method for Eigen values and Eigenvectors. **[4]**

6. **Differential Equations:** Solutions of Initial values problems using Eulers, modified Eulers method and Runge- kutta (upto fourth order) methods. **[4]**

7. **Probability distribution:** Binomial, Poisson and Normal distribution. **[4]**

8. **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. **[5]**

Suggested Readings/ Books:

1. E. Kreyszig,**" Advanced Engineering Mathematics"**, 5th Edition, Wiley Enstern 1985.
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. Peter V.O'Neil,**" Advanced Engineering Mathematics"**, Cengage Learning

BTCS303 Digital Circuits & Logic Design

Objective/s and Expected outcome: 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.

1. **Number Systems:** Binary, Octal, Decimal, Hexadecimal. Number base conversions, 1's, 2's, rth's complements, signed Binary numbers. Binary Arithmetic, Binary codes: Weighted BCD, Gray code, Excess 3 code, ASCII – conversion from one code to another. **[5]**

2. **Boolean Algebra:** Boolean postulates and laws – De-Morgan's Theorem, Principle of

Duality, Boolean expression – Boolean function, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS), Minterm, Maxterm, Canonical forms, Conversion between canonical forms, Karnaugh map Minimization, Quine-McCluskey method - Don't care conditions. **[5]**

3. Logic GATES: AND, OR, NOT, NAND, NOR, Exclusive-OR and 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. **[5]**

4. Combinational Circuits: Design procedure – Adders, Subtractors, Serial adder/Subtractor, Parallel adder/ Subtractor Carry look ahead adder, BCD adder, Magnitude Comparator, Multiplexer/Demultiplexer, encoder/decoder, parity checker, code converters. Implementation of combinational logic using MUX. **[6]**

5. Sequential Circuits: Flip flops SR, JK, T, D and Master slave, Excitation table, Edge triggering, Level Triggering, Realization of one flip flop 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. **[4]**

6. 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). **[4]**

7. Signal Conversions: Analog & Digital signals. A/D and D/A conversion techniques (Weighted type, R-2R Ladder type, Counter Type, Dual Slope type, Successive Approximation type). **[5]**

Suggested Readings/ 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

Limited, New Delhi, 2003.

3. R.P.Jain, Modern **Digital Electronics**, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.

4. Thomas L. Floyd, **Digital Fundamentals**, Pearson Education, Inc, New Delhi, 2003

5. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, **Digital System -Principles and Applications**, Pearson Education.

6. Ghosal , **Digital Electronics,** Cengage Learning.

BTCS 304 Data Structures

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.

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]**

2. **Introduction:** 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.   **[2]**

3. **Arrays:** Linear and multi-dimensional arrays and their representation, operations on arrays, sparse matrices and their storage.   **[3]**

4. **Linked List:** Linear linked list, operations on linear linked list, doubly linked list, operations on doubly linked list, application of linked lists.   **[4]**

5. **Stacks:** Sequential and linked representations, operations on stacks, application of stacks such as parenthesis checker, evaluation of postfix expressions, conversion from infix to postfix representation, implementing recursive functions.   **[4]**

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]**

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]**

8. **Heaps:** Representing a heap in memory, operations on heaps, application of heap in implementing priority queue and heap sort algorithm.   **[2]**

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]**

10. **Hashing & Hash Tables:** Comparing direct address tables with hash tables, hash functions, concept of collision and its resolution using open addressing and separate chaining, double hashing, rehashing.   **[3]**

11. **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. **[5]**

Suggested Readings/ Books:
1. Sartaj Sahni, **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. R. S. Salaria, **Test Your Skills in Data Structures.**
7. Malik , **Data Structures using C++**, Cengage Learning.

BTCS 305 Object Oriented Programming Using C++

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

1. **Object-Oriented Programming Concepts:** Introduction, comparision between procedural programming paradigm and object-oriented proramming 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, data hiding, inheritance, overloading, polymorphism, messaging. **[2]**

2. **Standard Input/Output:** Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and memberv functions of i/o stream classes, formatting output, formatting using ios class functions and flags, formatting using manipulators. **[3]**

3. **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**. [4]**

4. **Pointers and Dynamic Memory Management:** Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and 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**. [5]**

5. **Constructors and Destructors:** Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initializer lists. **[2]**

6. **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. **[4]**

7. **Inheritance:** Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors. **[5]**

8. **Virtual functions & Polymorphism:** Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract clasess, virtual destructors. **[3]**

9. **Exception Handling:** Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions. **[2]**

10. **Templates and Generic Programming:** Template concepts, Function templates, class templates, illustrative examples. **[3]**

11. **Files:** File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files. **[3]**

Suggested Readings/ 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. Bjarne Stroustrup, **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. R. S. Salaria, **Test Your Skills in Object-Oriented Programming With C++**, Salaria Publishing House.
8. Farrell- **Object Oriented using C++,** Cengage Learning.

BTCS306 Data Structures Lab

List of practical exercises, to be implemented using object-oriented approach in C++ Language.

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.

BTCS 307 Institutional Practical Training

BTCS 308 Digital Circuits & Logic Design Lab

Implementation all experiments with help of Bread- Board.

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. Demultiplexer: 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.

BTCS 309 Object Oriented Programming Using C++ Lab

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.

Fourth Semester

BTCS 401 Operating Systems

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

1. Introduction to Operating system, Role of Operating System as resource manager, function of kernel and shell, operating system structures, views of an operating system. **[5]**

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

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]**

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

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

6. Brief study to multiprocessor and distributed operating systems.

Case Studies: LINUX / UNIX Operating System and Windows based operating systems.

Suggested Readings/ 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. 3rd Edition
4. **Operating System** by Madnick Donovan
5. **Operating System** by Stallings
6. Ida M.Flynn **Understanding Operating Systems** -, Cengage Learning

BTCS402 Discrete Structures

Objective/s:

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.

1. **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, partial order relations.   **[7]**

2. **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)   **[8]**

3. **Combinatorial Mathematics:** Basic counting principles Permutations and combinations Inclusion and Exclusion Principle Recurrence relations, Generating Function, Application.   **[7]**

4. **Monoids and Groups:** Groups Semigroups and monoids Cyclic semigraphs and submonoids, Subgroups and Cosets. Congruence relations on semigroups. Morphisms. Normal subgroups. Dihedral groups.   **[7]**

5. **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.

Suggested Readings/ 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

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BTCS403 Computer Networks–I

Objective/s and Expected Outcome: This course provides knowledge about computer network related hardware and software using a layered architecture.

1. **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.   [7]

2.   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.   **[6]**

3.   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.   **[6]**

4.   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.   **[6]**

5.   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   **[6]**

6.   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.   **[3]**

7.   Application Layer:

World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security   **[2]**

Suggested Readings/ Books:

1. Computer Networks, 4th Edition, Pearson Education by Andrew S. Tanenbaum
2. Data Communication & Networking, 4th Edition, Tata McGraw Hill. By Behrouz A. Forouzan.
3. Computer Networking, 3rd 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, 5th Edition, Cengage Learning by Greg Tomsho,
6. Handbook of Networking, Cengage Learning by Michael W. Graves.

BTCS404 Microprocessors and Assembly Language Programming

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

1. **Introduction:** Introduction to Microprocessors, history, classification, recent microprocessors.　　**[5]**

2. **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.　　**[8]**

3. **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.　　**[6]**

4. **Instruction set & Assembly Languages Programming:** Introduction, instruction & data formats, addressing modes, status flags, 8085 instructions, Data transfer operations, Arithmetic operations, Logical operations, Branch operations.　　**[7]**

5. **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 micro computers.　　**[8]**

6. **Basic architecture of higher order microprocessors:** Basic introduction to 8086 family, Motorola 68000, Pentium processors.　　**[5]**

Suggested Readings/ 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

BTCS 405 System Programming

Objective/s and Expected Outcome: This course provides knowledge to design various

system programs.

1. **Introduction:** Introduction to system programming and different types of system programs – editors, assemblers, macro-processors, compilers, linkers, loader, debuggers. **[2]**

2. **Assemblers:** Description of single pass and two pass assemblers, use of data structures like OPTAB and SYMTAB, etc. **[9]**

3. **Macroprocessors:** Description of macros, macro expansion, conditional and recursive macro expansion. **[5]**

4. **Compilers:** Various phases of compiler – lexical, syntax and semantic analysis, intermediate code generation, code optimization techniques, code generation, Case study : LEX and YACC. **[9]**

5. **Linkers and Loaders:** Concept of linking, different linking schemes, concept of loading and various loading schemes. **[5]**

6. **Editors:** Line editor, full screen editor and multi window editor, Case study MS-Word, DOS Editor and vi editor. **[4]**

7. **Debuggers:** Description of various debugging techniques. **[2]**

Suggested Readings/ 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.

BTCS 406 Operating System Lab

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.

BTCS 407 Computer Networks-I Lab

1. To study various topologies for establishing computer networks.

2. To learn the usage of various basic tools (crimping, krone etc.) used in establishing a LAN.

3. To familiarize with switch and hub used in networks

4. To learn the usage of connecters and cables (cabling standards) used in networks

5. To make certain copper and fiber patch cords using different standards.

6. To familiarize with routers & bridges

7. Use commands like ping, ipconfig for trouble shooting network related problems.

8. Develop a program to compute the Hamming Distance between any two code words.

9. Develop a program to compute checksum for an 'm' bit frame using a generator polynomial.

BTCS408 Microprocessor and Assembly Language Programming Lab

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.

BTCS 409 System Programming Lab

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

BTIT501 System Analysis and Design

OBJECTIVES:

The course has been designed to provide a solid foundation of systems principles and an understanding of how business function, while heightening students to the issues analysts face daily.

1.   **Introduction**

System definition and concepts: Characteristics and types of system, Manual and automated systems (2)

Real-life Business sub-systems: Production, Marketing, Personal, Material, Finance

Systems models types of models: Systems environment and boundaries, Real- time and distributed systems, Basic principles of successful systems

2. Systems analyst

Role and need of systems analyst , Qualifications and responsibilities ,Systems Analyst as and agent of change, (1)

3. System Development cycle

Introduction to systems development life cycle (SDLC): Various phases of development: Analysis, Design, Development, Implementation, Maintenance (3)

Systems documentation considerations: Principles of systems documentation, Types of documentation and their importance, Enforcing documentation discipline in an organization.

4. System Planning

Data and fact gathering techniques: Interviews, Group communication, Presentations, Site visits. Feasibility study and its importance Types of feasibility reports, System Selection plan and proposal Prototyping (5)

Cost-Benefit and analysis: Tools and techniques

5. Systems Design and modeling

Process modeling,   Logical and physical design, Design representation, Systems

flowcharts and structured charts , Data flow diagrams , Common diagramming conventions and guidelines using DFD and ERD diagrams. Data Modeling and systems analysis , Designing the internals: Program and Process design, Designing Distributed Systems .(8)

6. Input and Output

Classification of forms: Input/output forms design, User-interface design, Graphical interfaces. (2)

7. Modular and structured design

Module specifications, Module coupling and cohesion, Top-down and bottom-up design.(5)

8. System Implementation and Maintenance

Planning considerations, Conversion methods, producers and controls, System acceptance Criteria, System evaluation and performance, Testing and validation, Systems qualify Control and assurance, Maintenance activities and issues. (2)

9. System Audit and Security

Computer system as an expensive resource: Data and Strong media Procedures and norms for utilization of computer equipment, Audit of computer system usage, Audit trails,

Types of threats to computer system and control measures: Threat to computer system and control measures, Disaster recovery and contingency planning (2)

10. Object Oriented Analysis and design

Introduction to Object Oriented Analysis and design life cycle, object modeling: Class Diagrams, Dynamic modeling: state diagram, Dynamic modeling: sequence diagramming.(6)

11. **Case study of the following systems**

(I) Inventory Control (II) Railway Reservation System (III) University Management System (IV) Hospital management System (5)

Suggested Readings/Books

1. System analysis and design - Elias M.Awad.
2. System analysis and design –Perry Edwards
3. Analysis and design of information systems – James A.Senn

BTIT502 Programming in Java

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

Overview of Java: Object oriented programming, Two paradigms, abstraction, the three OOP principles, Java class libraries
Date types, Variables and Arrays: Integers, floating-point types, characters, Boolean, Iterates, Variable, Data types and casting, automatic type promotion in expressions, arrays.

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.

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

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

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.

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.

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.

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.

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

Suggested Readings/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, McGraw-Hill

5.   Khalid A. Mughal, Torill Hamre, Rolf W. Rasmussen, Java Actually, Cengage Learning.

6.   Shirish Chavan, Java for Beginners, 2nd Edition, Shroff Publishers.

BTIT503 Database Management Systems

Objective: The objective of the course is to offer good understanding of database design, modeling and implementation of database management systems.

Introduction - Database Systems versus File Systems, View of Data, Data Models, database languages, Database Users and Administrators. Transaction Management, Decision Support Systems, Components of a Database management System. Distributed Processing and Client- Server Architecture. Entity-Relationship Model – Basic Concepts, Constraints, Keys, Design Issues, E-R Diagrams.

Relational Model - Structures of relational databases, Integrity Constraints, Logical database Design, Tables, Views, Data Dictionary. Relational Algebra, Relational Calculus. SQL – Basic Structures, Query Handling, Embedded SQL, Open Database Connectivity (ODBC), Java Database Connectivity (JDBC), Triggers, Security and Authorization. Query By Example (QBE), User Interfaces and Tools, Forms and Graphical User Interfaces. Report Generators. Overview of Relational Query Optimization.

Relational Database Design - Functional Dependencies, Multi-valued Dependencies, Normal Forms, Decomposition into Normalized Relations, Physical Database Design – File Structures. Object-Relational Databases – Nested Relations, Complex Data types, Object-Relational Features in SQL:1999.

Internet Databases - World Wide Web, Client Side Scripting and Applets, Web Servers and Sessions, Services, Server Side Scripting. XML – Structure of XML Data, XML Document Schema, XQuery, Storage of XML Data, XML Applications.

Advanced Topics - Fundamental Concepts of Transaction Management, Concurrency Control, Recovery Systems, Data Analysis and OLAP. Introduction to Data Mining, Data Farming, Data Warehousing, Spatial and Geographic Databases, Temporal databases and Multimedia Databases. NoSQL databases

Suggested Books:

1. Database Systems Concepts – Korth et. Al.

2. An Introduction to Database Design – Date

3. Fundamentals of Database Systems – Elmasri and Navathe

4. Database Management and Design – Hansen and Hansen

5. Object-Oriented Database Design – Harrington

Book to added by Neeraj Garg

BTCS501 Computer Networks -II

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 Contents:

1. **Network Security**: Fundamentals of network security, Basics of IPv6, IPsec: overview of IPsec, IP and IPv6, Authentication header (AH), Encapsulating Security Payload (ESP). [6]

2. **Internet Key Exchange (IKE):** History, Photuris, Simple Key-management for Internet protocols (SKIP), IKE phases, IKE encoding. [6]

3. **Adhoc networks**: Features, advantages and applications, Adhoc versus Cellular networks, Network architecture, Protocols: MAC protocols, Routing protocols, Technologies. [6]

4. **Wireless Communication Systems**: Evolution, examples of wireless communication systems, 2G Cellular networks, Evolution for 2.5G TDMA Standards, IS-95B for 2.5G CDMA. [6]

5. **3G wireless networks**: wireless local loop (WLL), Local Multipoint Distribution System (LMDS), Wireless local Area Networks (WLANs), Bluetooth and Personal Area Networks. [6]

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

Suggested Readings/Books:

1. Theodore S. Rappaport, Wireless Communication: Principles and Practices (2[nd]Edition), Pearson Education.

2. Charlie Kaufman, Radio Perlman, Mike Speciner, Neywork security, 2nd ed., PHI.

3. Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri, Wireless and mobile networks: concepts and protocols, Wiley India.

4. Michael A. Gallo & William M. Hancock, "Computer Communications and Networking Technologies", Cengage Learning / Thomson Brooks / Cole

5. S. Keshav, "An Engineering Approach to Computer Networking", Pearson Education.

    Mayank Dave, "Computer Networks", Cengage Learning

BTIT504 Cyber Laws and IPR

Basics of Computer & Internet Technology

[8]

Internet, ISP & domain name; Network Security; Encryption Techniques and

Algorithms; Digital Signatures

Introduction to Cyber World

[2]

Introduction to Cyberspace and Cyber Law; Different Components of cyber Laws; Cyber Law and Netizens.

E-Commerce

[7]

Introduction to E-Commerce; Different E-Commerce Models; E-Commerce Trends and Prospects; E-Commerce and Taxation; Legal Aspects of E-Commerce.

Intellectual Property Rights

[12]

IPR Regime in the Digital Society; Copyright and Patents; International Treaties and Conventions; Business Software Patents; Domain Name Disputes and Resolution.

IT ACT 2000

[12]

Aims and Objectives; Overview of the Act; Jurisdiction; Role of Certifying Authority; Regulators under IT Act; Cyber Crimes-Offences and Contraventions; Grey Areas of IT Act.

Project Work: Candidates will be required to work on a project. At the end of the course students will make a presentation and submit the project report.

Suggested Readings/Books

1.   Nandan Kamath, A Guide to Cyber Laws & IT Act 2000 with Rules & Notification
2.   Keith Merill & Deepti Chopra (IK Inter.), Cyber Cops, Cyber Criminals & Internet
3.   Diane Row Land, Information Technology Law

4.   Vakul Sharma (Mc Millian), Handbook of Cyber Laws

BTIT505 Database Management Systems Lab

1. Introduction to SQL and installation of a database product

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. Set Operators, Nested Queries, Joins, Sequences.

5. Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.

6. PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.

7. Stored Procedures and Exception Handling.

8. Triggers and Cursor Management in PL/SQL.

9. Working with XML databases

10. Introduction to a data mining tool

BTIT506 Programming in Java Lab

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.

BTCS 507 Computer Networks – II LAB

1.   To configure the IP address for a computer connected to LAN and to configure network parameters of a web browser for the same computer.

2.   To plan IPv6 address scheme for a local area network comprising of 'n' terminals.

3.   To develop programs for implementing / simulating routing algorithms for Adhoc networks.

4.   To install any one open source packet capture software like wireshark etc.

5.   To configure Wireless Local Loop.

6.   To plan Personal Area Network.

7.   To configure WLAN.

8.   To configure Adhoc networks.

9.   To install and configure wireless access points.

BTIT 507 Industrial Training

Sixth Semester

BTIT601 Network Programming

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

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.

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.

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.

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.

Suggested Readings/ 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

BTIT602 Information Security and Risk Management

1. Essentials of Information Security, Security Threats – Intruders, Viruses, Worms, and other Threats, Vulnerabilities, Cyber Crime and Hacker, Security Assessment, Analysis and Assurance, Role of Cryptography, The Data encryption Standard (DES), Analyzing and Strengthening of DES, Introduction to Advance Encryption Standard (AES)

2. Concept and Characteristics of Public Key Encryption system, Introduction to Merkle-Hellman Knapsacks, Rivets – Shamir-Adlman (RSA) Encryption. Hash Algorithms, Message Digest Algorithms such as MD4 and MD5, Secure Hash Algorithms such as SH1 and SHA2.Digital Signature Standard.

3. Network Security Issues such as Impersonation, Message Confidentiality, Message Integrity, Code Integrity, Denial of Service, Firewalls, DMZs, Virtual Private Networks. Web Security, Email Security, Pretty Good Privacy

4. Risk Management and Security planning –Risk management Process Overview and Life Cycle Activities, Information Security Life Cycle, Risk Analysis, Cost Benefit Analysis, Risk Assessment Process, Methodology, Threat assessment, Modes of risk analysis – Effective Risk analysis, Risk Mitigation, Qualitative Risk Analysis, Value Analysis, Case Study of IT Organization

Suggested Readings/ Books:

1. Principles of Cryptography, William Stallings, Pearson Education
2. Cryptography & Network Security, Atul Kahate, TMH
3. Matt Bishop, " Computer Security Art and Science", Pearson/PHI, 2002.
4. Thomas R Peltier, Information Security Risk Analysis.CRC Press,2001

BTIT603 Web Technologies

Internet and World Wide Web: Introduction, Internet Addressing, ISP, types of Internet Connections, Introduction to WWW, WEB Browsers, WEB Servers, URLs, HTTP, WEB Applications, Tools for web site creation.

HTML5: Introduction to HTML5, Lists, adding graphics to HTML5 page, creating tables, linking documents, forms, frames, Cascading Style sheets.

Java Script: Introduction, programming constructs: variables, operators and expressions, conditional checking, functions and dialog boxes, JavaScript DOM, creating forms, introduction to Cookies, Jquery.

AJAX: Introduction, HTTP Request, XMLHttpRequest, AJAX Server Script.

PHP: Introduction, syntax, statements, operators, PHP and MySQL, PHP and AJAX.

Introduction to ASP.net, J2EE, POJO, Java servlets and JSP.

Suggested Readings/Books

1. Deitel, Deitel, Nieto, Lin and Sadhu, XML How to Program, Pearson Education.

2. Ivan Bayross, Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl CGI, BPB.

3. Steven M. Schafer, HTML, CSS, JavaScript, Perl, Python and PHP, Wiley India Textbooks.

4. Paul S. Wang, G. Keller, S. Katila, An Introduction to Web Design + Programming, Cengage Learning.

5. Jeffery C. Jackson, Web Technologies: A Computer Science Perspective, Pearson Education.

6. Stephen Walhter, Kevin Hoffman, Nate Dudek, ASP.NET 4 Unleashed, Pearson Education.

7. James Keogh, ASP.NET 2.0 Demystified, McGraw-Hill.

8. Scott Mitchell, Sams Teach Yourself ASP.NET 4 in 24 Hours, SAMS, Pearson Education.

9. Robin Nixon, Learning PHP, MySQL, and JavaScript, Shroff/O'Reilly.

BTCS603 Software Engineering

B.Tech CSE Batch 2011

BTIT604 Network Programming Lab

1. To study and implement various network commands like telnet, ftp, etc.

2. To study various system calls.

3. Programs related to interprocess communication

4. Programs related to message queues

5. Programs related to pipes

6. Programs related to file handling

7. Programs related to process control

8. Programs using Socket Programming

BTCS 606 Software Engineering Lab

B.Tech CSE Batch 2011

BTIT605 Web Technologies Lab

1. Creation of Web pages using HTML, DHTML.
2. Creation of Web pages using JavaScript.
3. Creation of Web pages using AJAX.
4. Creating web pages using PHP.
5. Creating Web pages using ASP.

Seventh/Eighth Semester

BTIT701 Building Enterprise Applications

Unit I: 3 Hrs
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 II: 6 Hrs
Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation

Unit III: 12 Hrs
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 IV: 9 Hrs
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 V: 6 Hrs
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.

Suggested Books:

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

BTIT702 Software Project Management

Objective- Software development is a complex process involving such activities as domain analysis, requirements specification, communication with the customers and end-users, designing and producing different artifacts, adopting new paradigms and technologies, evaluating and testing software products, installing and maintaining the application at the end-user's site, providing customer support, organizing end-user's training, envisioning potential upgrades and negotiating about them with the customers, and many more. The proposed subject will take students through the various processes involved in project management.

Pre-requisite knowledge- The basic understanding of concepts of Software engineering, computer networks and Database concepts.

Unit-1

Project Management Fundamentals- Basic Definitions, Project Stakeholders and Organizational, Influences on Project Management, Project Management Processes, Project Initiating Processes

Unit-2

Planning and Resourcing a Project - Identifying Requirements, Creating the Work Breakdown structure, Developing the Project Schedule, Developing a Project Cost Estimate, Planning Quality, Organizing the Project Team, Planning for Potential Risks

Unit-3

Executing and Managing a Project -

Project Executing Processes- Acquiring and Developing the Project Team, Managing the Project Team, Managing Stakeholder Expectations, Directing and Managing the Project while assuring Quality

Unit - 4

Project Monitoring and Controlling Processes - Verifying and Controlling Scope, Managing Schedule and Cost, Controlling Quality, Monitoring and Controlling Risks

Unit-5

Integrated Change Control, Project Closing Process - Closing a Project

Text Books:

1. Software Engineering - Somerville (Addison Wesley) .

2. Software Engineering-Pressmen.

Suggested Tools – Rational Team Concert, MS Project

BTIT 704 Building Enterprise Applications Lab

Case Study: Students should work on one case study related to any enterprise **(for Ex: -** manufacturing. IT **industry. etc.) to** implement (and learn **to** use **the tools to accomplish this** task) **the** following (illustrative **only)**

Note: *At the end of finishing each milestone of the case study, the student* will *write a report mentioning the conclusion drawn from that section, recommendations /or the improvement and any missing links in the enterprise software.*

• Development **of** Software Requirement Specification (SRS) document **to**

  • Understand or analyze **a given business scenario** and document the **use** case diagrams for the **given scenario** (use tools **like MOOSE.** smartdraw. visio **etc.)**
  • Identify **the functional** and **non-functional** requirements **for the given scenario** and **document it in the given template**

• **Establishment of** architecture **of enterprise which**

  • **Identifies different modules required in the given enterprise application**
  • **Create a logical** architecture **of** databases **for the** given **business scenario documented in the use case diagrams**
  • **Determination of UI tool** that **best suits given applications**
  • **Determination of** infrastructure (networking. internetworking. software, hardware, **middleware,** etc.) **required for the given scenario**

• **Development of a comprehensive plan** for **the enterprise application (refer to the Unit IV ofBTIT-701)**

• Create **test** cases (subset) as per the **given template**

. Perform the manual and automated testing on the any code base using any testing tools (such as rational **rose.** QTP etc.)

BTIT 901 Storage Management (Elective-I)

Prerequisites: To understand the content and successfully complete this course, a participant must have a basic understanding of computer architecture, operating systems, networking, and databases.

Objective: Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS. Define backup, recovery, disaster recovery, business continuity, and replication. Understand logical and physical components of a storage infrastructure. Identify components of managing and monitoring the data center. Define information security and identify different storage technologies.

Introduction to Information Storage Technology: Review data creation and the amount of Data being created and understand the value of data to a business, Challenges in Data Storage And Management, Data Storage Infrastructure. Identify Data Centre infrastructure elements and their requirements. Detail disk drive architecture and performance.

Data protection: Concept of RAID and its Components Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Comparison of Levels.

Intelligent Storage Systems: Intelligent Storage System (ISS) and its components. Implementation of ISS as high-end and midrange storage arrays.

Introduction to Networked Storage: Evolution of networked storage, Architecture, overview of FC-SAN, NAS, and IP-SAN. Network-Attached Storage (NAS): Benefits of NAS, NAS components, Implementations, File Sharing, I/O operations, Performance and availability.

Content Addressed Storage (CAS): features and Benefits of a CAS. CAS Architecture, Storage and Retrieval, Examples.

Disaster Recovery: Backup, Methods, And Technologies, Replication technologies: Local replicas, Technologies, Restore and Restart, Multiple Replicas and Remote Replication.

Storage and Security Management: Introduction Security, Identity management, Single sign-on, Access Management, Basics of network security, LDAP fundamentals, Intrusion detection, firewall, security information management. Introduction to Storage, Backup & Restore, Archive & Retrieve, Space Management, SAN & NAS, Disaster Recovery, Hierarchical space management, Database & Application protection, Bare machine recovery, Data retention.

Suggested Readings/ Books:

1. EMC Educational Services, .Information Storage and Management, Wiley India.
2. Richard Barker and Paul Massiglia, Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs, Wiley India.

3. Robert Spalding, .Storage Networks: The Complete Reference., Tata McGraw Hill Osborne, 2003.
4. Marc Farley, .Building Storage Networks., Tata McGraw Hill, Osborne, 2001.
   Suggested Tools : Tivoli Storage Manager

BTIT 902 Multimedia Databases

Introduction : An introduction to Object-oriented Databases; Multidimensional Data Structures: k-d Trees, Point Quadtrees, The MX-Quadtree, R-Trees, comparison of Different Data Structures

Image Databases : Raw Images, Compressed Image Representations, Image Processing: Segmentation, Similarity-Based Retrieval, Alternative Image DB Paradigms, Representing Image DBs with Relations, Representing Image DBs with R-Trees, Retrieving Images By Spatial Layout, Implementations

Text/Document Databases : Precision and Recall, Stop Lists, Word Stems, and Frequency Tables, Latent Semantic Indexing, TV-Trees, Other Retrieval Techniques

Video Databases : Organizing Content of a Single Video, Querying Content of Video Libraries, Video Segmentation, video Standards

Audio Databases: A General Model of Audio Data, Capturing Audio Content through Discrete Transformation, Indexing Audio Data. Multimedia Databases : Design and Architecture of a Multimedia Database, Organizing Multimedia Data Based on The Principle of Uniformity, Media Abstractions, Query Languages for Retrieving Multimedia Data, Indexing SMDSs with Enhanced Inverted Indices, Query Relaxation/Expansion

Creating Distributed Multimedia Presentations : Objects in Multimedia Presentations, Specifying Multimedia Documents with Temporal Constraints, Efficient Solution of Temporal Presentation Constraints, Spatial Constraints.

Spatial Concepts and Data Models: Models of spatial information, Design extending the ER model with spatial concepts, Extending the ER model pictograms, Object oriented data model with UML.

Spatial Query Languages: Extending the SQL for spatial data, Examples of queries that emphasis spatial data, Object relational schema examples queries.

Suggested Readings/ Books:

1. Principles of Multimedia Database Systems, V.S. Subrahmanian, Elseveir(Morgan Kauffman).
2. Spatial Databases, Shashi Shekhar, Sanjiv Chawla, Pearson Education.
3. Multimedia Databases: An object relational approach, Lynne Dunckley, Pearson Education.
4. Multimedia Database Systems, Prabhakaram, Springer
5.

BTIT 903 Mobile Computing

Unit – I

Introduction, issues in mobile computing, Wireless telephony: cellular
concept, GSM: air-interface, channel structure, location management: HLR-VLR,
hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS, Wireless LAN
Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over
wireless, Wireless applications, Mobile IP, WAP: Architecture, protocol stack, applications.

Unit – II

Data management issues, data replication for mobile computers, adaptive clustering for
mobile wireless networks, File system, Disconnected operations, Mobile Agents computing,
security and fault tolerance, transaction processing in mobile computing environment.

UNIT- III.

Introduction to Mobile operating system, Operating system structure, Constraints and
Restrictions, Hardware configuration with mobile operating system, Features: Multitasking
Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface,
Protection and Security, Multimedia features, Introduction to Mobile development IDE's ,
Introduction to Worklight basics, Optimization, pages and fragments, Client technologies, Client
side debugging, Creating adapters, Invoking adapters from Worklight Client application,
Common Controls, Using Java in adapters, Programming exercise with Skins, Understanding
Apache Cordova, Offline access, Encrypted cache deprecated, Using JSONStore

Unit - IV

Introduction to architecture ,memory management, communication protocol, application
development, deployment on Apple iOS, Android, Windows phone Applications using
development platforms e.g. WorkLight, Kendo, Appcon, Xcode, Xpages

Understanding and implementing Shell Development, Creating Java ME application, Exploring
the Worklight Server, Understanding device analytics, Working with UI frameworks,
Authentication, Push notification, SMS Notifications, Globalization, WebView overlay ,
Creating Authentication application: development for Apple iOS by using a login module

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

REFERENCES : 1. Reza Behravanfar, "Mobile Computing Principles: Designing and
Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge
University Press, October 2004, 2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden ,
Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379,
McGraw-Hill Professional, 2005. 3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile

Computing", Springer, second edition, 2003. 4. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003.

1. PhoneGap Essentials: Building Cross-Platform Mobile Apps -- By John M. Wargo
2. Pro iOS Geo: Building Apps with Location Based Services -- By Giacomo Andreucci
3. Mobile Device Management: - by Michael Johnson
4. Mobile Device Security – by Stephen Fried..
5. Jeff McWherter, Scott Gowell "Professional Mobile Application Development", John Wiley & Sons, 2012.
6. Jennifer Kyrnin, "Sams Teach Yourself HTML5 Mobile Application Development in 24 Hours", Sams Publishing, 2011.
7. Damon Oehlman, Sébastien Blanc, "Pro Android Web Apps: Develop for Android using HTML5, CSS3 & JavaScript", Apress, 2011.
8. Burd, "Android Application Development All-in-One For Dummies", John Wiley & Sons, 2011.
9. Henry Lee, Eugene Chuvyrov, "Beginning Windows Phone App Development", Apress, 2012.
10. Neal Goldstein, Tony Bove, "iPhone Application Development All-In-One For Dummies", John Wiley & Sons, 201

Web Resources-

1. http://www-01.ibm.com/software/mobile-solutions/worklight/

2. https://www.ibm.com/developerworks/mobile/worklight/getting-started/

3. http://pic.dhe.ibm.com/infocenter/wrklight/v5r0m5/index.jsp

Suggested Tools: Sencha , Worklight, Apache Flex, Appceletor, CNETiPhone , iUI, Kendo, Appcon, Xcode, Xpages

BTCS 904 Information Security (Elective-I)

B.Tech CSE Batch 2011

BTCS912 Cloud Computing
B.Tech CSE Batch 2011

Elective II
BTIT904 Theory of Computation

B. Tech CSE Batch 2011 (BTCS702)

BTCS906 Object Oriented Analysis and Design (Elective–II)

B.Tech CSE Batch 2011

BTCS908 Business Intelligence (Elective II)

B.Tech CSE Batch 2011

BTCS909 Agile Software Development (Elective II)

B.Tech CSE Batch 2011

BTCS905 Software Testing and Quality Assurance (Elective–II)

B.Tech CSE Batch 2011

Elective III

BTCS913 Compiler Design (Elective III)

B.Tech CSE Batch 2011

BTIT905- Modeling and Simulation (Elective III)

Objectives: This course should provide the students with good understanding of various techniques of Simulation.

Introduction: What is modeling and simulation? Application areas, definition and types of system, model and simulation, introduction to discrete-event qand continuous simulation.

Simulation Methods: Discrete-event Simulation, Time advance Mechanisms, Components and organization of Discrete-event simulation, Flowchart of next-event time advance approach, Continuous Simulation, Monte Carlo Simulation.

Queueing Models: Single server queueing system, introduction to arrival and departure time, flowcharts for arrival and departure routine. Event graphs of queueing model. Determining the events and variables, Event graphs for inventory model.

Random Numbers: Introduction to Random Numbers, Importance of Random Numbers in Simulation, Mid-Square random number generator, Residue method, Arithmetic Congruential generator, Testing Numbers for Randomness, Chi-Square Test.

Distribution Functions: Stochastic activities, Discrete probability functions, Cumulative distribution function, Continuous probability functions. Generation of random numbers following binomial distribution, poisson distribution, continuous distribution, normal distribution, exponential distribution, uniform distribution.

Simulation Languages: Basic Introduction to Special Simulation Languages:-GPSS/ MATLAB/ Network Simulators.

 Suggested Readings/ Books:

1.   Averil M. Law and W. David Kelton, **"Simulation Modeling and Analysis"**, Tata Mc-Graw –Hill

2.   Jeoferry Gordan, **"System Simulation"**, Prentice-Hall of India.

3.   DS, Hira, **"System Simulation"**, S. Chand Publication.

4.   Stephen J. Chapman, **"MATLAB Programming for Engineers",** Thomson learning Inc.

5.   Jerry Banks, John S. Carson, Barry L. Nelson and David M. Nicol, **"Discrete-Event System**

        Simulation", Prentice-Hall of India.

6.   Rudra Pratap**," Getting Started with MATLAB 7"**, Oxford University Press.

BTIT906 Advanced Java (Elective III)

Unit I:Introduction to Multithreading and Concurrency in Java

Creating and managing threads in Java, Priority management, Thread synchronization, Inter thread communication, Thread groups and Daemon threads.

Concepts of concurrency, task scheduling, Callable and Futures, Synchronizes, Semaphores, Concurrent collections, Atomic variables and Locks

Unit II: Understanding Input Output Streams

Basic concepts of Stream data, Input Stream hierarchy, Output Stream hierarchy, Understanding of various API's and methods used or streaming of data. Serialization and security in Serialization.

Unit III: Introduction to Java Data Base Connectivity

Basic concept on Database Connectivity Drivers. Database interaction using Statement Interface, Result set Interface. Prepared Statements and Callable statements. Transaction management.

Unit IV: Java Beans and Generics

Reflection API, Introduction to Java Bean, Java Bens in User Interface, Naming Convention, Importance of Bean Serialization. Introduction to generics, Importance of generics, Implementation of various types in Generics and Concept of Erasure.

Unit V: Annotations

Introduction to Annotations, Build in Annotations, Annotation Inheritance, Creation of user defined Annotations and Advantages of Annotations

Suggested Readings/Books

- Thinking in Java
- Head First Java
- The elements of Java Style

BTCS910 Multimedia and Application (Elective III)
B.Tech CSE Batch 2011

BTCS916 Enterprise Resource Planning (Elective III)

B.Tech CSE Batch 2011

BTIT-907 Mobile Application and Programming (Elective III)

Prerequisites

Object Oriented Programming, Java Language Experience, Software Design

Unit 1

Characteristics of mobile applications. Architecture and working of Android, iOS and Windows phone 8 operating system. User-interface design for mobile applications and managing application data. Integrating cloud services, networking, OS and hardware into mobile-applications. **Addressing enterprise requirements in mobile applications**: performance, scalability, modifiability, availability and security.

Unit 2

Mobile Software Engineering (Design Principles, Development, Testing methodologies for mobile applications, Publishing, Deployment, maintenance, and management).

Introduction to Android Development Environment, What Is Android? Advantages and Future of Android, **Frameworks, Tools and Android SDK.** Installing Java, Eclipse, and Android. Android Software Development Kit for Eclipse. Android Development Tool: Android Tools for Eclipse. Android Software Development Platform. Understanding Java SE and the Dalvik Virtual Machine.

The Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML.

Unit 3

Application Development in Android: App Components (Intents and Intent Filters, activities, services, Content Providers, App Widgets, Processes and Threads), App resources, App Manifest and User interface Animation and graphics, computation, Media and Camera, Location and sensors, Connectivity, Text and Input, Data Storage, Administration and Web Apps.

Unit 4

Introduction to iOS application development: Overview of iOS, iOS Development Environment, , iOS Layers, basic of **Objective C**, Building an application for IOS.

Windows phone Environment: Overview of windows phone and its platform, Building windows phone applications.

References/ Text Books

1 Beginning Android 4, Onur Cinar, Apress Publication

2 Professional Android 4 Application Development, Reto Meier, Wrox Publication

3 Beginning iOS 6 Development: Exploring the iOS SDK, David Mark, Apress Publication

4 Professional Windows 8 Programming: Application Development with C# and XML, Allen Sanders and Kevin Ashley, Wrox Publication

Web Resources

• Safari Textbooks Online: http://library.ohio-state.edu/search/y?SEARCH=Safari

• Android Developer Site: http://developer.android.com/index.html

• Stack Overflow: http://www.stackoverflow.com