PROPOSED

SCHEME OF STUDY & EVALUATION

FOR

B. Tech. in Computer Science & Engineering

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Graphic Era Hill University Dehradun

Graphic Era
HILL UNIVERSITY
Established by Act 12 of 2011 of the State Legislature of Uttarakhand
Society Area, Clement Town, Dehradun
www.gehu.ac.in

Minutes of the meeting of the Board of Studies of Department of Computer Science And Engg held on 15th Febuary, 2014

Present:

Sl.No	Name	Address	Signature
1.			
2.			
3.			
4.			
5.			
6			
7.			
8			

Following agenda are discussed:

1. The Board of Studies considered the regulations of the University and recommended to the Academic Council for approval with retrospective effect i.e. from the start of Academic Session 2013 – 14.

2. The Board of Studies considered the syllabus /scheme of examination/ relevant ordinances for B.Tech (CSE) course as applicable from the academic session 2013-14 onwards and recommended to the Academic Council for approval.

3. Under any other item with the permission of chair:

(Signatures of BOS Members)

B. Tech (COMPUTER SCIENCE & ENGINEERING)
Proposed Scheme of Study and Evaluation W.E.F. 2013-14

SNO	SUB CODE	SEMESTER-III	L	T	P	C	Contact Hours	MTE	TA	ESE	Total
	Theory										
1.	TCS301	UNIX & Shell programming	3	0	0	3	3	30	10	60	100
2.	TCS302	Data Structures with C	3	1	0	4	4	30	10	60	100
3.	TMA301	Discrete Mathematics	3	1	0	4	4	30	10	60	100
4.	TEC312	Logic Design	3	0	0	3	3	30	10	60	100
5.	TCS 305	OOPS using C++	3	0	0	3	3	30	10	60	100
6.	XCS 300	Career Skill	2	0	0	2	2	30	10	60	100
	Labs										
7.	PCS301	UNIX & Shell programming Lab	0	0	4	2	4	30	20	50	100
8.	PCS302	Data Structures Lab	0	0	4	2	4	30	20	50	100
9	PEC 312	Logic Design Lab	0	0	2	1	2	30	20	50	100
10	PCS305	C++ Lab	0	0	4	2	4	30	20	50	100
11.	SCS301	Seminar	0	0	2	1	2	-	-	50	50
12.	GP301	General Proficiency	-	-	-	1	-	-	50	-	50
		Grand Total	17	02	16	28	35	300	190	610	1100

Note: MTE : Mid-Term Examination
TA : Teacher's Assessment (Assignments, Seminar, Term work etc)
ESE : End Semester Examination

Course Code: TCS 301 **L T P C**

Course Name: UNIX & SHELL PROGRAMMING **3 0 0 3**

UNIT-I **7 Hours**

Overview of Operating System

Brief history of UNIX Operating System, UNIX Architecture, Internal Command vs External Command, System calls, Virtual Machine. **File System:** File and Directory, Unix File System, Types of files in UNIX, Components of File System, Structure of inode, parent-child relationship, the HOME variable, Absolute and Relative pathnames

UNIT-II **8 Hours**

Understanding UNIX Utilities

Command Structure, Man Browsing the manual pages on-line. **General Purpose Utilities:** pwd, clear, lock, tput, uname, cal, date, echo, printf, bc, script, passwd, who,tty. **Directory and File Related Commands:** cd, mkdir, rmdir, touch, cat, cp, rm, mv, more, file, lp, wc, od, cmp, comm,dos2unix, unix2dos, compressing and archiving files, gzip and gunzip, tar, zip and unzip, ls –il, umask, chmod, chown, chgrp, find, ln, hard link vs soft link. **The vi editor**: The three modes. Basic navigation. Moving to a specific line number. Repeat factor. The command mode commands. Saving and quitting. Text deletion. Using operators in deleting and copying text. Undoing and repeating commands. Pattern search and substitution. Moving text, Customization. The file ***.exrc***

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UNIT-III **12 Hours**

Shell Programming

Shell, The Shell's interpretive cycle, Pattern Matching, Three Standard Files and Redirection, Shell Variable, Environment variables, Two special files, command substitution, aliases, command history, pipe, and tee. Shell scripts, Making Scripts Interactive, Using Command line arguments, exit and Exit status of a command, The logical operators && and ||,the if conditional, using test and [ ] to evaluate expressions, the case conditional, expr, $0, while, for, set and shift, the here document, trap, debugging shell scripts with set –x, Shells and sub-shells, export.

UNIT-IV **8 Hours**

The Process

Introduction, ps, system process, zombie process, orphan process, process creation, running jobs in background, nice, killing processes with signals, job control, at and batch, cron, time. **Filters:** pr, head, tail, cut, paste, sort, tr, grep, egrep and fgrep.
"sed":The Stream Editor, Line Addressing, Using Multiple Instructions Advance Filters : awk(-e and –f), Context addressing, writing selected lines to a file, Text editing, Substitution.

UNIT-V **7 Hours**

Essential System Administration:

root, role and power of the system administrator, becoming super user, user administration. Understanding /etc/passwd, /etc/shadow and /etc/fstab files. Booting and shutdown. Set-user-id and sticky bit. Mounting file systems. Creating Partitions and File System, File system checking. Checking free space and disk usage. Backing up files

Text Books:

1. Sumitabha Das, "UNIX Concepts and Applications", TMH, fourth edition, 2011.
2. Brain W. Kernighan , Rob Pike, The Unix Programming, PHI, 2011
3. Maurice J.Bach, "The Design of The UNIX Operating System", Pearson Education, 2011.
4. Kenneth Roson, "UNIX – The Complete Reference", TMH, 2011.

Course Code: TCS 302 **L T P C**

Course Name: Data Structures With C **3 1 0 4**

UNIT-I **10 Hours**

Introduction Basic Terminology, Pointer and dynamic memory allocation, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Array as Parameters, Ordered List, Sparse Matrices. Stacks: Array. Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive definition and processes, recursion in C, example of recursion, Tower of Hanoi Problem, tail recursion.

UNIT-II **8 Hours**

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Dequeue, and Priority Queue.

Linklist: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list.

UNIT-III **8 Hours**

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary trees, Huffman algorithm & Huffman tree.

Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, and Hash Table Implementation.

UNIT-IV **8 Hours**

Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting. Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees.

UNIT-V **8 Hours**

Files Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons, Graph, Traversal(DFS,BFS) ,Minimum spanning tree.

Text Books:

1. Horowitz and Sahani, “Fundamentals of data Structures”, 2nd Edition, Galgotia, 2007
2. R. Kruse etal, “Data Structures and Program Design in C” Pearson Education, 2007
3. A M Tenenbaum etal, “Data Structures using C”, 2nd Edition, PHI, 2009
4. Lipschutz, “Data Structure”, 1st Edition, TMH, 2010

Course Code : TMA 301 **L T P C**

Course Name: DISCRETE MATHEMATICS **3 1 0 4**

UNIT-I **6 Hours**

Fundamental of Logic: Connectives and Truth Tables, Logical Equivalence-The Laws of Logic, Logical Implication- Rule of Inference, Use of Quantifiers, Validity and Consistency.

UNIT-II **8 Hours**

Set Theory: Sets and Subsets, Venn Diagrams, Set Operations and Laws of Set Theory, Partition of Sets, Finite Sets, Infinite Sets-Countable and Uncountable Sets.

Fundamental Principal of Counting: Rule of Sum and Product, Permutations, Combinations- Combinations with Repetitions, Counting Techniques-Pigeon-hole Principle, Mathematical Induction, Principle of Inclusion and Exclusion.

UNIT-III **9 Hours**

Relation and Functions: Cartesian Products, Relations, Properties of Relations, Composition of Relations, Equivalence Relations, Partial Order Relations, Computer Recognition-Zero One Matrix & Directed Graphs, Hasse Diagrams, Closures. Function- Into, One-to-One, Onto functions, Composition of functions and Inverse functions.

UNIT-IV **7 Hours**

Generating Functions: Introduction, Definition and examples, Exponential Generating functions, and the Summation Operators.

Recurrence Relations: Solution- First Order Linear Recurrence Relation, Second Order Linear Homogeneous Recurrence Relations with Constant Coefficients, Non-homogeneous Recurrence Relations, Particular Solution of Recurrence Relations. Solution of Recurrence Relations using the Method of Generating functions.

UNIT-V **12 Hours**

Groups: Definitions, Examples and Elementary Properties, Permutation Groups and Cyclic Groups, Cosets and Lagrange's Theorem,Homomorphism & Isomorphism (Definition with examples).

Ring and Modular Arithmetic: The Ring Structure-Definition and Examples, Properties of Ring, Subrings, the Integer modulo *n.*

Boolean algebra of Lattice: Introductions, Basic definitions, Types of Lattices andTheorems based on Distributed, Complete, Complemented and Bounded Lattices.

Text Books:

1. Liu, C.L . and Mahapatra D. P. "Elements of Discrete Mathematics", Special Indian Edition, McGraw Hill, 2008.
2. Sarkar S. K. "A Text Book of Discrete Mathematics", 6th Edition, S. Chand, 2009.
3. Mott. J.L., Kandel A. and Baker, T.P. "Discrete mathematics for computer scientists and Mathematicians", Second Edition, Prentice Hall 1986.
4. Smullyan, R.M. "First Order Logic", Springer Verlag. 1968.
5. Tremblay J.P. and Manohar, R. "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill, 1975.
6. Kolamn, B., Busby R.C. and Ross., S.C., "Discrete Mathematical Structures", 3rd Edi., Prentice Hall, 1996.
7. Lipschutz & Lipson. "Discrete Mathematics", 3rd Edi., McGraw Hill, 2010.

Course Code: TEC 312 **L T P C**

Course Name: Logic Design **3 0 0 3**

UNIT-I **6 Hours**

Review of number systems: Binary, Octal, Hexadecimal, Complements, Signed binary numbers, arithmetic operation, Binary codes. Error detection and correction.

UNIT-II **9 Hours**

Boolean algebra and gate level minimization: Basic definition, Boolean logic, postulates, theorems and properties. Digital Logic gates, K-Map method for minimization upto six variables, Quine-Meclusky method for minimization, NAND and NOR implementation.

UNIT-III **9 Hours**

Combinational Logic: Combinational circuits. Analysis procedure, Design Procedure, Binary AdderSubtractor, Decimal Adder, Binary multiplier, Magnitude Comparator, Decoder, Encoder, Multiplexers, Demultiplexers, Code Converters. Static and dynamic hazards.

UNIT-IV **12 Hours**

Sequential Logic: Latches, FFs (RS, JK, D, T) , State Reduction and assignment, FF conversion .

Register: Types of registers, Design & its Application. Counter: Synchronous Counter and asynchronous Counter. Design of Asynchronous and Synchronous sequential Circuits.

UNIT-V **9 Hours**

Logic Family (Digital Integrated Circuits): Introduction, special characteristics, RTL, DTL, TTL, ECL, MOS, CMOS. Semiconductor memory and its classification

Text Books:

1. Mano M. Morris and Ciletti M. D. ,'Digital Design' Pearson Education 4th Edition.
2. Malvino Leach, Saha,'Digital Principles and applications' , TMH
3. Jain R.P.,'Digital Electronics', PHI.
4. Floyd L. Thomas, 'Digital Fundamentals', Pearson, 10th Edition
5. Sedra A.S. & Smith K.C., 'Microelectronic Circuits', (5/e), Oxford, 2004.
6. Switching & Finite Automata theory - Zvi Kohavi, TMH,2nd Edition
7. Taum & Shcilings, Digital Electronics, TMH
8. TTL handbook

Course Code: TCS 305 **L T P C**

Course Name: OOPs with C++ **3 0 0 3**

UNIT-I **8 Hours**

Principles of object oriented programming:- Introduction to Object-Oriented Programming , C++ Statements, Class, Structure of C++ Program, structure verses objects oriented. Tokens, expressions and control structures:-Introduction, Tokens, Keywords, Identifiers

Basic Data types, User Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operators, Manipulators, Type Cast Operator, Expressions and Implicit Conversions, Operator Precedence, Control Structures.

UNIT-II **7 Hours**

Classes and Objects:- Specifying a Class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Function, Arrays within a Class, Memory Allocation for Objects, Static Data Member, Static Member Functions, Arrays of Objects, Object as Function Arguments. Constructors and destructors:-Introduction, Constructors, Parameterized Constructors, Multiple Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructors, Dynamic Constructors, Destructor.

UNIT-III **9 Hours**

Functions in C++ and Overloading :-The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Argument, Const. Arguments, Function Overloading, Friend and Virtual Function. Introduction to overloading, Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators Using Friends, Manipulation of strings using Operators, Rules for Overloading Operators, Type conversions.

UNIT-IV **9 Hours**

Inheritance and Polymorphism:- extending classes Introduction, Defining Derived Classes, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance. Pointers,virtual functions and polymorphism: - Compile time Polymorphism, run time polymorphism, Pointers to Objects, This Pointer, and Pointers to Derived Classes, Virtual Functions, and Pure Virtual Functions.

UNIT-V **9 Hours**

File Handling:- Managing Console & I/O operations and stream computations, working with files, Generic programming with templates, Exception Handling & manipulating strings.

Text Books:

1. E. Balagurusamy, “Object oriented Programming with C++”, 4th Edition, TMH,2008
2. B. Stroustrup, “The C++ Programming Language”, 3rd Edition , Addison-Wesley
3. H. Schildt “A Complete Reference C++”, TATA McGraw Hill
4. Deitel & Deitel “ How to Program C++ ”, Pearson Education, Asia

Course Code: PCS 301 **L T P C**

Course Name: UNIX & SHELL PROGRAMMING **0 0 4 2**

1. Execution of various file/directory handling commands.
2. Simple shell script for basic arithmetic and logical calculations.
3. Shell scripts to check various attributes of files and directories.
4. Shell scripts to perform various operations on given strings.
5. Shell scripts to explore system variables such as PATH, HOME etc.
6. Shell scripts to check and list attributes of processes.
7. Execution of various system administrative commands.
8. Write awk script that uses all of its features.
9. Use sed instruction to process /etc/passwd file.
10. Write a shell script to display list of users currently logged in.
11. Write a shell script to delete all the temporary files.

Course Code: PCS 302 **L T P C**

Course Name: Data Structures Lab **3 1 0 4**

Sorting

1. Program for Sort an Array using Quick Sort.
2. Program for sort an Array using Bubble sort .
3. Program for sort an Array using Insertion sort.
4. Program for sort an Array using Merge sort.
5. Program for sort an Array using Selection sort

Searching

1. Program for Linear Search
2. Program for Binary Search

Link List

1. Program to search an element in doubly circular linked list with various operation.
2. Program to implement Link List in ascending order .
3. Program to implement stack using linked list.
4. Program to merge two linked list.
5. Program to implementing Queue using array.
6. Program to implement circular queue using linked list.
7. Program to sort a linked list.
8. Program to addition of two poly using link list.

Tree

1. Program to conversion of infix expression into postfix expression.
2. Program to search an element in doubly circular linked list and delete the particular node.
3. Program to implementation of binary search tree with operation insertion, deletion and display.
4. Program to search a key and delete particular node from a binary search tree & count no. of node, leaf node & height of tree.

Course Code : PEC 312 **L T P C**

Course Name: Logic Design Lab **0 0 4 2**

List of Experiments:

1. Study of digital ICs & verification of Logic Gates
2. Study & verification of operation of Half Adder & Half Subtractor
3. Study & verification of operation of Full Adder & Full Subtractor
4. Verification of operation of Code converter
5. Verification of operation of Multiplexer & Demultiplexer
6. Verification of operation of 2 bit comparator
7. Verification of operation of ALU
8. Study & verification of operation of FLIP FLOP
9. Study & verification of operation of shift registers
10. Study & verification of operation of operation of counters

Course Code: PCS 305 **L T P C**

Course Name: C++ Lab **0 0 4 2**

1. An election is conducted by 5 candidates. The candidates are numbered by 1-5 and voting is done by marking the candidate number on the ballot paper. Write a program to read the ballots and count the votes cast for each candidate using array variable count. In case a number read outside range 1-5, the ballot is considered as a spoiled ballot. The program should also count the number of spoiled ballots.
2. An electricity board charges the following rate to domestic users to discourage bad consumption of energy. For the first 100 units 60p/unit. For next 200 units, 80p/unit and beyond 300 units, 90p/unit. All users are charged minimum of ₹ 50. If the total amount is above ₹ 300, additional sub charge of 15% is added. Write a program to read the name of users and number of units consumed and print out the charges with name.
3. Write a program to sort an array using bubble sort technique in a class.
4. Write a program to calculate volume of different shapes using function overloading.
5. Write a program to add two times using friend function.
6. Write a program to test a class that represents a vector of integer values.
7. Write a program to add two complex numbers using friend function.
8. Write a program to add two distance using friend function.
9. Write a program that reads several city names from the keyboard and display only those names beginning with characters B or C.
10. Write a program that counts the number of occurrences of a particular character such as 'E' as the line of texts.
11. Write a program that reads the following text and counts the number of times the word "IT" appears in it.

    "It is new. It is singular. It is simple. It must succeed."

    Write a program to sort an array using function template.

12. Assume that a bank maintains an account for customer called as savings account. The savings account provides compound interest and withdrawal facility. Create a class account that stores customer name and account number. From this class derive another class savings account.

    Deposit balance function

    Display balance function

    Calculate compound interest

    Withdrawal

13. Write a program that will read a text file and create an identical copy of that text file, except that white spaces will be replaced by special characters.

14. Write a program that will create a data file containing the list of telephone numbers and persons. Write an attractive menu driven program that will access the file created above and implement the following task:
    a. Determine the telephone number of the specified name.
    b. Determine the name if telephone number is known.

15. Write a program to implement String class using operator overloading.

16. Write a program implement overloading of "<<" and ">>" operator.

B. Tech (COMPUTER SCIENCE & ENGINEERING)

Proposed Scheme of Study and Evaluation W.E.F. 2013-14

SNO	SUB CODE	SEMESTER-IV	L	T	P	C	Contact Hours	MTE	TA	ESE	Total
	Theory										
1.	TCS401	Computer Based Numerical and Statistical Techniques	3	1	0	4	4	30	10	60	100
2.	TCS402	Computer Organization	3	0	0	3	3	30	10	60	100
3.	TEC 402	Microprocessor	3	1	0	4	4	30	10	60	100
4.	TCS404	Design and Analysis of Algorithms	3	1	0	4	4	30	10	60	100
5.	TCS405	Data Communication & Networks	3	0	0	3	3	30	10	60	100
6.	XCS400	Career Skill	2	0	0	2	2	30	10	60	100
	Labs										
7.	PCS401	Computer Based Numerical and Statistical Technique Lab	0	0	4	2	4	30	20	50	100
8.	PEC 402	Microprocessors Lab	0	0	4	2	4	30	20	50	100
9.	PCS404	Design and Analysis of Algorithms Lab	0	0	4	2	4	30	20	50	100
10.	SCS401	Seminar	0	0	2	1	2	-	-	50	50
11.	GP401	General Proficiency	-	-	-	1	-	-	50	-	50
		Grand Total	17	03	14	28	34	270	170	560	1000

Note: MTE : Mid-Term Examination
TA : Teacher's Assessment (Assignments, Seminar, Term work etc)
ESE : End Semester Examination

Course Code: TCS 401 **L T P C**

Course Name: Computer Based Numerical & Statistical Techniques 3 1 0 4

UNIT-I **10 Hours**

Floating Point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation. **Iterative Methods:** Zeros of transcendental equations and zeros of polynomials using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

UNIT-II **10 Hours**

Interpolation: Finite Differences, Difference tables. Polynomial Interpolation- Newton's forward and backward formula, Central Difference Formulae- Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula. Interpolation with unequal intervals- Langrange's Interpolation, Newton Divided difference formula, (all formulae/ rules without Proof). **Numerical Differentiation**- Numerical Differentiation using Newton's forward and backward formula.

UNIT-III **8 Hours**

Numerical Integration: Introduction, Numerical Integration using Trapezoidal rule, Simpson's rules (1/3 and 3/8 rules), Weddle's Rule (all formulae/ rules without Proof). **Numerical Methods:** Numerical Solution of Ordinary Differential Equations of first order- Picard's Method, Euler's Method, Euler's Modified Method, Taylor Series Method, Runge-Kutta methods.

UNIT-IV **7 Hours**

Simultaneous Linear Equations: Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of Solution Gauss Seidal iterative method, Rate of Convergence. **Curve Fitting and Approximation:** Method of least squares (Explanation without Proof), fitting of straight lines, polynomials, exponential curves.

UNIT-V **8 Hours**

Regression Analysis: Correlation, Linear and Non-linear regression, multiple regressions. **Time Series and Forecasting:** Moving averages, smoothening of curves, forecasting models and methods. Statistical Quality Controls methods

Text Books:

1. V. Rajaraman, "Computer Oriented Methods". PHI
2. Gerald & Wheatley, " Applied Numerical Analysis", AW
3. Jain, Iyengar & Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
4. B. S. Grewal, "Numerical Methods in Engineering and Science", Khanna Publication, Delhi.
5. Manish Goyal, "Computer Based Numerical and Statistical Techniques".
6. T. Veerarajan and T. Ramachandran, " Theory and Problems in Numerical Methods". TMH

Course Code: TCS 402 **L T P C**

Course Name: Computer Organization **3 0 0 3**

UNIT-I **10 Hours**

Basic Structure of Computers : Computer Types, Functional unit, Basic Operational concepts ,Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation. Fixed Point Representation. Floating – Point Representation. Error Detection codes. Addition, subtractions and multiplications and algorithms.

UNIT-II **9 Hours**

Register Transfer Language and Microoperations : Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Mircrooperatiaons, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions –Instruction cycle. Memory – Reference Instructions. Input – Output and Interrupt. STACK organization. Instruction formats. Addressing modes, DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

UNIT-III **10 Hours**

Micro Programmed Control: Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Microprogrammed control. THE MEMORY SYSTEM: Basic concepts semiconductor RAM memories. Read-only memories ,cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.

UNIT-IV **8 Hours**

Input and output organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP) .Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, IEEE1394.

UNIT-V **8 Hours**

Pipelining and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Multi Processor: Characteristics or Multiprocessors, Interconnection Structures, Interprocessor Arbitration.InterProcessor Communication and Synchronization Cache Coherance. Shared Memory Multiprocessors.

Text Books:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky “Computer Organization“, 5th Edition, TMH, 2011.
2. M.Moris Mano “Computer Systems Architecture”, 3rd Edition, Pearson/PHI.
3. William Stallings “Computer Organization and Architecture”, 8th Edition, Pearson/PHI.
4. Andrew S. Tanenbaum “Structured Computer Organization”, 5th Edition, PHI/Pearson.

Course Code: TEC402 **L T P C**

Course Name: Microprocessors **3 1 0 4**

UNIT-I **6 Hours**

Introduction to microprocessors

Introduction to Microprocessors: Evolution of Microprocessors, review of semiconductor memory organization, 8-bit Microprocessor (8085): Architecture and pin diagram

UNIT-II **10 Hours**

Programming with 8085

Instruction set, addressing modes, assembly language programming*, Timing and control, peripheral I/O, memory mapped I/O, 8085 Interrupts, Stack and subroutines.

UNIT-III **12 Hours**

16 bit processor

16-bit Microprocessors (8086): Architecture, pin diagram Physical address, segmentation, memory organization, Bus cycle, Addressing modes, Assembly Language Programming of 8086, comparison of 8086 & 8088.

UNIT-IV **7 Hours**

Interfacing

Data Transfer Schemes: Introduction, handshaking signals, Types of transmission, 8255 (PPI), Keyboard-display controller (8279), Serial Data transfer (USART 8251), memory interfacing, 8257 (DMA), programmable interrupt Controller (8259).

UNIT-V **7 Hours**

Interfacing with timing devices

Programmable Interval Timer/ Counter (8253/8254): Introduction, modes, Interfacing of 8253, applications. Introduction to DAC & ADC, ADC & DAC Interfacing (0808 , 0809)

Note : Advanced sample programs like looping, Counting, modulo ten counter, time delay, wave form generation etc will be dealt in tutorials

Text Books:

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", 5th Edition, Penram International Publication (India) Pvt. Ltd.
2. Douglas V. Hall, "Microprocessors and Interfacing", 2nd Edition, TMH, 2006.
3. R. Singh and B. P. Singh : Microprocessor Interfacing and Application, New Age International Publishers, 2nd Edition.
4. B.P. Singh and R. Singh : Advanced Microprocessor and Microcontrollers, New Age International Publishers, 2nd Edition.

Course Code: TCS 404 **L T P C**

Course Name: Design and Analysis of Algorithms **3 1 0 4**

UNIT I **8 Hours**

Analysis techniques

Growth of Functions: Asymptotic notations; Standard Notations and Common Functions; Mathematical Analysis of Non-Recursive and Recursive Algorithms**. Recurrences and Solution of Recurrence Equations:** The Substitution method, The Recurrence–Tree Method, The Master Method.

UNIT II **10 Hours**

Design Techniques-I

Brute Force Approaches: Selection Sort, Bubble Sort, Brute Force String Matching; **Decrease & Conquer:** Insertion Sort; **Divide & Conquer:** Merge Sort, Quick Sort; **Transform & Conquer:** Heap Sort; **Greedy Technique:** Fractional Knapsack Problem, Activity Selection Problem.

UNIT-III **8 Hours**

Design Techniques-II

Dynamic Programming: 0/1 Knapsack Problem, Matrix-Chain Multiplication. **Backtracking:** Hamiltonian Circuit Problem, Subset – Sum Problem; **Branch-and-Bound:** Assignment Problem, Traveling Salesperson Problem;

UNIT IV **12 Hours**

Graph Algorithms

Graph: Introduction, Representation of Graph, BFS, DFS, **Minimum Spanning Tree:** Prims Algorithm, Kruskal Algorithm, **Single Source Shortest Paths:** Bellman-Ford Algorithm, Dijkstra Algorithm, **All Pair Shortest Paths:** Floyd-Warshall Algorithm.

UNIT V **6 Hours**

NP- Completeness & Approximation Algorithms

NP-Completeness: P, NP, NP-Hard & NP-Complete Class, Reducibility & NP-Complete Problems. **Approximation Algorithms:** The Vertex Cover Problem, The Set Covering Problem.

Text Books:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition,Prentice-Hall of India.
2. Anany Levitin: Introduction to The Design & Analysis of Algorithms, 2nd Edition, Pearson Education.

Reference Books:

1. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press
2. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning.

Course Code: **TCS 405** **L T P C**

Course Name: **Data Communication & Networks** **3 0 0 3**

UNIT-I **6 Hours**

Introduction to data communication system data communication, components, networks, protocols and standards, line configuration, topologies, transmission mode, categories of networks, internetworks. .

UNIT-II **8 Hours**

OSI model: layered architecture, function of layers, TCP/IP protocol suit, signals-analog and digital signals, periodic and a periodic signals, time and frequency domain, composite signal

UNIT-III **12 Hours**

Digital Conversion: - Digital Data Conversion :uni-polar, polar, bipolar, analog data conversion:- PAM, PCM, sampling, Modulation techniques :- ASK, FSK, PSK,BPSK, QPSK , AM, FM, PM.

UNIT-IV **8 Hours**

Transmission of digital data: Digital data transmission, modems, transmission media:- guided and unguided media, transmission impairments, performance, wavelength, Shannon capacity, comparison of media

UNIT-V **9 Hours**

Multiplexing:- TDM, FDM, WDM, multiplexing applications:- the telephone system, digital subscriber line(DSL), FTTC, Error Detection and correction:- type of errors, detection:- VRC, LRC, CRC, checksum, error correction, switching:- circuit, packet, message switching

Text Books:

1. Data Communications and Networking, by Behrouz A. Forouzan, McGraw Hill 4th edition 2012
2. Godbole,"Data Communication & Network" , TMH 2nd edition 2011
3. William Stallings ,"Data & Computer Communication", Pearson Education 8th edition 2007.
4. A.S Tanenbum,"Computer Network",Pearson Education 4th edition 2011

Course Code: PCS401	**L**	**T**	**P**	**C**
Course Name: CBNST LAB	**0**	**0**	**4**	**2**

Note: Write down and execute the following programs using c.

1. WAP to find the roots of non-linear equation using Bisection method.
2. WAP to find the roots of non-linear equation using False position method.
3. WAP to find the roots of non-linear equation using Newton's Raphson method.
4. WAP to find the roots of non-linear equation using Iteration method.
5. WAP to interpolate numerically using Newton's forward difference method.
6. WAP to interpolate numerically using Newton's backward difference method.
7. WAP to interpolate numerically using Lagrange's method.
8. WAP to Integrate numerically using Trapezoidal rule.
9. WAP to Integrate numerically using Simpson's 1/3 rules.
10. WAP to Integrate numerically using Simpson's 3/8 rules.
11. WAP to find numerical solution of ordinary differential equations by Euler's method.
12. WAP to find numerical solution of ordinary differential equations by Runge-Kutta (fourthorder) method.
13. WAP to linear Curve fitting by least – square approximations.

Course Code: PEC 402 **L T P C**

Course Name: Microprocessor Lab **0 0 4 2**

List of Experiments:

8085 Programming

1. Introduction to 8085
2. 8 bit Addition and Subtraction
3. 8 bit Multiplication and Division
4. 16 bit Addition and Subtraction
5. 16 bit Multiplication and Division
6. Largest and Smallest number in an array
7. Sorting in Ascending and Descending Order
8. Code Conversions using 8085
9. BCD Addition and Subtraction
10. Matrix Multiplication

8085 Interfacing

1. Interfacing 8255 PPI IC with 8085
2. Interfacing 8253 Timer IC with 8085

Course Code: PCS 404	**L**	**T**	**P**	**C**
Course Name: DAA Lab	**0**	**0**	**4**	**2**

NOTE: Implement the following Algorithms in C/C++ & analyse its run time complexity within the program and verify with mathematically given complexity.

(For all sorting algorithms Input and Output size should be in some thousands and stored preferably in File)

BRUTE FORCE APPROACHES:

1. Implement Selection Sort Algorithm.
2. Implement Bubble Sort Algorithm.
3. Implement Brute Force String Matching Algorithm.

DECREASE-AND-CONQUER:

4. Implement Insertion Sort Algorithm.

DIVIDE AND CONQUER:

5. Implement Merge Sort Algorithm.
6. Implement Quick Sort Algorithm.

TRANSFORM-AND-CONQUER:

7. Implement Heap Sort Algorithm.

THE GREEDY METHOD:

8. Implement Fractional Knapsack Problem Algorithm.
9. Implement Activity Selection Problem Algorithm.

DYNAMIC PROGRAMMING:

10. Implement 0-1 Knapsack Problem Algorithm.
11. Implement Matrix-Chain Multiplication Order Algorithm.

GRAPH ALGORITHM:

12. Implement Single Source Shortest Paths: Bellman-Ford Algorithm.
13. Implement Single Source Shortest Paths: Dijkstra's Algorithm.
14. Implement All-Pairs Shortest Paths: Floyd & Warshall's Algorithm.

B. Tech (COMPUTER SCIENCE & ENGINEERING)
Proposed Scheme of Study and Evaluation W.E.F. 2013-14

SNo	SUB CODE	SEMESTER-V	L	T	P	C	Contact Hours	MTE	TA	ESE	Total
	Theory										
1.	TCS501	Theory of Computation	3	0	0	3	3	30	10	60	100
2.	TCS502	Computer Networks-I	3	0	0	3	3	30	10	60	100
3.	TCS503	Operating System	3	1	0	4	4	30	10	60	100
4.	TCS504	Database Management Systems	3	0	0	3	3	30	10	60	100
5.	TCS505	Java Programming	3	1	0	4	4	30	10	60	100
6.	XCS500	Career Skill	2	0	0	2	2	30	10	60	100
	Labs										
7.	PCS502	Computer Network Lab	0	0	4	2	4	30	20	50	100
8.	PCS504	Database Management Systems Lab	0	0	4	2	4	30	20	50	100
9	PCS505	Java programming Lab	0	0	4	2	4	30	20	50	100
10	SCS501	Seminar	0	0	2	1	2	-	-	50	50
11.	GPC501	General Proficiency	-	-	-	1	-	-	50	-	50
		Grand Total	17	02	14	27	33	270	170	560	1000

Note: MTE : Mid-Term Examination
TA : Teacher's Assessment (Assignments, Seminar, Term work etc)
ESE : End Semester Examination

Course Code: TCS 501 **L T P C**

Course Name: Theory of Computation **3 0 0 3**

UNIT-I **6 Hours**

Introduction

Introduction of Theories of: Automata, Computability and Complexity Mathematical Notions and Introduction to Terminology Sets, Sequences and tuples, Functions and Relations, Graphs, Alphabets, Strings and Languages.

UNIT-II **10 Hours**

Automata & Languages: Regular Languages

Finite Automata definition, examples, computation, designing, regular operations Nondeterministic Finite Automata definition, NFA-DFA equivalence.

UNIT-III **9 Hours**

Context free Languages

Regular Expressions definition, application of regular expressions (unix, lexical analysis), equivalence with finite automata, Introduction to Nonregular Languages pumping lemma for regular languages, Context-free Grammars definition, designing, Chomsky normal form Applications Of CFG Parse Trees, Left factoring and Left Recursion.

UNIT-IV **8 Hours**

Push-down automata

Pushdown Automata definition, Types of equivalence with context free grammars, Designing of PDA (Nondeterministic and deterministic), Non Context Free Languages pumping lemma for context free languages.

UNIT-V **9 Hours**

Computability Theory

Introduction computability theory, Church-Turing thesis Turing Machines definition, examples, design variants of turing machines: nondeterministic, hilbert's problem, terminology for describing turing machines Decidability and Undecidability , decidable languages, unsolvability of halting problem, Reducibility undecidable problems from language theory, computable functions

Textbooks:

1. Michael Sipser ,"Introduction to Theory of Computation" ,2nd Edition, Course Technology.
2. Peter Linz , "Introduction to Formal Languages and Automata", 3rd Edition, Jones and Barlett,2009.
3. Elaine Rich,"Automata, Computability, Complexity-Theory and applications", 1st Edition PHI, 2008.
4. Hopcroft, Rajeev, Ullman," Introduction to Automata Theory, Languages and Computation",3rd Edition, Pearson, 2008

Course Code: TCS 502 **L T P C**

Course Name: Computer Networks-I **3 0 0 3**

UNIT-I **7 Hours**

Introduction: Computer Networks and the Internet, Overall view: As components and as services; What is a protocol, what is a network protocol, Access Networks and Physical Media, Circuit and Packet Switching, Internet Backbone, Delays: Processing, Queuing, Transmission and Propagation delays

UNIT-II **8 Hours**

The Layered Architecture: Protocol Layering, The OSI Reference Model and the TCP/IP protocol stack, History of Computer Networking and the Internet

Application Layer: Principles and Architectures of Network Applications, Client and Server processes, the idea of socket, Transport services available to Application Layer especially in the internet.

UNIT-III **8 Hours**

Application Layer Protocols:

The Web and http: Persistent and Non-persistent connections, http message format, cookies, proxy server, conditional GET, File Transfer Protocol.

Email: smtp, mail message formats, mail access protocols: pop3, imap, MIME

DNS: Services, how it works, Root, Top-Level and Authoritative DNS servers, Resource Records, DNS messages. A simple Introduction to p2p files distribution: Bit Torrent

UNIT-IV **10 Hours**

Transport Layer: Introduction and Services, Transport layer in internet, Difference between Connection Oriented and Connectionless services.

UDP: Segment structure, checksum in UDP.

TCP: the principles behind connection oriented data transfer, designing a connection oriented protocol, stop-and-wait, Go Back N, Selective Repeat. Connection Establishment, TCP header, Sequence and acknowledgement numbers, Round Trip Time, Flow Control, Congestion Control

UNIT-V **10 Hours**

Network Layer: Network Layer Design Issues, Packet Forwarding and Routing, Difference between Virtual Circuits and Datagram networks, The internals of a router: Input ports, output ports, switching architecture. The Internet Protocol(IP), Datagram format, IP fragmentation, IPv4 addressing, subnets, CIDR, classful addressing, DHCP, Network Address Translation(NAT), Universal Plug and Play as a provider of NAT, Internet Control Message Protocol(ICMP), IPv6 Header, Moving from IPv4 to IPv6: tunneling, A brief discussion on IP security

Text Books:

1. Computer Networking , 3th Edition , James F. Kurose/ Keith W. Ross, Pearson.
2. Computer Networks, 4th Edition, Tanenbaum, Pearson.
3. Computer Networks & Internets 4th Edition , Douglas E. Comer, MS Narayanan.
4. TCP/IP Protocol Suite 4th Edition, Forouzan, TMH

Course Code: TCS- 503 **L T P C**

Course Name: Operating Systems **3 1 0 4**

UNIT-I **6 Hours**

Fundamentals of Operating System

Introduction to Operating System, Functions of Operating system, Types of operating systems, Batch Systems, multi-programming, time-sharing, parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, Virtual machines. **Case Study:** Structure of Linux .

UNIT-II **7 Hours**

Process

Process Concept, Process State, PCB, Context Switch, Process Scheduling Queues, Types of Scheduler CPU Scheduling Criteria, Preemptive vs Non-Preemptive Algorithm, CPU Scheduling Algorithms, FCFS, SJF, SRTN, Priority, Round Robin , Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling, Multiple-processor scheduling, Real-time scheduling Operation on Process, Thread. **Case Study:** Process Creation in Linux.

UNIT-III **10 Hours**

Process Coordination and Deadlock

Cooperative vs Independent Process, Advantage of Cooperating Process, Implementation of Cooperating process; IPC, Shared memory, Problem due to Co-operating Process; Critical Section Problem, race condition, Two process Solution; Algo 1, Algo 2, Peterson Algorithm, N process solution; Bakery Algorithm, Semaphore, Process Synchronization , Classical Problem of Synchronization, Monitor, Solution of Producer-Consumer using Semaphore and Monitor, Deadlock, Deadlock Characterization, RAG, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery. **Case Study:** IPC mechanism in Linux.

UNIT-IV **10 Hours**

Memory Management

Logical and Physical Address Space, Swapping, Allocation methods, Paging, Segmentation, Virtual Memory, Demand paging, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation. **Case Study:** Linux Memory Management

UNIT-V **9 Hours**

Storage Management

File concept, access methods, allocation methods-contiguous, linked and index allocation, directory structure – single level, two-level, tree structure, acyclic graph and general graph directory structure of file system, Secondary storage structure; Disk structure, disk scheduling algorithm. **Case Study:** Linux File System.

Text Books:

1. Abraham Silberschatz and Peter Baer Galvin, “Operating System Concepts”, Wiley, eight edition, 2012.
2. Stuart E.Madnick, John J. Donovan, “Operating System”, TMH,2010.
3. Andrew S Tanenbaum, Modern Operating System, PHI, third edition, 2011.
4. Milan Milankovic, “Operating Systems, Concepts and Design”, TMH, second edition, 2011.
5. Harvey M Deital, "Operating Systems", Pearson, third edition, 2012.

Course Code: TCS 504 **L T P C**

Course Name: Database Management Systems **3 0 0 3**

UNIT-I **6 Hours**

Introduction: An overview of DBMS; Advantages of using DBMS approach; Database systems vs File Systems, Database system concepts and architectureData models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.

Entity-Relationship Model:

Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

UNIT-II **8 Hours**

Relational Model and Relational Algebra: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER-to-Relational Mapping.

UNIT-III **10 Hours**

SQL: SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures.

UNIT-IV **10 Hours**

Database Design: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form. Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms.

UNIT-V **10 Hours**

Transaction Management

The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; Log Files; Checkpointing; Recovering from a System Crash; Media Recovery

Text Books:

1. Elmasri and Navathe: Fundamentals of Database Systems, 5th Edition, Pearson Education, .
2. Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill,
3. Silberschatz, Korth and Sudharshan: Data base System Concepts, 6th Edition, Mc-GrawHill, .2010
4. C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems, 8th Edition, Pearson education,

Course Code: TCS 505 **L T P C**

Course Name: Java Programming **3 1 0 4**

UNIT-I **6 Hours**

The Java Environment: Java Development Kit (JDK), Java virtual machine, Java programming environment (compiler, interpreter, applet viewer, debugger), Java Applications Programming Interface (API), Basic idea of application and applet**.**

UNIT-II **8 Hours**

Java as an object oriented language: objects, classes, encapsulation, inheritance, and software reuse, Polymorphism, abstract classes and abstract methods, : defining an interface, implementing & applying Interfaces, variables in interfaces, extending interfaces, Packages, scope and lifetime; Access specifies; Constructors; Copy constructor; this pointer; finalize () method; Memory allocation and garbage Collection

Java Utilities: (java.util Package) The Collection Framework: Collections of Objects, Collection Types: Sets, Sequence, and Map: hash map Understanding Hashing Use of ArrayList & Vector.

UNIT-III **10 Hours**

AWT & Exception handling: AWT: Containers and components, AWT classes, window fundamentals: Component, Container, Panel, Window, Frame, Canvas, AWT Controls, Layout Managers: - flow layout, Grid layout, Border layout, Card layout. Java Event Handling Model and Menus, Scroll bar; Frame; Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet.

Exception Handling:

Basic idea of exception handling, stack based execution and exception propagation, Exception types, Exception Handling: Try, Catch, Finally, Throw statement, Assertions

UNIT-IV **10 Hours**

Multithreading: Overview of simple threads, Basic idea of multithreaded programming, Thread synchronization: Locks, Synchronized methods, synchronized block, Thread scheduling, Producer-consumer relationship, Daemon thread,

Input/output: Exploring Java I/O., Directories, stream classes The Byte stream: Input stream, output stream, file input stream, file output stream, print stream, Random Access file, the character streams, Buffered reader, buffered writer, print writer, serialization.

UNIT-V **8 Hours**

Java Networking: exploring java.net package Networking Basics: Socket, Client server, reserved Sockets, proxy servers, Internet addressing, TCP sockets, UDP sockets

JDBC: JDBC-ODBC Bridge; The connectivity model; the driver manager; navigating the result set Object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

Text Books:

1. Naughton & Schildt "The Complete Reference Java 2", Tata McGraw Hill
2. Deitel "Java- How to Program:" Pearson Education, Asia
3. Bert Bates, Kathy Sierra "Head First Java" O'Reilly publication
4. Java Programming for the absolute beginners By Russell, PHI Learning

Course Code: PCS 502	**L**	**T**	**P**	**C**
Course Name: Computer Network Lab	**0**	**0**	**4**	**2**

Note: The socket programming can be done on Unix/Linux operating or/and Windows. Socket programming, and the language can be C/VC++ and/or Java

1. Program to manipulate the IP address of a system.
2. Program to obtain the information about the (a) Host (b)Port
3. Program to access daytime service from server using socket
4. Program to get remote and local socket address.
5. Program to find port no running on server.
6. Program to read the source code of the web Page
7. Program to create socket for sending and receiving data
8. Program to find ip address of a website.

Course Code: PCS 504 **L T P C**

Course Name: Database Management Systems Lab **0 0 4 2**

List of proposed work to be done in DBMS Practicals

1. Creating database tables
    - Create table
    - Modify Table
    - Drop table
    - Truncate
2. Practicals for retrieving Data Using following causes
    - Simple SELECT clause
    - Accessing specific data with WHERE , Exist, Not Exist
    - Ordered By, Distinct clause
    - Operators like IN, BETWEEN, LIKE, IS NULL, NOT NULLetc
3. Practicals based on Data manipulation
    - Adding data with Insert
    - Modify Data with Update
    - Deleting records with Delete
    - Alter Table Command
4. Practicals based on Implementing the Constraints
    - NULL & NOT NULL
    - PRIMARY KEY Constraint
    - FOREIGN KEY Constraint
    - UNIQUE KEY Constraint
    - CHECK Constraint
    - DEFAULT Constraint
5. Practicals based on Aggregate & Mathematical Functions
    - AVG
    - COUNT
    - MAX
    - MIN
    - MIN
    - GROUP BY, HAVING Clause
6. Practicals based on implementing use of Set Operators
    - UNION
    - INTERSECTION
    - MINUS etc
7. Implement various types of JOIN operations
    - EQUI JOIN
    - SELF JOIN
    - INNER JOIN
    - OUTER JOIN etc
8. One project on above fundamentals

Course Code: PCS 505 **L T P C**

Course Name: JAVA Programming Lab **0 0 4 2**

1. Write a java program to print “hello world”.
2. Write a java program to input value of a variable “a” and display the input value.
3. Write a program to simulate Calculator using switch case.
4. Write a java program to practice String class and its method.
5. Write a java program for the following: Define a class called “MyRectangle” with instance variables called “length” and “width” and methods setData() and rectArea(). SetData() method inputs two argument values from user for setting length and width of the rectangle. rectArea() calculates area of rectangle and returns it.
6. Write a java program for the following: declare a class called “MyDate” which contains dd, mm and yy as instance variables and getDay (), getMonth (), getYear () and setDate () as public methods that allow access to private variables. Also write a test class that declares an object of class MyDate and instantiates it. Call upon the method setdate () to set values of instance variables. The call getDay (), getMonth () and getYear () and print their values.
7. Write a java program to create a super class called employee and two subclass named manager and clerk. The employee class contains following attributes name, code, dept, address, email_id, mobile _no and a method called show () which displays values of attributes. The manager class has an additional attribute known as transport allowance.
8. Write a java program to create an interface that consists of a method to display grades of students. Create a class that implements the interface and displays grades according to percentage of marks obtained.
9. Using execute() method execute a SELECT statement and traverse the rows by obtaining ResultSet from the getResultSet() method. Verify that execute() method returns true only when a SELECT statement is executed and false otherwise. Also show how to obtain ResultSet and updateCount.
10. Program to create TCP Sockets for sending and receiving data.
11. Program to create UDP Sockets for sending and receiving data.
12. Program to implement a chat server using TCP/IP protocol.
13. Write a program by using JDBC to execute a SQL query for a database and display the results.

PROPOSED

SCHEME OF STUDY & EVALUATION

FOR

B. Tech. in Computer Science & Engineering

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Graphic Era Hill University Dehradun

Graphic Era
HILL UNIVERSITY
Established by Act 12 of 2011 of the State Legislature of Uttarakhand
Society Area, Clement Town, Dehradun
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Minutes of the meeting of the Board of Studies of Department of Computer Science And Engg held on 15th Febuary, 2014

Present:

Sl.No	Name	Address	Signature
1.			
2.			
3.			
4.			
5.			
6			
7.			
8			

Following agenda are discussed:

1. The Board of Studies considered the regulations of the University and recommended to the Academic Council for approval with retrospective effect i.e. from the start of Academic Session 2013 – 14.

2. The Board of Studies considered the syllabus /scheme of examination/ relevant ordinances for B.Tech (CSE) course as applicable from the academic session 2013-14 onwards and recommended to the Academic Council for approval.

3. Under any other item with the permission of chair:

(Signatures of BOS Members)

B. Tech (COMPUTER SCIENCE & ENGINEERING)

Proposed Scheme of Study and Evaluation W.E.F. 2013-14

SNO	SUB CODE	SEMESTER-VI	L	T	P	C	Contact Hours	MTE	TA	ESE	Total
	Theory										
1.	TCS601	Compiler Design	3	0	0	3	3	30	10	60	100
2.	TCS602	Web Technology	3	0	0	3	3	30	10	60	100
3.	TCS603	Software Engineering	3	0	0	3	3	30	10	60	100
4.	TCS604	Graph Theory	3	1	0	4	4	30	10	60	100
5.	TCS605	Computer Network II	3	0	0	3	3	30	10	60	100
6.	XCS600	Career Skill	2	0	0	2	2	30	10	60	100
	Labs										
6	PCS601	Compiler Design Lab	0	0	4	2	4	30	20	50	100
7.	PCS602	Web Technology Lab	0	0	4	2	4	30	20	50	100
8.	GP601	General Proficiency	-	-	-	1	-	-	50	-	50
9	SCS 601	Seminar	0	0	2	1	2			50	50
		Grand Total	17	01	10	24	28	240	150	510	900

Note: MTE : Mid-Term Examination
TA : Teacher's Assessment (Assignments, Seminar, Term work etc)
ESE : End Semester Examination

Course Code: TCS 601 **L T P C**

Course Name: Compiler Design **3 0 0 3**

UNIT-I **10 Hours**

Introduction, Lexical analysis: Compilers, Analysis of source program, The phases of a compiler, Cousins of the compiler, The grouping of phases, Compiler-construction tools.

Lexical analysis: The role of lexical analyzer, Input buffering, Specifications of tokens, Recognition of tokens.

UNIT-II **8 Hours**

Syntax Analysis: The Role of the parser, Context-free grammars, Writing a grammar, Top-down parsing, Bottom-up parsing.

Operator-Precedence Parsing: LR parsers, Using ambiguous grammars, Parser generators.

UNIT-III **8 Hours**

Syntax-Directed Translation: Syntax-directed definitions, Constructions of syntax trees, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down translation.

Run-Time Environments: Source language issues, Storage organization, Storage-allocation strategies, Storage-allocation in C, Parameter passing.

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UNIT-IV **8 Hours**

Intermediate Code Generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls.

Code Generation: Issues in the design of code generator, The target machine, Run-time storage management, Basic blocks and Flow graphs, Next-use information, Simple code generator, Register allocation and assignment, The dag representation of basic blocks, Generating code from dags.

UNIT-V **8 Hours**

Code Optimization, Compiler Development:

Code Optimization: Introduction, The principal sources of optimization, Peephole optimization, Optimization of basic blocks, Loops in flow graphs.

Compiler Development: Planning a compiler, Approaches to compiler development, the compiler development environment, Testing and maintenance.

Text Books:

1. Alfred V Aho, Ravi Sethi, Jeffrey D Ullman: Compilers- Principles, Techniques and Tools, Pearson Education, 2007.

Reference Books:

1. Charles N. Fischer, Richard J. leBlanc, Jr.: Crafting a Compiler with C, Pearson Education, 1991.
2. Andrew W Apple: Modern Compiler Implementation in C, Cambridge University Press, 1997.
3. Kenneth C Louden: Compiler Construction Principles & Practice, Thomson Education, 1997.

Course Code: TCS 602 **L T P C**

Course Name: Web Technology **3 0 0 3**

UNIT-I **10 Hours**

Introduction to Web Technology:
History of the internet and world wide web, Web browsers, Web applications, Search engines.

HTML and DHTML
HTML – XHTML – HTML 5, Creating simple web page, Basic text formatting, presentation elements, Phrase elements, Lists, Font, Grouping elements, **Basic links**: External, Internal document links, Email link. Image, Audio and video, Image maps, Image format, Adding flash content and video, **Tables:** Attributes, Nested tables. **Forms**: Attributes, form controls. **Frames:** Frameset, nested frames, attributes. **Introduction to HTML 5:** New tags of HTML 5, Embedding media contents, Building input forms. Introduction to Joomla, Durpal.

UNIT-II **8 Hours**

Cascading Style Sheet: Introduction, What are CSS, Levels of style sheet and specification formats, Embedded style sheet, External style sheet, Inline style sheet, Classes and ID method, DIV and SPAN tags, Inheritance with CSS. Introduction to CSS 3, HTML 5 and CSS3.

UNIT-III **8 Hours**

Introduction to JavaScript, Object in java script, Object orientation and javascript, Javascript identifiers, Operators, Control & Looping structure, Array, Methods, DOM objects: Window, Document, Navigator, History, Location, Screen etc. Event handling, **Validation:** HTML Forms, Regular Expressions.

UNIT-IV **8 Hours**

Introduction to XML, Parsing an XML document, Data interchange with an XML document, Document type definitions. XML schemes, **XML Processors:** DOM and SAX.

UNIT-V **10 Hours**

PHP: Introduction to PHP, Building blocks of PHP, Variables, Operator, Control statements, Loops, Functions, Arrays, String handling, Working with date and time, Uploading Files, **MYSQL:** Basic SQL commands, **Basic Data Base Operations:** creation, insertion, deletion & updation in tables, Interacting MYSQL with PHP, Working with forms, Creating three tier application.

Text Books:

1. Kris Jamsa, King Anderson, "HTML & Web Design", TMH Publication, 2002.
2. Ivan Bayross, “Commericial Application Development Using: HTML, Javascript, DHTML and PHP ”, BPB Publications , Fourth Revised Edition, 2010.

Reference Books:

1. Thomas A. Powell, “The Complete Reference HTML and CSS Fifth Edition” TMH, 2010
2. P.J Deital, H.M Deital, “Internet and World Wide Web How to Program”, Fourth Edition, Pearson publication, 2009.

Course Code: TCS 603 **L T P C**

Course Name: Software Engineering **3 0 0 3**

UNIT-I **10 Hours**

Introduction: What is Software Engineering and its history, software crisis, Evolution of a Programming System Product, Characteristics of Software, Brooks' No Silver Bullet, Software Myths. Software **Development Life Cycles:** Software Development Process, The Code-and-Fix model, The Waterfall model, The Evolutionary Model, The Incremental Implementation, Prototyping, The Spiral Model, Software Reuse, Critical Comparisons of SDLC models, An Introduction to Non-Traditional Software Development Process: Rational Unified Process, Rapid Application Development, Agile Development Process.

UNIT-II **8 Hours**

Requirements: Importance of Requirement Analysis, User Needs, Software Features and Software Requirements, **Classes of User Requirements:** Enduring and Volatile, Sub phases of Requirement Analysis, Functional and Non-functional requirements, Barriers to Eliciting User requirements, The software requirements document and SRS standards, Requirements Engineering, Case Study of SRS for a Real Time System. **Tools for Requirements Gathering:** Document Flow Chart, Decision Table, Decision Tree, Structured Analysis: DFD, Data Dictionary, Introduction to non-traditional Requirements.

UNIT-III **8 Hours**

Software Design: Goals of good software design, Design strategies and methodologies, Data oriented software design, **Structured Design:** Structure chart, Coupling, Cohesion, Modular structure, Packaging, Object oriented design, Top-down and bottom-up approach, Design patterns.

UNIT-IV **8 Hours**

Software Measurement and Metrics: **Various Size Oriented Measures:** Halestead's software science, Function Point (FP) based measures, **Cyclomatic Complexity Measures:** Control flow graphs.

Development: Selecting a language, Coding guidelines, Writing code, Code documentation

UNIT-V **10Hours**

Software Testing: Testing process, Design of test cases, **Functional Testing**: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing, Path testing, Data flow and mutation testing, Unit testing, Integration and system testing, Debugging, Alpha & beta testing, testing tools & standards.

Software Maintenance: Management of maintenance, Maintenance process, Maintenance models, Regression testing, Reverse engineering, Software re-engineering, Configuration management, documentation.

Text Books:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill, Seventh Edition, 2010.
2. P.K.J. Mohapatra, Software Engineering (A Lifecycle Approach), New Age International Publishers, First Edition, 2009.

Reference Books:

1. K.K. Aggarwal, Yogesh Singh, Software Engineering (3rd Edition), New Age International Publishers, Third Edition, 2007.
2. Ian Sommerville, Software Engineering, Addison Wesley, Ninth Edition, 2010.

Course Code: TCS 604 **L T P C**

Course Name: Graph Theory **3 1 0 4**

UNIT –I **10 Hours**

Introduction to Graph Theory: Graphs and sub graphs. Definitions, Types, Examples and basic properties. Vertex and degree of a graph, Walk, Path and circuits. Some applied theorems. Euler and Planar graphs. Operations on graphs. Hamiltonian paths and circuits. The travelling salesman problems.

UNIT – II **8 Hours**

Trees: Definitions, Properties, and examples, Binary tree, Routed Tree, Weighted Tree and spanning trees.

Optimization: Dijkstra's Shortest Path Algorithm, Minimal Spanning Trees-The algorithms of Kruskal and Primes, Max-flow and Min-cut Theorem.

UNIT – III **8 Hours**

Cut Sets in Graphs: Cut sets, cut vertices and fundamental circuits with their properties, connectivity and separability, network flows, Kuratowski graphs.

UNIT – IV **10 Hours**

Vector Space Of A Graph: Basic vectors, Cut set vectors, Circuit vectors, Orthogonal vectors. **Graph Matrices:** Incidence matrix, Sub matrices of A(G), Circuit matrix, Cut set matrix and adjacency matrices. Graph Isomorphism.

UNIT – V **8 Hours**

Graph Coloring And Matching Theory: Coloring, and Partitioning of a graph, Chromatic number and polynomials, Some theorems and properties**,** Matching and covering of a graph, Four color problems.

Text Books:

1. Deo,N: Graph theory, PHI. Publication.
2. Chartrand Zhang: Introduction to Graph Theory, TMH, 2006.
3.

Reference Books:

1. Richard A. Brualdi: Introductory Combinatorics, 4th Edition, Pearson Education, 2004.
2. D.S. Chandrasekharaiah: Graph Theory and Combinatorics, Prism, 2005.

Course Code: TCS 605 **L T P C**

Course Name: Computer Network II **3 0 0 3**

UNIT-I **6 Hours**

Routing Algorithms: Link state (LS), Distance Vector (DV), Hierarchical, **Routing in the Internet:** Intra-AS, **Routing in the Internet:** RIP, OSPF & BGP Broadcast and Multicast Routing, Algorithms, Multicast.

UNIT-II **10 Hours**

Link Layer and Local Area Network: **Introduction and Services:** Service provided by the LL, Implemented. **Error-Detection and Correction Techniques:** Parity checks, Checksumming methods, Cyclic Redundancy Check (CRC). **Multiple Access protocols:** Channel partitioning, Random access, Taking turns, LANs. **Link-Layer Addressing:** MAC and ARP. **Ethernet:** Frame structure, CSMA/CD, Ethernet technologies. **Link-Layer Switches:** Forwarding and filtering, Self-learning, Properties, VLANs, Switches versus routers. **Point-to-Point Protocol (PPP):** Data framing. Link-virtualization.

UNIT-III **8 Hours**

Multimedia Networking: Applications, Streaming stored audio and video, **Best of the Best-Effort Service:** Limitation, Removing jitter, Recovering from packet loss, QOS. **Protocol for Real-Time Interactive Applications:** RTP, RTP Control protocol (RTCP), SIP, H.323. **Multiple Classes of Service:** Motivating scenarios, Scheduling and policing, Diffsev.

UNIT-IV **10 Hours**

Security in Computer Networks: Principal of Cryptography: Symmetric key, Public-key. **Message Integrity:** Hash functions, Message authentication code, Digital signatures, End-point authentication, Securing E-mail, PGP, Securing TCP connections, SSL. **Network Layer Security:** IPsec and VPNs, AH and ESP protocols, IPset datagram, Security applications, Key management in IPsec. **Securing Wireless LANs:** Wired Equivalent Privacy (WEP), IEEE802.11i. **Operational Security:** Firewalls and intrusion detection systems.

UNIT-V **10 Hours**

Wireless and Mobile Networks: Introduction, Characteristics, CDMA, **WiFi:** 802.11 Architecture, MAC Protocol, Frame, Mobility in IP Subnet, Bluetooth and WiMAX., Cellular Internet Access, Mobile Management: Principles, Addressing, Routing to a mobile Node., Mobile IP, **Managing Mobility In Cellular Networks**: Routing calls to a mobile user, Handoffs in GSM, Impact on higher-layer protocols.

Text Book

1. Computer Networking – A Top Approach, James F. Kurose and Keith W. Ross, Pearson Fifth Edition, 2010.
2 Computer Networks, 4th Edition, Tanenbaum, Pearson, 2009.

Reference Books:

1. Computer Networks & Internets, Douglas E. Comer, MS Narayanan, 4th Edition, 2004.
2. TCP/IP Protocol Suite 4th Edition, Forouzan, TMH, 2010.

Subject Code : PCS-601 **L T P C**

Subject Name : Compiler Design Lab **0 0 4 2**

NOTE: Design LEX/YACC Code for following Set of Program. (Study of LEX/YACC with file-handling is required)

LEX code using Regular Grammar (without file-handling):

1. Design a LEX Code to count the number of lines, space, tab-meta character and rest of characters in a given Input pattern.
2. Design a LEX Code to identify and print valid Identifier of C/C++ in given Input pattern.
3. Design a LEX Code to identify and print integer and float value in given Input pattern.
4. Design a LEX Code for Tokenizing (Identify and print OPERATORS, SEPERATORS, KEYWORDS, IDENTIFERS) the following C-fragment:

```
int p=1,d=0,r=4,
float m=0.0, n=200.0,
while (p <= 3)
    { if(d==0)
        { m= m+n*r+4.5, d++, }
      else
        { r++, m=m+r+1000.0, }
      p++, }
```

LEX code using Regular Grammar (with file-handling):

5. Design a LEX Code to count and print the number of total characters, words, white spaces in given 'Input.txt' file.
6. Design a LEX Code to replace white spaces of 'Input.txt' file by a single blank character into 'Output.txt' file.
7. Design a LEX Code to remove the comments from any C-Program given at run-time and store into 'out.c' file.
8. Design a LEX Code to extract all html tags in the given HTML file at run time and store into Text file given at run time.

LEX code using DFA:

9. Design a DFA in LEX Code which accepts string containing even number of 'a' and even number of 'b' over input alphabet {a, b}.
10. Design a DFA in LEX Code which accepts string containing third last element 'a' over input alphabet {a, b}.
11. Design a DFA in LEX Code to Identify and print Integer & Float Constants and Identifier.

YACC/LEX code:

12. Design YACC/LEX code to recognize valid arithmetic expression with operators +, -, * and /.
13. Design YACC/LEX code to evaluate arithmetic expression involving operators +, -, * and / without operator precedence grammar & with operator precedence grammar.
14. Design YACC/LEX code that translates infix expression to postfix expression.
15. Design Desk Calculator using YACC/LEX code.

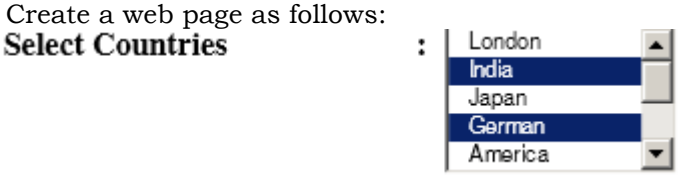
Subject Code : PCS-602 **L T P C**
Subject Name : Web Technology Lab **0 0 4 2**

HTML 5

1. Write a HTML code to draw the following Figure (Hut):

```
/\--\ /\--\
/ \ \ / \ \
/____\--/____\__\
| oo | | oo | |
| __ | | __ |oo|
| || |vV| || |Vv|
vvVVVvVvVvVvVvVvv
```

2. Demonstrate the Image Mapping by creating four different hyperlinks.
3. Demonstrate the use of <IFRAME> tag using suitable example.
4. Create navigational bar using <frameset> tag.
5. Create a web page as follows:



The list box should have names of at least 10 countries where 2nd , 4th and 10th country should be selected by default.

6. Design the page as follows

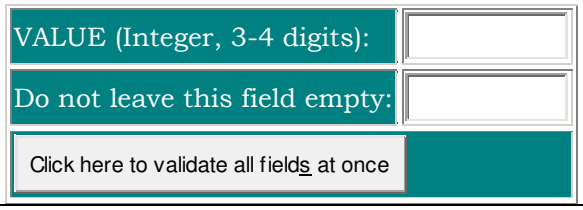
Cascading Style Sheet

1. Create a sample code to illustrate the Inline style sheet for your web page.
2. Create a sample code to illustrate the External style sheet for your web page.
3. Create a sample code to illustrate the embedded style sheet for your web page.
4. Create a sample code to illustrate the procedure of creating user defined classes in
   CSS

JavaScript

1. Consider this form:

EMAIL:	
VALUE (0-5):	



Write javascript to validate inputs to a form consists of four different functions:

- emailvalidation will check to see if a value lives up to the general syntax of an email.
- valuevalidation will check to see if a value is within a certain interval.
- digitvalidation will check to see if a value consits of a certain number of digits.
- emptyvalidation will check to see if a field is empty or not.

2. Write a java script program to "Wish a user " at different hours of a day
3. Design the simple Calculator.

4. Design a web page that self modifying itself after every one minute. Demonstrate with suitable example.

5. Write an code for web application, which accepts the birth date from the user in a textbox and display the day of the week in a message box on the click of a button.

6. Write a script that inputs a telephone number as a string in the form (555)555-555. The script should use strings method split to extract the area code as token and the last four digits of the phone numbers as a token. Display the area code in one test field and the seven digit phone number in another text field.
7. Create a web page that applies the invert filter to an image if the user moves the mouse over it.
8. Store some country names and their capitals. Ask the user to select a country and its capital from given two lists. If the match is correct, display "Correct answer", otherwise display error message and tell the correct answer.
9. Design a web page to perform survey on four different model of Maruti (Maruti - K10, Zen-Astelo, Wagnor, Maruti- SX4) owned by person living in four metro cities(Delhi, Mumbai, Chennai & Kolkatta). Display tabulated report like format given below:

	Maruti-K10	Zen-Astelo	Wagnor	Maruti-SX4
Delhi				
Mumbai				
Cheenai				
Kolkatta				

Calculate numbers of cars of different model in each metro city.

XML

1. Data Interchange with XML
2. Well formed and Validate XML document

PHP

1. Write a program to create a Login form having User-Id and Password fields. After submitting the form match the user-id and password with existing user-id and password. If user-id and password match a new welcome window should be appear.

2. Write a PHP page to display all the records from *PERS* table that contain Department Number(field name dno) similar to that of given in textbox *txtdno* given in interface web browser screen.

3. Write a PHP code to create a drop-down box for country and their capital. Create a new table called ***country_tab*** and make it part of the same Company database. It should have two fields. The first is an text field called *Company Name* and second is a text field called *Country name*. Now write an PHP code that will read this table and put the options into a list box.

4. Creating, retrieving and deleting cookies.

5. Sending E-Mail .

6. Validating and Filtering inputs.

B. Tech (COMPUTER SCIENCE & ENGINEERING)

Proposed Scheme of Study and Evaluation W.E.F. 2013-14

SNO	SUB CODE	SEMESTER-VII	L	T	P	C	Contact Hours	MTE	TA	ESE	Total
	Theory										
1.	TCS701	Software project management	3	0	0	3	3	30	10	60	100
2.	TCS702	Computer Graphics	3	0	0	3	3	30	10	60	100
3.	TCS703	Big Data Analysis	3	0	0	3	3	30	10	60	100
4.		Elective 1	3	0	0	3	3	30	10	60	100
5.		Elective 2	3	0	0	3	3	30	10	60	100
6.	XCS700	Career Skill	2	0	0	2	2	30	10	60	100
	Labs										
7.	PCS702	Computer Graphics Lab	0	0	4	2	4	30	20	50	100
8.	PCS 703	Big Data Analytic Lab	0	0	4	2	4	30	20	50	100
9.	SCS701	Seminar on Industrial Interaction	0	0	4	2	4	--	--	50	50
10.	CSP701	Project work Phase 1	0	0	6	3	6		50	100	150
11.	GP701	General Proficiency	-	-	-	1	-	-	50	-	50
		Grand Total	17	00	18	27	35	240	200	610	1050

Elective 1	
TCS711	Embedded Systems
TCS712	Natural Language Processing
TCS713	Business Intelligence

Elective 2	
TCS721	Mobile Application Development
TCS722	Adhoc Sensor Networks
TCS723	Soft Computing

Note: MTE : Mid-Term Examination
TA : Teacher's Assessment (Assignments, Seminar, Term work etc)
ESE : End Semester Examination

Course Code: TCS 701 **L T P C**

Course Name: Software Project Management **3 0 0 3**

UNIT- I **9 Hours**

Conventional Software Management : The waterfall model, conventional software management performance. **Evolution of Software Economics:** Software economics, Pragmatic software cost estimation. **Improving Software Economics:** Reducing software product size, Improving software processes, Improving team effectiveness, Improving automation, Achieving required quality, Peer Inspections. **Old way and the new:** Principles of conventional software Engineering, Principles of modern software management, Transitioning to an iterative process.

UNIT-II **8 Hours**

Life Cycle Phases: Engineering and production stages, Inception, Elaboration, Construction, Transition phases. **Artifacts of The Process**: Artifact sets, Management artifacts, Engineering artifacts, Programmatic artifacts.

UNIT-III **8 Hours**

Model Based Software Architectures: A Management perspective and technical perspective.

Work Flows of The Process: Software process workflows, Iteration workflows. **Checkpoints of The Process:** Major mile stones, Minor milestones, Periodic status assessments.

UNIT-IV **8 Hours**

Project Organizations and Responsibilities: Line-of-business organizations, Project organizations, Evolution of organizations. **Process Automation:** Automation Building blocks, The project environment.

UNIT -V **9 Hours**

Project Control and Process Instrumentation: The seven core metrics, Management indicators, Quality indicators, life cycle expectations, Pragmatic Software metrics, Metrics automation.

Tailoring the Process: Process discriminants. **Future software Project Management:** Modern project profiles, Next generation software economics, modern process transitions.

Case Study: Command Center Processing and Display system: Replacement (CCPDS-R)

Text Book :

1. Software Project Management, Walker Royce: Pearson Education, 2005.
2. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.

Reference Books :

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education, 2009.

Course Code: TCS 702 **L T P C**

Course Name: Computer Graphics **3 0 0 3**

UNIT-I **10 Hours**

Introduction: What is computer graphics and what are the applications, **Graphics Systems:** Video display devices, Raster scan and random scan displays, Flat panel displays, Three-dimensional viewing devices, Video controller, Input devices, Graphics on the internet, Graphics software, Coordinate representations.

Introduction to OpenGL, Basic OpenGL syntax, Related libraries, Header Files, Display-window management using GLUT, A complete OpenGL program.

UNIT-II **10 Hours**

Geometric Transformations: Two dimensional translation, Rotation and scaling, Matrix representations and homogeneous coordinates, Inverse transformations, Composite transformations, Reflection, Shear, Raster methods for geometric transformations, Geometric transformations in three-dimensional space, Affine transformations, OpenGL geometric-transformation programming examples.

UNIT-III **8 Hours**

Two Dimensional Viewing: Viewing pipeline, Clipping window, Normalization and viewport transformations, **Clipping Algorithms:** Cohen-Sutherland line clipping, Liang-Barsky line clipping, Line clipping against non rectangular clip windows, **Polygon Clipping:** Sutherland-Hodgman, Weiler-Atherton, Curve clipping, Text clipping

UNIT-IV **8 Hours**

Three dimensional viewing, Transformations from world to viewing coordinates, **3-D Clipping Three-Dimensional Object Representations:** Polyhedra, Curved and quadric surfaces, Blobby objects, Spline representations, Bezier spline curves, Bezier surfaces, B-spline curves, B-spline Surfaces, Octrees, Introduction to fractals.

UNIT-V **8 Hours**

Visible Surface Detection Methods: Classification, Back-Face detection, Depth-Buffer method, A-buffer method, Scan-line method, Curved surfaces.

Illumination Models and Surface Rendering Methods: Basic illumination models-Ambient light, Diffuse reflection, Specular reflection and the Phong model,

Polygon Rendering Methods: Gouraud surface rendering, Phong surface rendering, Ray tracing, Texture mapping.

Text Book:

1. Computer Graphics with OpenGL by Donald Hearn and M. Pauline Baker, Pearson ,Third Edition, 2004,

Reference Books:

1. J.D. Foley, A. Dam, S.K. Feiner, Graphics Principle and Practice , Addison Wesley
2. Rogers, " Procedural Elements of Computer Graphics", McGraw Hill, 1997.

Course Code: TCS 703 **L T P C**

Course Name: Big Data Analysis **3 0 0 3**

UNIT-I **8 Hours**

Introduction to Big Data Analytics

Overview of Big Data, State of practice of analytics, Big Data Analytics in industry verticals, Data analytics lifecycle, Discovery, Data preparation, Model planning, Model building, Communicating results and findings and operationalizing.

UNIT-II **8 Hours**

R for Initial Analysis of the Data

Introduction to using R Initial exploration and analysis of data using R, Basic visualization using R. R package as a tool to perform basic data analytics, Reporting and applying basic data visualization techniques, Basic analytics methods such as distribution, Statistical test and summary operation and differentiate between result and that are statistical sound vs statistical significant.

UNIT-III **10 Hours**

Advanced Analytics and Statistical Modeling for Big Data – Theory and methods examining analytic needs and select an appropriate technique based on business objective, Initial hypotheses and the data structure and volume, analytics solution, Algorithm and methods, Diagnostic method to validate models created use R and in-database analytical function to fit, Score and evaluate models.

Methods used by a Data Scientist: Candidate selection using the Naïve Bayesian classifier, Categorization using K-means clustering, Association rules, Predictive modelling using decision trees, Linear and logistic regression using time-series analysis and text analysis.

UNIT-IV **8 Hours**

Advanced Analytics and Statistical Modeling for Big Data – Technology and Tools Tools to perform analytics on unstructured data using Map-Reduce programming paradigm. Hadoop, HDFS, HIVE, PIG and other products in the Hadoop ecosystem for understanding data analytics, Advanced SQL function, Greenplum extension and MADlib

UNIT-V **8 Hours**

Articulate three tasks needed to operationalize an analytic project, Four common deliverables of an analytics lifecycle project, Framework for creating final presentation for sponsors and analysts, Evaluate a data visualization and identify ways to improve it.

Text Books:

1. Analytics in Practice, Soumendra Mohanty,Publisher: Tata Mcgraw Hill Education 2011.
2. Agile Analytics, A Value-Driven Approach to Business Intelliegence and data warehousing,Ken W.Collier publisher: Pearson Education, 2012.

Reference Book:

1. MapReduce Design Patterns, DonaldMiner,O'Reilly,2012.

Course Code: TCS 711 **L T P C**

Course Name: Embeded System **3 0 0 3**

UNIT-I **8 Hours**

Introduction to Embedded Systems: **Definition and Classification:** Overview of processors and hardware units in an embedded system, Software embedded into the system, Exemplary embedded systems, Embedded systems on a Chip (SoC) and the use of VLSI designed circuits, Embedded micro controller cores, Embedded memories, Examples of embedded systems.

UNIT-II **9 Hours**

Devices and Buses for Devices Network: I/O Devices, Device I/O types and examples, Synchronous, ISO, Synchronous and asynchronous communications from Serial devices , Examples of internal serial, Communication devices, UART and HDLC, Parallel port Devices, Sophisticated interfacing features in devices/ports, Timer and counting devices ,'12C', 'USB', 'CAN' and advanced I/O serial high speed buses, ISA, PCI, PCI-X, CPCI and advanced buses.

UNIT-III **8 Hours**

Programming Concepts and Embedded Programming In C, C++: Programming in assembly language (ALP) vs. High level language, C Program elements, Macros and functions, Use of pointers, NULL Pointers, Use of function calls, Multiple function calls in a Cyclic order in the main function pointers, Function queues and interrupt service routines queues pointers, Concepts of Embedded programming in C++, Objected Oriented Programming, Embedded Programming in C++, 'C' Program compilers, Cross compiler, Optimization of memory codes.

UNIT-IV **10 Hours**

Real Time Operating Systems: Definitions of process, tasks and threads, ISRs and tasks by their characteristics, Operating system services, Structures, Kernel, Process management, Memory management, Device management, File system organisation and implementation, I/O Subsystems, **Interrupt routines Handling in RTOS:** RTOS task scheduling models, Handling of task scheduling and latency and deadlines as performance metrics, Co-operative Round Robin scheduling, Cyclic scheduling with time slicing (Rate Monotonics Co-operative Scheduling), Preemptive scheduling model strategy by a Scheduler, Critical section service by a preemptive scheduler, Fixed (Static) real time scheduling of tasks, Inter process communication and synchronisation, Shared data problem, Use of semaphore(s), Priority Inversion problem and deadlock situations, Inter process communications using signals, Semaphore flag or mutex as resource key, Message queues, Mailboxes, Pipes, Virtual (Logical) sockets, Remote Procedure Calls (RPCs)-Case study of Micro C/OS-II or VX works or any other popular RTOS.

UNIT-V **7 Hours**

Software Development Methodology: Real-time UML (RoseRT), DOORS, Case studies, Controlling an Injection moulding process, Flight simulator, digital call center handler, Codec.

Text Books

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, 2008.
2. Jack Ganssle, The Art of Designing Embedded Systems, Newnes, 2008.

Reference Book:

1. C.M. Krishna and Kang G. Shin, RTS: Real-Time Systems, McGraw-Hill, 2010.

Course Code: TCS 712 **L T P C**

Course Name: Natural Language Processing **3 0 0 3**

UNIT-I **8 Hours**

Introduction: Knowledge in speech and language processing, Ambiguity-models and algorithms, Language thought and understanding regular expressions and automata, Regular expressions, Finite state automata, Morphology and finite-state transducers, Survey of english morphology, Finite-state Morphological parsing, Combining FST lexicon and rules, Lexicon, Free FSTs, The porter stammer, Human morphological processing.

UNIT-II **9 Hours**

Syntax : Word classes and part-of-speech tagging, English word classes, Tagsets for English, Part-of-speech tagging, Rule-based part-of-speech tagging, Stochastic part-of-speech tagging, Transformation-based tagging, Other issues, Context-Free grammars for English, Constituency, Context-Free rules and trees, Sentence-level constructions, The noun phrase, Coordination, Agreement, Verb phase and sub categorization, Auxiliaries, Spoken language syntax, Grammars equivalence and normal form, Finite-State and Context-Free grammars, Grammars and human processing, Parsing with context-Free grammars, Parsing as search, Basic top-down parser, Problems with the basic top-down parser, Early algorithm, Finite-State parsing methods.

UNIT-III **8 Hours**

Advanced Features and Syntax: Features and unification, Feature structures, Unification of feature structures, Features structures in the grammar, Implementing unification, Parsing with unification constraints, Types and Inheritance, Lexicalized and probabilistic parsing, Probabilistic context-free grammar, Problems with PCFGs , Probabilistic lexicalized CFGs, Dependency Grammars, Human parsing.

UNIT-IV **8 Hours**

Semantics: Representing Meaning: Computational desiderata for representations, Meaning structure of language, First order predicate calculus, Some linguistically relevant concepts, Related representational approaches, Alternative approaches to meaning, **Semantic Analysis:** Syntax-Driven semantic analysis, Attachments for a fragment of English, Integrating semantic analysis into the early parser, Idioms and compositionality, Robust semantic analysis, **Lexical semantics:** Relational among lexemes and their senses, **WordNet:** A database of lexical relations, Internal structure of words, Creativity and the lexicon.

UNIT-V **9 Hours**

Application: Word Sense Disambiguation and Information Retrieval: Selectional restriction-based disambiguation, Robust word sense disambiguation, Information retrieval, other information retrieval tasks, **Natural Language Generation:** Introduction to language generation, Architecture for generation, Surface realization ,Discourse planning, Other issues, **Machine Translation:** Language similarities and differences, Transfer metaphor, **Interlingua idea:** Using meaning, Direct translation Using statistical techniques, Usability and system development.

Text Books

1. Daniel Jurafsky & James H.Martin, " Speech and Language Processing", Pearson Education (Singapore) Pte. Ltd., 2002.

Reference Books

1. James Allen, "Natural Language Understanding", Pearson Education, 2003.

Course Code: TCS 713 **L T P C**

Course Name: Business Intelligence **3 0 0 3**

UNIT-I **10 Hours**

Turning Data Into Information- Business and data, Challenges for Business and data, Data, Information, Insight, Data decision challenge, Operational versus Informational data, Data Warehouse architecture, What is a Data Warehouse, Logical tiers in a Data Warehouse, concept of Data Mart, Data Warehouse process flow, Dynamic Warehousing, Decision support system , Decision support processes, Decision support users , DW + DSS = Business Intelligence areas, Information as a service, Explicit and tacit knowledge, Knowledge lifecycle, Value of information, Extending beyond the Data Warehouse **Building the Data Warehouse:** Data modeling and metadata, Data warehouse modeling and design, Challenges, Requirements capturing, Modeling, Modeling process, Modeling techniques,Entity relationship modelling, Temporal modeling, Multidimensional modelling, Snowflake , Dimension hierarchies, Multidimensional data modelling, Basic, ERM versus MDDM, Metadata, Types of metadata, Metadata benefits, Populating the Data Warehouse, Data transformation, Anomalies in data fields, Lack of data standards, Lack of data consolidation, Federation.

UNIT-II **10 Hours**

Accessing the Data Warehouse: Data warehouse usage, Decision support processing, Decision support system users, Query and reporting, Query and reporting process flow, Data analysis, Data analysis,OLAP, OLAP: Multdimensional view, OLAP: Slice and dice, Data mining, Information mining / Data mining, Statistical Analysis versus Data Mining, Data mining process , data mining algorithms , BI technologies. **Information Integration**: Components, Functions, Information integration, Data workflow, Information as a service, SOA, SOA reference architecture, Data warehouse and MDM, MDM logical architecture, MDM logical architecture with Data warehousing, MDM with Data warehousing and information integration, MDM, data warehouse and EII, Operational Data store / dynamic warehousing, Batch processing, Data warehouse and MDM working together.

UNIT-III **6 Hours**

Wrap up and Planning Considerations- Planning Considerations, Data insight, The big picture, Suggestions for success, People stand in the middle of the environment ,

UNIT-IV **8 Hours**

Understanding information on demand: Cognos bi and fpm cognos bi components, IBM cognos bi architecture (high level), Cognos bi groups and roles introduction to the reporting application what is report studio? , explore the environment, Report templates, Properties of an object , Dimensionally-modeled and multi-dimensional data sources, Examine list reports group data, Fact/measure data, Aggregate data, Difference in aggregation, Shared dimensions to create multi-fact queries focus reports using filters, Advanced detail filters, Filter with aggregation pre-defined source filters, Crosstab report, Measures to crosstab reports, Unrelated items in crosstab edges present data graphically chart report, create charts containing peer and nested items, Custom chart palettes, gauge charts, parameters and prompts.

UNIT-V **8 Hours**

Extend reports using calculations & maps deriving information from the data source, Run-time features from reports, Present data using maps, **Map Reports**: Match your Data Source, Zoom capabilities statistics, Statistical report types, Descriptive statistics, Normality and related terms working with multiple reports, drill through from one report to another, Set up drill-through access from a report, values passed to target parameters, Navigate through multiple reports package, Drill through from measure-based scope, Drill through assistant enhance report layout structure of the report, Page breaks in reports, Horizontal pagination, Modifying structures, Change pdf page orientation to suit report objects set pdf security options format objects across a report .

Reference Books:

1. IBM -Changing Business with Data Insight
2. IBM - Working with Cognos Report Builder
3. Business Intelligence by David Loshin
4. Business intelligence for the enterprise by Mike Biere
5. Business intelligence roadmap by Larissa Terpeluk Moss, Shaku Atre

Course Code: TCS 721 **L T P C**

Course Name: Mobile Application Development **3 0 0 3**

UNIT-I **8 Hours**

Introduction: 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.

UNIT-II **10 Hours**

Introduction to mobile development IDE's, Introduction to Worklight basics, Optimization, Pages and fragments , Writing a basic program in Worklight Studio, 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-III **8 Hours**

Android: Introduction to Android, Architecture, Memory management, communication protocols, Application development methods, Deployment.

Case Study: Design and development of application using mobile application development platforms e.g. IBM WorkLight

UNIT-IV **8 Hours**

Windows Phone: Introduction to Windows Phone, Architecture, Memory management, Communication protocols, Application development methods, Deployment.

Case Study: Design and development of application using mobile application development platforms e.g. IBM WorkLight,

UNIT-V **8 Hours**

iOS: Introduction to iOS, Architecture, Memory management, Communication protocols, Application development methods, Deployment.

Text Books :

1. IBM -Worklight resources
2. Jeff McWherter, Scott Gowell “Professional Mobile Application Development”, John Wiley & Sons, 2012.
3. Damon Oehlman, Sébastien Blanc, “Pro Android Web Apps: Develop for Android using HTML5, CSS3 & JavaScript”, Apress, 2011.

Reference Books:

1. Henry Lee, Eugene Chuvyrov, “Beginning Windows Phone App Development”, Apress, 2012.
2. Neal Goldstein, Tony Bove, “iPhone Application Development All-In-One For Dummies”, John Wiley & Sons, 2010

Course Code: TCS 722 **L T P C**

Course Name: Ad-Hoc and Sensor Network **3 0 0 3**

UNIT-I **8 Hours**

AD-HOC MAC: Introduction, Issues in Ad-Hoc wireless networks, MAC Protocols, Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol, Security Issues.

UNIT-II **9 Hours**

AD-HOC Network Routing & TCP: Issues, Classifications of routing protocols, Hierarchical and power aware, Multicast routing, Classifications, Tree based, Mesh based, Ad Hoc transport layer issues. TCP over Ad Hoc, Feedback based, TCP with explicit link, TCP-BUS, Ad Hoc TCP and Split TCP.

UNIT-III **8 Hours**

WSN –MAC: Introduction, Sensor network architecture, Data dissemination and Gathering, MAC protocols, self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

UNIT-IV **8 Hours**

WSN Routing, Localization & QOS: Issues in WSN routing, OLSR, AODV, Localization, Indoor and Sensor Network Localization, QoS in WSN.

UNIT-V **9 Hours**

Mesh Networks: Necessity for Mesh Networks, MAC enhancements, IEEE 802.11s Architecture, Opportunistic routing, Self configuration and Auto configuration, Capacity Models, Fairness, Heterogeneous mesh networks, Vehicular mesh networks.

Text Books:

1. C.Siva Ram Murthy and B.Smanoj, " Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.
2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.

Reference Books:

1. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
2. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007.

Course Code: TCS 723 **L T P C**

Course Name: Soft Computing **3 0 0 3**

UNIT-I **8 Hours**

Fundamentals of ANN: The Biological neural network, Artificial neural networks, Building blocks of ANN and ANN terminologies, Architecture, Setting of weights, Activation functions, McCulloch-Pitts neuron model, Hebbian learning rule, Perception learning rule, Delta learning rule.

UNIT-II **8 Hours**

Models of ANN: Single layer perception, Architecture, Algorithm, Application procedure, Feedback networks, Hopfield Net and BAM, Feed forward networks, Back Propogation Network (BPN) and Radial Basis Function Network (RBFN), Self organizing feature maps, SOM and LVQ.

UNIT-III **8 Hours**

Fuzzy Sets, Properties And Operations: Fuzzy relations, Cardinality, Operations and properties of fuzzy relations, Fuzzy composition.

UNIT-IV **8 Hours**

Fuzzy Variables: Types of membership functions, **Fuzzy rules:** Takagi and Mamdani, **Fuzzy Inference Systems:** Fuzzification, Inference, Rulebase, Defuzzification.

UNIT-V **10 Hours**

Genetic Algorithm (GA): Biological terminology, Elements of GA, Encoding, Types of selection, Types of crossover, Mutation, reinsertion, Simple genetic algorithm, Theoretical foundation, Schema, Fundamental theorem of GA, Building block hypothesis.

TEXT BOOKS :

1. S. N. Sivanandam, S. Sumathi, S.N. Deepa, Introduction to Neural Networks using MATLAB 6.0 , Tata McGraw-Hill, New Delhi, 2006
2. S. N. Sivanandam, S.N. Deepa, Principles of Soft Computing, Wiley-India, 2008.
3. D.E. Goldberg, Genetic algorithms, optimization and machine learning, Addison Wesley 2000.

REFERENCE BOOKS :

1. Satish Kumar, Neural Networks – A Classroom approach, Tata McGraw-Hill, New Delhi, 2007.
2. Martin T. Hagan, Howard B. Demuth, Mark Beale, Neural Network Design, Thomson Learning, India, 2002.
3. B. Kosko, Neural Network and fuzzy systems, PHI, 1996.
4. Klir & Yuan, "Fuzzy sets and fuzzy logic – theory and applications, PHI, 1996.
5. Melanie Mitchell, An introduction to genetic algorithm, PHI, India, 1996.

Subject Code : PCS-702 **L T P C**

Subject Name : Computer Graphics Lab **0 0 4 2**

1. D.D.A line generating program.
2. Bresenham's line generating program.
3. Generating circle using mid-point circle generating algorithm.
4. Generating circle using Bresenham's circle generating algorithm.
5. Cube genrating program.
6. Program for point clipping algorithm.
7. Program for scaling of triangle.
8. Program for rotation of triangle about origin.
9. Program for translation of a triangle.
10. Program implementing Bezier Curve.
11. Program for generating flower using fractal .
12. Program for taking reflection of a triangle about line y=x.
13. Generating ellipse using Mid-Point ellipse generating algorithm.
14. Generating ellipse using parametric equations.
15. Program for projectile motion.
16. Program to demonstrate bucket hit.
17. Program of Cavallier projection.
18. Midpoint circle generation algorithm(complete)
19. Prospective projection of a unit cube on xy plane(z=0)
20. Program to rotate a body with rotation point (200,400) and rotation angle 90.

Subject Code : PCS-703 **L T P C**

Subject Name : Big Data Analytic Lab **0 0 4 2**

1. Practical on How to prepare data for mining through aggregation, discretization, feature selection, transformation etc. (Data Pre-processing.)
2. Practical on how to build a basic classifier such as decision tree, k-nn etc.(Classification).
3. Practical on how to build other models for classification and how to compare models etc (Advance Classification) .
4. Practical on how to generate frequent itemsets? How to apply different measures for AR mining? (Association Rule Mining)
5. Practical based on how to construct clusters using different algorithms? (Clustering)
6. Practical based on how to evaluate clusters? How to compare different algorithms of clustering? How to detect outliers? (Advance Clustering)

B. Tech (COMPUTER SCIENCE & ENGINEERING)

Proposed Scheme of Study and Evaluation W.E.F. 2013-14

SNO	SUB CODE	SEMESTER-VIII	L	T	P	C	Contact Hours	MTE	TA	ESE	Total
	Theory										
1.	TCS801	Artificial Intelligence	3	1	0	4	4	30	10	60	100
2	TCS802	Advance Computer Architecture	3	0	0	3	3	30	10	60	100
3.		Elective 3	3	0	0	3	3	30	10	60	100
4		Elective 4	3	0	0	3	3	30	10	60	100
	Labs										
5.	CSP801	Project Phase II	0	0	12	6	12	-	100	300	400
6.	GP801	General Proficiency	-	-	-	1	-	-	50	-	50
		Grand Total	12	1	12	20	25	120	190	540	850

Elective 3	
TCS811	Mobile Computing
TCS812	Data Warehousing & Mining
TCS813	Distributed System

Elective 4	
TCS821	Cloud Computing
TCS822	System software
TCS823	Knowledge Management

Note: MTE : Mid-Term Examination
TA : Teacher's Assessment (Assignments, Seminar, Term work etc)
ESE : End Semester Examination

Course Code: TCS 801 **L T P C**

Course Name: Artificial Intelligence **3 1 0 4**

UNIT-I **8 Hours**

Introduction : Introduction to Artificial Intelligence, Simulation of sophisticated & intelligent behavior in different area, **Problem Solving In Games:** Chess, Tic-Tac-Toe, Min–Max algorithm, alpha –beta algorithm.
Heuristic Algorithm Versus Solution Guaranteed Algorithms: (A *, Best First, Hill climbing, DFS, BFS , Uniform cost search)

UNIT-II **10 Hours**

Understanding Natural Languages: Introduction to parsing techniques, Context free and transformational grammars, Transition nets, Augmented transition nets, Fillmore's grammars, Shanks conceptual dependency, Grammar free analyzers, Sentence generation and translation.

UNIT-III **8 Hours**

Knowledge Representation
Predicate logic, Horn clauses, Semantic nets partitioned nets, Minskey frames, Production rules knowledge base, Inference system, Forward & backward deduction.

UNIT-IV **8 Hours**

Expert System
Existing systems (DENDRAL, MYCIN), Domain exploration, Meta knowledge, Expertise transfer, Self explaining system.

UNIT-V **8 Hours**

Pattern Recognition
Introduction to pattern recognition, Structured description, Symbolic description, Machine perception, Line finding, Interception, Semantic & model, Object identification, Speech recognition.
Programming Language: Introduction to programming language, LISP, PROLOG

Text Books:

1. Charnick "Introduction to Artificial Intelligence." Addision Wesley.
2. Rich & Knight, "Artificial Intelligence",TMH, 2009

Reference Books:

1. Winston, "LISP", Addison Wesley.
2. Marcellous, "Expert Systems Programming", PHI.

Course Code: TCS 802 **L T P C**

Course Name: Advance Computer Architecture **3 0 0 3**

UNIT-I **8 Hours**

Review Of Basic Computer Architecture: Flynn's classification, Feng classification, Shore's classification, Quantitative techniques in computer design, Measuring and reporting performance, CISC and RISC processors. Amdahl' law.

UNIT-II **10 Hours**

Pipelining: Basic concepts, Instruction and arithmetic pipeline, Data hazards, Control hazards and structural hazards, Techniques for handling hazards, Exception handling, Pipeline optimization techniques, Compiler techniques for improving performance.

UNIT-III **8 Hours**

Instruction-Level Parallelism: Basic concepts, Techniques for increasing ILP, Superscalar, Super pipelined and VLIW processor architectures, Array and vector processors.

UNIT-IV **8 Hours**

Hierarchical Memory Technology: Inclusion, Coherence and locality properties, Cache memory organizations, Techniques for reducing cache misses, Virtual memory organization, Mapping and management techniques, Memory replacement policies.

UNIT-V **8 Hours**

Multiprocessor Architecture: Taxonomy of parallel architectures, Centralized shared-memory architecture, Synchronization, Memory consistency,Interconnection networks, Distributed shared-memory architecture, Cluster computers, Non von Neumann architectures, Data flow computers, Reduction computer architectures.

Text Books:

1. Computer Architecture: A Quantitative Approach, 4th Edition by Hennesey and Patterson, 2011
2. Kai Hwang, Advanced Computer Architecture-Parallelism, Scalability, Programmability, McGraw Hill John, 2003.

Course Code: TCS 811 **L T P C**

Course Name: Mobile Computing **3 0 0 3**

UNIT-I **8 Hours**

Introduction, Issues in mobile computing, Overview of wireless telephony, Cellular concept, GSM, Air-interface, Channel structure, Location management, HLR-VLR, Hierarchical, Handoffs, Channel allocation in cellular systems, CDMA, GPRS.

UNIT-II **8 Hours**

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

UNIT-III **8 Hours**

Wireless Networking, Wireless LAN overview, MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, Data broadcasting, Mobile IP, WAP architecture, Protocol stack, Application environment,

UNIT-IV **8 Hours**

Data management issues, Data replication for mobile computers, Adaptive clustering for mobile wireless networks, File system, Disconnected operations.

UNIT-V **8 Hours**

Mobile agents computing, Security and fault tolerance, Transaction processing in mobile computing environment.

Text Books:

1. D. P. Agrawal and Q-A. Zeng, Introduction to Wireless and Mobile Systems, Thomson, 2010.
2. Kumkum Garg, Mobile Computing, Theory and Practice, Pearson, 2010.

Reference Book:

1. Schiller, Mobile Communications, Addison Wesley.
2. Mehrotra , GSM System Engineering, ArTech House, 2008.

Course Code: TCS 812 **L T P C**

Course Name: Data Warehousing and Mining **3 0 0 3**

UNIT I **8 Hours**

Data preprocessing language, Architectures, Concept description, Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept hierarchy Generation, Data mining primitives, Query language, Graphical user interfaces, Concept description, Data generalization, Characterizations, Class comparisons, Descriptive statistical measures.

UNIT II **10 Hours**

Association Rule: Association rule mining, Single-dimensional boolean association Rules from transactional databases, Multi-level association rules from transaction databases, Mining multidimensional association rules, Association mining to correlation analysis, Constraint based association mining.

UNIT III **10 Hours**

Classification and Prediction: Classification and prediction, Issues, Decision tree Induction, Bayesian classification, Association rule based, Other classification methods, Prediction, Classifier accuracy.

UNIT IV **8 Hours**

Cluster Analysis: Cluster analysis, Types of data, Categorization of methods, Partitioning methods, Hierarchical methods, Density based methods, Grid based methods, Outlier analysis, Recent trends, Multidimensional analysis and descriptive mining of complex data objects, Spatial databases, Multimedia databases, Time series and sequence data, Text databases, World Wide Web, applications and trends in data mining.

UNIT V **8 Hours**

Data Warehousing: Introduction, data warehouse, Multidimensional data model, Data warehouse architecture, Implementation, Data warehousing to data mining, Data warehousing components, Building a data warehouse, Mapping the Data warehouse to an architecture, Data extraction, Cleanup, Transformation tools, Metadata, OLAP, Patterns and models, Data visualization principles.

Text Books:

1. J. Han and M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India MorganKauffman, 2001.
2. Alex Berson and Stephen J. Smith, “Data Warehousing, Data mining and OLAP”, Tata McGraw-Hill, 2004.

Reference Books:

1. Margaret H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, 2004.
2. Sam Anahory and Dennis Murry, “Data Warehousing in the Real World”, Pearson

Course Code: TCS 813 **L T P C**

Course Name: Distributed Systems **3 0 0 3**

UNIT-I **8 Hours**

Characterization of Distributed Systems: Introduction, Examples of distributed systems, Resource sharing and the web challenges, **System Models:** Architectural models, Fundamental Models, **Theoretical Foundation for Distributed System:** Limitation of distributed system, Absence of global clock, Shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, Global state, Termination detection. **Distributed Mutual Exclusion:** Classification of distributed mutual exclusion, Requirement of mutual exclusion theorem, Token based and non token based algorithms, Performance metric for distributed mutual exclusion algorithms.

UNIT-II **10 Hours**

Distributed Deadlock Detection: System model, Resource Vs communication deadlocks, Deadlock prevention, Avoidance, Detection & resolution, Centralized dead lock detection, Distributed dead lock detection, Path pushing algorithms, Edge chasing algorithms, **Agreement Protocols:** Introduction, System models, Classification of Agreement problem, Byzantine agreement problem, Consensus problem, Interactive consistency problem, Solution to Byzantine Agreement problem, Application of Agreement problem.

UNIT-III **8 Hours**

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study, **Security:** Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent, **Distributed File Systems:** File service architecture, Sun Network File System, The Andrew File System, Recent advances.

UNIT-IV **8 Hours**

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

UNIT-V **8 Hours**

Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm. CORBA Case study, CORBA RMI, CORBA services.

Text Books:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill, 2001.
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson, 2009.

Course Code: TCS 821 **L T P C**

Course Name: Cloud Computing **3 0 0 3**

UNIT-I **8 Hours**

Understanding Cloud Computing: Cloud computing, History of cloud computing, Cloud architecture, Cloud storage, Advantages of cloud computing, Disadvantages of cloud computing, Companies in the cloud today, Cloud services

UNIT-II **8 Hours**

Developing Cloud Services: Web-Based application, Pros and cons of cloud service development, Types of cloud service development, Software as a service, Platform as a service, Web services, On-demand computing, Discovering cloud services development services and tools, Amazon ec2, Google app engine, IBM clouds.

UNIT-III **8 Hours**

Cloud Computing For Everyone: Centralizing email communications, Collaborating on schedules, Collaborating on to do lists, Collaborating contact lists, Cloud computing for the community, Collaborating on group projects and events, Cloud computing for the corporation.

UNIT-IV **9 Hours**

Using Cloud Services: Collaborating on calendars, Schedules and task management, Exploring online scheduling applications, Exploring online planning and task management, Collaborating on event management, Collaborating on contact management, Collaborating on project management, Collaborating on word processing, Collaborating on databases, Storing and sharing files

UNIT-V **9 Hours**

Other Ways To Collaborate Online: Collaborating via web-based communication tools, Evaluating web mail services, Evaluating web conference tools, Collaborating via social networks and groupware, Collaborating via blogs and wikis.

Text Books:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

Course Code: TCS 822 **L T P C**

Course Name: System Software **3 0 0 3**

UNIT -I **8 Hours**

Machine Architecture: Introduction, System software and its relation to machine architecture, Simplified instructional computer (SIC), Architecture of SIC machine , SIC programming examples.

UNIT -II **10 Hours**

Assemblers: Basic assembler functions, Simple sic assembler, Algorithm and data structures for assemblers, Machine dependent assembler features, Instruction formats & addressing modes, Program relocation, Machine independent assembler features, Literals, Symbol-definition statements, Expression, Program blocks, Control sections and programming linking, Assembler design operations, One-pass assembler, Multi-pass assembler, Implementation examples, Masm assembler.

UNIT-III **10 Hours**

Loaders and Linkers: Basic loader functions, Design of an absolute loader, Simple bootstrap loader, Machine-dependent loader features, Relocation, Program linking, Algorithm and data structures for a linking loader, Machine-independent loader features, Automatic library search, Loader options, Loader design options, Linkage editor, Dynamic linkage, Bootstrap loaders.

Editors and Debugging Systems: Text editors, Overview of editing process, User interface, Editor structure, Interactive debugging systems, Debugging functions and capabilities, Relationship with other parts of the system, User-interface criteria

UNIT-IV **8 Hours**

Macro Processor: Basic macro processor functions, Macro definitions and expansion, Macro processor algorithm and data structures, Machine-independent macro processor features, Concatenation of macro parameters, Generation of unique labels, Conditional macro expansion, Keyword macro parameters, Macro processor design options, Recursive macro expansion, General-purpose macro processors, Macro processing within language translators, Implementation example, ANSI C macro processor.

UNIT-V **8 Hours**

Lex and Yacc : Lex and Yacc, Simplest lex program, Recognizing words with lex, Symbol tables, Grammars, Parser-lexer communication, Parts of speech lexer, Yacc parser, Rules section, Running lex and yacc, Lex and hand- written lexers, Using lex Regular expression, Examples of regular expressions, Word counting program, Parsing a command line, using yacc, Grammars, Recursive rules, Shift/reduce parsing, Yacc parser, Definition section, Rules section, Symbol values and actions, Lexer, Compiling and running a simple parser, Arithmetic expressions and ambiguity, Variables and typed tokens.

Text Books:

1. Leland.L.Beck: System Software: an introduction to systems programming, 3rd Edition, Addison-Wesley, 1997.

2. John.R.Levine, Tony Mason and Doug Brown: Lex and Yacc, O'Reilly, SPD, 1998.

Course Code: TCS 823 **L T P C**

Course Name: Knowledge Management **3 0 0 3**

UNIT-I **8 Hours**

Introduction: Key concepts, Knowledge representation and reasoning, Language of first order logic, Syntax, semantic pragmatics, Expressing knowledge, Levels of representation, Knowledge acquisition and sharing, Sharing ontology, Language Ontology, Language Patterns, Tools for knowledge acquisition.

UNIT-II **8 Hours**

Resolution and Reasoning: Proportional case, Handling variables and qualifies, Dealing with intractability, Reasoning with horn clauses, Procedural control of reasoning, Rules in production, Description logic, Vivid knowledge, Beyond vivid.

UNIT-III **8 Hours**

Representation: Object oriented representations, Frame formalism, Structured descriptions, Meaning and entailment, Taxonomies and Classification, Inheritance, Networks strategies for defensible inheritance, Formal account of inheritance networks.

UNIT-IV **9 Hours**

Defaults, Uncertainty and Expressivene: Defaults, Introduction to closed world reasoning, Circumscription, Default logic limitations of logic, Fuzzy logic, Non-monatomic logic, Theories and world semiotics Auto epistemic logic, Vagueness, Uncertainty and Degrees of belief, Non-categorical reasoning, Objective and subjective probability.

UNIT-V **9 Hours**

Actions and Planning: Explanation and diagnosis, Purpose, Syntax, Semantics of context, First order reasoning, Modal reasoning in context, Encapsulating objects in context, Agents, Actions, Situational calculus, Frame problem, Complex actions, Planning, Strips, Planning as reasoning, Hierarchical and conditional planning.

Text Books:

1. Ronald Brachman, Hector Levesque “Knowledge Representation and Reasoning”, The Morgan Kaufmann Series in Artificial Intelligence 2004.
2. John F. Sowa, “ Knowledge Representation: Logical, Philosophical, and Computational Foundations”, 2000.

Reference Books:

1. Arthur B. Markman, “Knowledge Representation”, Lawrence Erlbaum Associates, 1998.