UG Syllabus Under CBCS
2019 Admission Batch Onwards
Information Technology Management (ITM)
Scheme of UG ITM Under Choice Based Credit System (CBCS)
<u>Courses for Honours Students</u>

SEM.	COURSE	COURSE CODE	MARKS	CREDITS	TITLE	REMARKS
I	Core	C-1	100	6	Digital Logic	Compulsory
		C-2	100	6	Programming using C	
	Generic Elective	GE-1	100	6	Discrete Mathematical Structures	Compulsory
	Ability Enhancement	AECC-1	100	4	Environmental Science	Compulsory
II	Core	C-3	100	6	Computer Organization	Compulsory
		C-4	100	6	Data Structure	
	Generic Elective	GE-2	100	6	Numerical Techniques	Compulsory
	Ability Enhancement	AECC-2	100	4	MIL Communication (English/Odia/Hindi)	Compulsory
III	Core	C-5	100	6	Programming using C++	Compulsory
		C-6	100	6	Database Systems	
		C-7	100	6	Principle of Management	

SEM.	COURSE	COURSE CODE	MARKS	CREDITS	TITLE	REMARKS
III	Generic Elective	GE-3	100	6	Theory of Computation	Compulsory
	Skill Enhancement	SEC-1	100	4	Communicative English	Compulsory
IV	Core	C-8	100	6	Java Programming	Compulsory
		C-9	100	6	Business Accounting	
		C-10	100	6	Operating Systems	
	Generic Elective	GE-4	100	6	Quality Assurance and Testing	Compulsory
	Skill Enhancement	SEC-2	100	4	Quantitative Aptitude and Logical Reasoning	Compulsory

SEM.	COURSE	COURSE CODE	MARKS	CREDITS	TITLE	REMARKS
V	Core	C-11	100	6	Web Technologies	
		C-12	100	6	Software Engineering	Compulsory
	Discipline Specific	DSE-1	100	6	Computer Network Security	Compulsory
		DSE-2	100	6	Organizational Behavior	Compulsory
	Skill Enhancement	SEC-3	100	4	Python Programming	Compulsory
VI	Core	C-13	100	6	Management Accounting	Compulsory
		C-14	100	6	Computer Networks	Compulsory
	Discipline Specific	DSE-3	100	6	Marketing Management	Compulsory
		DSE-4	100	6	E-Commerce / Project	Compulsory
	Skill Enhancement	SEC-4	100	4	Android Programming	Compulsory

ITM (HONOURS)
SEMESTER I
Core Course
C-1: Digital Logic (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Character Codes, Decimal System, Binary System, Decimal to Binary Conversion, Hexadecimal Notation, Boolean Algebra, Basic Logic Functions: Electronic Logic Gates, Synthesis of Logic Functions, Minimization of Logic Expressions, Minimization using Karnaugh Maps, Synthesis with NAND and NOR Gates, Tri-State Buffers

Unit-2

Arithmetic: Addition and Subtraction of Signed Numbers, Addition/ Subtraction Logic Unit, Design of Fast Adders: Carry-Lookahead Addition, Multiplication of Positive Numbers, Signed-Operand Multiplication: Booth Algorithm, Fast Multiplication: Bit-Pair Recodng Multipliers, Carry-Save Addition of Summands, Integer Division, Floating-Point Numbers and Operations: IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers, Guard Bits and Truncation, Implementing Floating-Point Operations.

Unit-3

Flip-Flops, Gated Latches, Master-Slave Flip-Flops, Edge-Triggering, T Flip-Flops, JK Flip- Flops. Registers and Shift Registers, Counters, Decoders, Multiplexers, Programmable Logic Devices (PLDs), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Array (FPGA), Sequential Circuits, UP/ DOWN Counters, Timing Diagrams, The Finite State Machine Model, Synthesis of Finite State Machines.

Unit-4
Memory System: Semiconductor RAM Memories, Internal Organization of Memory Chips, Static Memories, Asynchronous DRAMS, Synchronous DRAMS, Structure of Large Memories, Memory System Considerations, RAMBUS Memory. Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size, and Cost of Memory. Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems.

Text Books:

1. Carl Hamacher, Z. Vranesic, S. Zaky: Computer Organization, 5/e (TMH)

Reference Books:

   1. M. Morris Mano: Digital Logic and Computer Design, Pearson

C–1: Practical/Tutorial: Digital Logic Lab

1. Introduction to Xilinx software (VHDL)

Write the VHDL code for

2. Realizing all logic gates.

3. Combination Circuit.

4. ADDER.

5. SUBTRACTOR.

6. MUX.

7. DE-MUX.

8. Encoder.

9. Decoder.

10. PAL.

11. PLA.

Write the VHDL program for the following Sequential Logic Circuits

12. Flip Flops.

13. Shift Registers.

14. Counters.

15. Memory Elements.

ITM (HONOURS)
SEMESTER I
Core Course
C-2: Programming Using C (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1
Introduction: Introduction to Programming Language, Introduction to C Programming, Keywords & Identifiers, Constants, Variables, Input and Output Operations, Compilation and pre-processing, **Data types**: Different data types, Data types qualifier, modifiers, Memory representation, size and range, **Operators:** Operators (Arithmetic, Relational, Logical, Bitwise, Assignment & compound assignment, Increment & Decrement, Conditional),Operator types(unary, binary, ternary). Expressions, Order of expression (Precedence and associativity)
Control structures: Decision Making and Branching (Simple IF Statement, IF…ELSE Statement, Nesting IF… ELSE Statement, ELSE IF Ladder), Selection control structure (Switch Statement).
Unit-2
Loops: The WHILE Statement, The DO…WHILE Statement, The FOR Statement, Jumps in Loops, **Array:** Concept of Array, Array Declaration, types of array (one and multiple dimension), Character Arrays and Strings, Subscript and pointer representation of array, Array of Pointers, Limitation of array, **Pointers**: Concept of Pointer (null pointer, wild pointer, dangling pointer, generic pointer), Pointer Expressions, Accessing the Address of a Variable, Declaring Pointer Variables, Initializations of Pointer Variable, Accessing a Variable through its Pointer, Pointer arithmetic.

Unit-3
class: Types (auto,register,static,extern), scope rules, declaration and definition.**Function**: Function & types (User defined function, library function) Function Definition, Declaration, Function Calls, Header file and library, Function Arguments,string handling function (strlen,strcmp,strcpy,strncpy,strcat,strstr),Function recursion, Functions Returning Pointers, Pointers to Functions, Command line arguments, Application of pointer(dynamic memory allocation).

Unit-4
Structure and Union: Defining, Declaring, Accessing, Initialization Structure, nested structure, self-referential structure, bit-field, Arrays of Structures, Structures and Functions, Unions, difference between structure and union, active data member, structure within union, Self-referential Structure.
File: File Management in C, Defining and Opening a File, File opening modes(read,write,append), Closing a File, File operations, file and stream, Error Handling During I/O Operations, sequential and random access file,low level and high level file.
Text Books:
   1. E. Balagurusamy, "Programming in ANSI C",4/e, (TMH)

Reference Books:
1. B. Kernighan & Dennis Ritchie, "The C Programming Language", 2/e PHI
2. Paul Deitel, Harvey Deitel, "C: How to Program", 8/e, Prentice Hall.
3. P.C. Sethi, P.K. Behera, "Programming using C", Kalyani Publisher, Ludhiana

C2: Practical/Tutorial: Programming Fundamentals using C Lab
1. Write a Program to find greatest among three numbers.
2. Write a Program to all arithmetic operation using switch case.
3. Write a Program to print the sum and product of digits of an integer.
4. Write a Program to reverse a number.
5. Write a Program to compute the sum of the first n terms of the following series
$$S = 1+1/2+1/3+1/4+\ldots\ldots$$
6. Write a Program to compute the sum of the first n terms of the following series
$$S = 1-2+3-4+5\ldots\ldots\ldots.$$
7. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
8. Write a function to find whether a given no. is prime or not. Use the same to generate theprime numbers less than 100.
9. Write a Program to compute the factors of a given number.
10. Write a program to swap two numbers using macro.
11. Write a Program to print a triangle of stars as follows (take number of lines from user):

$$
\begin{array}{c}
* \\
*** \\
***** \\
****
\end{array}
$$

12. Write a Program to perform following actions on an array entered by the user:
    a) Print the even-valued elements
    b) Print the odd-valued elements
    c) Calculate and print the sum and average of the elements of array
    d) Print the maximum and minimum element of array
    e) Remove the duplicates from the array
    f) Print the array in reverse order

    The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.
13. Write a Program that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
14. Write a program that swaps two numbers using pointers.
15. Write a program in which a function is passed address of two variables and then alter its contents.
16. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
17. Write a program to find sum and average of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc( ) functions.
18. Write a menu driven program to perform following operations on strings:
    a) Show address of each character in string
    b) Concatenate two strings without using strcat function.
    c) Concatenate two strings using strcat function.

d) Compare two strings

e) Calculate length of the string (use pointers)

f) Convert all lowercase characters to uppercase

g) Convert all uppercase characters to lowercase

h) Calculate number of vowels

i) Reverse the string

19. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.

20. Write a program to copy the content of one file to other.

ITM (HONOURS)
SEMESTER I
Generic Elective Course
GE-1: Discrete Mathematical Structures (Theory: 4 Credits; Practical: 2 Credits)
Full marks - 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Logics and Proof: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers Nested Quantifiers, Rules inference, Mathematical Induction.
Sets and Functions: Sets, Relations, Functions, Closures of Equivalence Relations,Partial ordering well ordering, Lattice, Sum of products and product of sums principle of Inclusions and Exclusions

Unit-2

Combinatory: Permutations, Combinations, Pigeonhole principle

Recurrence Relation: Linear and Non-linear Recurrence Relations, Solving Recurrence Relation using Generating Functions.

Unit-3

Graphs:Introduction to graphs, graphs terminologies, Representation of graphs, Isomorphism,

Connectivity& Paths: Connectivity, Euler and Hamiltonian Paths, Introduction to tree, tree traversals, spanning tree and tree search: Breadth first search, Depth first search, cut-set, cut-vertex.

Unit-4

Modeling Computation: Finite State Machine, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata(NFA), Grammars and Language,Application of Pumping Lemma for Regular Language.

Text Books:
1. "Discrete Mathematics and its Applications with Combinatory and Graph Theory" 7th edition by Kenneth H. Rosen.

Reference Books:
1. Elements of Discrete Mathematics by C.L. Liu and D.P. Mohapatra, TMH, 2012
2. J.P Tremblay, R.Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TMH, 1997.

GE-1: Practical/Tutorial: Discrete Mathematical Structures Lab
Write the following programs using C/ C++

1. Tower of Hanoi
2. Graph representation using Adjacency List.
3. Graph representation using Adjacency Matrix.
4. String Matching using finite state machine.
5. Detecting whether a number is even or odd using Finite State Machine.
6. To identify keywords such as char, const, continue using Finite State Machine.
7. To find the power set for a given set.
8. To find GCD of two numbers using recursion.
9. To find Binomial coefficients.
10. To find Permutation and Combination result for a given pair of values n and r.
11. To check a number is prime or not.
12. To calculate the Euclidean distance between two points.
13. To find the Roots of polynomials.
14. Find the shortest path pair in a plane.

Ability Enhancement Compulsory Course
AECC-1: Environmental Science (4 Credits)
Full marks -100 (Mid-Sem: 20; End-Sem: 80)

Unit-1

The Environment: The Atmosphere, Hydrosphere, Lithosphere, Biosphere, Ecology, Ecosystem, Biogeochemical Cycle (Carbon Cycle, Nitrogen Cycle), Environment Pollution: Air Pollution, Water Pollution, Soil Pollution, Radiation Pollution.

Unit-2

Population Ecology: Individuals, Species, Pollution, Community, Control Methods of Population, Urbanization and its effects on Society, Communicable Diseases and its Transmission, Non-Communicable Diseases.

Unit-3

Environmental Movements in India: Grassroot Environmental movements in India, Role of women, Environmental Movements in Odisha, State Pollution Control Board, Central Pollution Control Board.

Unit-4

Natural Resources: Conservation of Natural Resources, Management and Conservation of Wildlife, Soil Erosion and Conservation, Environmental Laws: Water Act, 1974, Air Act, 1981, The Wildlife (Protection) Act, 1972, Environment Protection, 1986, Natural Disasters and their Management.

Suggested Readings:

Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.

Gadgil, M., & Guha, R. 1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.

Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.

Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.

Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.

Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science,* 339: 36-37.

McCully, P. 1996. *Rivers no more: the environmental effects of dams* (pp. 29-64). Zed Books.

McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.

Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.

ITM (HONOURS)
SEMESTER II
Core Course
C-3: Computer Organization (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Basic Structure of Computers: Computer Types, Functional Units, Input Unit, Memory Unit, Arithmetic and Logic Unit, Output Unit, Control Unit, Basic Operational Concepts, Bus Structures, Software. Machine Instructions and Programs: Numbers, Arithmetic Operations, and Characters: Number Representation, Addition of Positive Numbers, Addition and Subtraction of Signed Numbers, Overflow of Integer Arithmetic, Floating-Point Numbers & Operations, Characters, Memory Locations and Addresses, Byte Addressability, Word Alignment, Accessing Numbers, Characters, and Character Strings, Memory Operations, Instructions and Instruction Sequencing, Register Transfer Notation, Basic Instruction Types, Instruction Execution and Straight-Line Sequencing, Branching, Condition Codes, Generating Memory Addresses, Addressing Modes, Implementation of Variables and Constants, Indirection and Pointers, Indexing and Arrays, Relative Addressing.

Unit-2

Basic Processing Unit: Register Transfers, Performance on Arithmetic or Logic Operation, fetching a Word from Memory, Storing a Word in Memory. Execution of a Complete Instruction, Branch Instruction, Multiple Bus Organization Hardwired Control, A Complete Processor. Micro-programmed Control: Microinstructions, Microprogram Sequencing, Wide-Branch Addressing, Microinstructions with Next-Address Field, Prefetching Microinstructions, Emulation.

UNIT-3

Input/ Output Organization: Accessing I/O Devices, Interrupts, Interrupt Hardware, Enabling & Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions. Direct Memory Access, Bus Arbitration, Buses, Synchronous Bus, Asynchronous Bus, Interface Circuits: Parallel Port, Serial Port, Standard I/O Interfaces, Peripheral Component Interconnect (PCI) Bus, SCSI Bus, Universal Serial Bus (USB)

Unit-4

Pipelining: Role of Cache Memory, Pipeline Performance, Data Hazards: Operand Forwarding, Handling Data Hazards in Software, Side Effects. Instruction Hazards: Unconditional Branches, Conditional Branches and Branch Prediction. Influence on Instruction Sets: Addressing Modes, Condition Codes, Data path and Control Considerations. Superscalar Operation: Out-of-Order Execution, Execution Completion, Dispatch Operation, RISC & CISC Processors.

Text Books

1. Carl Hamacher, Z. Vranesic, S. Zaky: Computer Organization, 5/Ed (TMH)

Reference Books

2. William Stallings: Computer Organization and Architecture (Design for Performance), 9/Ed
3. S. Brown, & Z. Vranesic, "Fundamentals of Digital Logic Design with VHDL", 2/Ed, McGraw-Hill

C–3: Practical/Tutorial: Computer Organization Lab

1. Study of the complete Architecture of 8085 Microprocessor along with its instruction set.
2. Introduction to GNU Simulator 8085, with its features.
3. Write an Assembly Language Program to add N consecutive numbers.
4. Write an Assembly Language Program to find the smallest and largest number from a given series.
5. Write an Assembly Language Program for subtraction of two 8-bit numbers.
6. Write an Assembly Language Program for displaying a Rolling message "Hello 123".
7. Write an Assembly Language Program to perform ASCII to Decimal conversion.
8. Write an Assembly Language Program to add two unsigned binary numbers.
9. Write an Assembly Language Program to subtraction of two unsigned binary numbers.

Demonstrate the followings:

10. Assembling and Dis-assembling of computer.
11. Trouble shooting in Computer.

ITM (HONOURS)
SEMESTER II
Core Course
C-4: Data Structure (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Introduction: Basic Terminology, Data structure, Time and space complexity, Review of Array, Structures, Pointers.
Linked Lists: Dynamic memory allocation, representation,Linked list insertion and deletion, Searching, Traversing in a list, Doubly linked list, Sparse matrices.

Unit-2

Stack: Definition, Representation, Stack operations, Applications (Infix–Prefix–Postfix Conversion & Evaluation, Recursion).
Queues: Definition, Representation, Types of queue, Queue operations, Applications.

Unit-3

Trees: Tree Terminologies, General Tree, Binary Tree, Representations, Traversing, BST, Operations on BST, Heap tree, AVL Search Trees, M-way search tree, Applications of all trees.

Unit-4

Sorting: Exchange sorts, Selection Sort, Bubble sort, Insertion Sorts, Merge Sort, Quick Sort, Radix Sort, Heap sort.
Searching: Linear search, Binary search.

Text Books:

1. Classic Data Structure ,P.Samanta , PHI , 2/ed

Reference Books:

1. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Publications, 2000.

2. Sastry C.V., Nayak R, Ch. Rajaramesh, Data Structure & Algorithms, I.K.International Publishing House Pvt.Ltd, New Delhi.

C – 4: Practical/Tutorial: Data Structure Lab

Write a C/ C++ Program for the followings

1. To insert and delete elements from appropriate position in an array.
2. To search an element and print the total time of occurrence in the array.
3. To delete all occurrence of an element in an array.
4. Array implementation of Stack.
5. Array implementation of Linear Queue.
6. Array implementation of Circular Queue.
7. To implement linear linked list and perform different operation such as node insert and delete, search of an item, reverse the list.
8. To implement circular linked list and perform different operation such as node insert and delete.
9. To implement double linked list and perform different operation such as node insert and delete.
10. Linked list implementation of Stack.
11. Linked list implementation of Queue.
12. Polynomial representation using linked list.
13. To implement a Binary Search Tree.
14. To represent a Sparse Matrix.
15. To perform binary search operation.
16. To perform Bubble sort.
17. To perform Selection sort.
18. To perform Insertion sort.
19. To perform Quick sort.
20. To perform Merge sort.

ITM (HONOURS)
SEMESTER II
Generic Elective Course
GE-2: Numerical Techniques (Theory: 4 Credits; Practical: 2 Credits)
Full marks - 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Floating point representation and computer arithmetic, Significant digits, Errors: Round-off error, Local truncation error, Global truncation error, Order of a method, Convergence and terminal conditions, Efficient computations.

Unit-2

Bisection method, Secant method, Regula−Falsi method Newton−Raphson method, Newton's method for solving nonlinear systems.

Unit-3

Interpolation: Lagrange's form and Newton's form Finite difference operators, Gregory Newton forward and backward differences Interpolation Piecewise polynomial interpolation: Linear interpolation.

Unit-4

Numerical integration: Trapezoid rule, Simpson's rule (only method), Newton−Cotes formulas, Gaussian quadrature, Ordinary differential equation: Euler's method Modified Euler's methods, Runge-Kutta second methods

Text books

1. S.S. Sastry, "Introductory Methods of Numerical Analysis", EEE , 5/ed.
2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012)

Reference books

1. Numerical Analysis: J. K. Mantri & S. Prahan, Laxmi Publication.
2. Introduction to Numerical Analysis, Josef Stoer and Roland Bulirsch, Springer.

GE/IC – 2 Practical/Tutorial: Numerical Methods Lab
Implement using C/ C++ or MATLAB/Scilab

1. Find the roots of the equation by bisection method.
2. Find the roots of the equation by secant/Regula–Falsi method.
3. Find the roots of the equation by Newton's method.
4. Find the solution of a system of nonlinear equation using Newton's method.
5. Find the solution of tri-diagonal system using Gauss Thomas method.
6. Find the solution of system of equations using Jacobi/Gauss-Seidel method.
7. Find the cubic spline interpolating function.
8. Evaluate the approximate value of finite integrals using Gaussian/Romberg integration.
9. Solve the boundary value problem using finite difference method.

Ability Enhancement Compulsory Course
AECC-2: MIL Communication (English/Odia/Hindi) (4 Credits)
Full marks -100 (Mid-Sem: 20; End-Sem: 80)

English

Unit 1: Short Story
- (i) Jim Corbett – The Fight between Leopards
- (ii) Dash Benhur – The Bicycle
- (iii) Dinanath Pathy – George V High School
- (iv) Alexander Baron – The Man Who knew too much
- (v) Will F Jenkins – Uneasy Homecoming

Unit 2: Prose
- (i) Mahatma Gandhi – The way to Equal Distribution
- (ii) S Radhakrishnan – A Call to Youth
- (iii) C. V. Raman – Water- The Elixir of Life
- (iv) Harold Nicolson – An Educated Person
- (v) Claire Needell Hollander – No Learning Without Feeling

Unit 3:
- (i) Comprehension of a passage and answering the questions

Unit 4:
- (ii) Language exercises-test of vocabulary and grammar

Text Books:
All Stories and Prose pieces

Reference Books:
- (i) The Widening Arc: A Selection of Prose and Stories, Ed. A R Parhi, S Deepika, P Jani, Kitab Bhavan, Bhubaneswar.
- (ii) A Communicative Grammar of English, Geoffrey Leech.
- (iii) A University Grammar of English, Randolph Quirk and Sidney Greenbaum
- (iv) Developing Reading Skills. F. Grellet. Cambridge: Cambridge University Press, 1981

Odia

ସବିଶେଷ ପାଠ୍ୟ

ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ଓଡ଼ିଆ (AECC)

ପାଠ୍ୟ-୧ / Course – 1: ଯୋଗାଯୋଗ ଅନୁବିଧୁ, ରୀତି ଓ ମାଧମ

୧ମ ଏକକ : ଯୋଗାଯୋଗର ପରିଭାଷା, ଅନୁବିଧୁ, ପରିସର ଓ ପ୍ରକାରଭେଦ

୨ୟ ଏକକ : ସାକ୍ଷାତକାର, ଭାଷଣ କଳା

୩ୟ ଏକକ : ସମ୍ୱାଦର ପରିଭାଷା, ପରିସର ଓ ସମ୍ୱାଦ ପ୍ରସ୍ତୁତି

୪ର୍ଥ ଏକକ : ଓଡ଼ିଆ ଭାଷାର ବର୍ଣ୍ଣମାଳା, ବର୍ଣ୍ଣାଶୁଦ୍ଧିର ନିରାକରଣ । (ବନାନ ତ୍ରୁଟି - ସାଦୃଶ୍ୟଜନିତ ଅଶୁଦ୍ଧି, ଲିଙ୍ଗଗତ ଅଶୁଦ୍ଧି, ସନ୍ଧିଗତ ଅଶୁଦ୍ଧି, ସମାସଗତ ଅଶୁଦ୍ଧି, ବଚନ ଓ ବିଭକ୍ତିଗତ ଅଶୁଦ୍ଧି, ବାକ୍ୟ ବିନ୍ୟାସଜନିତ ଅଶୁଦ୍ଧି, ସମାର୍ଥବୋଧକ ଶବ୍ଦାଶୁଦ୍ଧି, ପ୍ରତ୍ୟୟ ଜନିତ ଅଶୁଦ୍ଧି, ଶବ୍ଦ ସଂଯୋଗାମ୍ଳକ ଓ ସ୍ୱରସଙ୍ଗତି ଜନିତ ଅଶୁଦ୍ଧି)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ (ପାଠ୍ୟ-୧ / Course – 1)

୧. ଯୋଗାଯୋଗ ମୂଳକ ମାତୃଭାଷା (ଓଡ଼ିଆ) ସାମଲ ବିରଞ୍ଜି ନାରାୟଣ, ସତ୍ୟନାରାୟଣ ବୁକ ଷ୍ଟୋର, କଟକ ।

୨. ସଂଯୋଗ ଅନୁବିଧୁ, ସନ୍ତୋଷ କୁମାର ତ୍ରିପାଠୀ, ନାଳନ୍ଦା, କଟକ

୩. ଭାଷଣ କଳା ଓ ଅନ୍ୟାନ୍ୟ ପ୍ରସଙ୍ଗ - କୁଞ୍ଜବନ୍ଧୁ ପ୍ରଧାନ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର, କଟକ

୪. ପ୍ରାୟୋଗିକ ଓଡ଼ିଆ ଭାଷା – ଓଡ଼ିଶା ରାଜ୍ୟପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୧. ସମ୍ୱାଦ ଓ ସାମ୍ୱାଦିକତା – ଚନ୍ଦ୍ରଶେଖର ମହାପାତ୍ର, ଓଡ଼ିଶା ରାଜ୍ୟ ପାଠ୍ୟପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୧. ନିର୍ଭୁଲ ଲେଖାର ମୂଳସୂତ୍ର, ନୀଳାଦ୍ରିଭୂଷଣ ହରିଚନ୍ଦନ, ପି.ସି.ଆର ପବ୍ଲିକେସନ, ଭୁବନେଶ୍ୱର

୨. ସର୍ବସାର ବ୍ୟାକରଣ - ନାରାୟଣ ମହାପାତ୍ର ଓ ଶ୍ରୀଧର ଦାସ, ନିୟୁ ଷ୍ଟେଣ୍ଡସ୍ ଷ୍ଟୋର, କଟକ

Hindi

AECC : HINDI (MIL)

UNIT - I
कविता

(i) कबीर – साखी : 1 से 10
(ii) तुलसी – विनयपत्रिका – पद 1 और 2
(iii) प्रसाद – मधुमय देश
(iv) निराला – भिक्षुक
(v) अज्ञेय – हिरोशिमा

UNIT - II
गद्य

(i) रामचन्द्र शुक्ल – उत्साह
(ii) हजारी प्रसाद द्विवेदी – कुटज
(iii) हरिशंकर परसाई – सदाचार का तावीज

UNIT - III
शब्द ज्ञान

(i) शब्द शुद्धि
(ii) वाक्य शुद्धि
(iii) पर्यायवाची शब्द
(iv) विलोम शब्द

UNIT - IV
सामान्य ज्ञान

(i) निबंध लेखन (Essay Writing)

पाठ्य पुस्तक :

1. हिन्दी प्रसून – सं. डॉ. अंजुमन आरा, प्लानेट वी, कटक

ITM (HONOURS)
SEMESTER III
Core Course
C-5: Programming using C++ (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Principles of Object-Oriented Programming: Object-Oriented Programming (OOP) Paradigm, Basic Concepts of OOP, Benefits of OOP, Characteristics of OOPS, Object Oriented Languages, Applications of OOP. Introduction to C++, Difference between C & C++, Tokens, Data types, Operators, Structure of C++ Program, C++ statements, Expressions and Control Structures. Functions in C++: Argument passing in function, Inline Functions, Default Arguments, Const. Arguments, Friend function.

Unit-2

Classes and Objects: Defining Member Functions, Making an outside Function Inline, Nested Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friend Functions. Constructors & Destructors: Constructors, Parameterized Constructors, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Destructors.

Unit-3

Inheritance: Basics of Inheritance, Type of Inheritance, Virtual Base Classes, Abstract Classes, Member Classes, Nesting of Classes. Polymorphism: Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions, Function Overloading, Operator Overloading.

Unit-4

Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators.
Files: Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, File Modes, File Pointers and their Manipulations, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling during File Operations, Command-line Arguments.

Text Books

1. E. Balgurusawmy, Object Oriented Programming with C++, 4/e (TMH).
2. Paul Deitel, Harvey Deitel, "C++: How to Program", 9/e. Prentice Hall.

Reference Books:

1. Bjarne Stroustroup, Programming - Principles and Practice using C++, 2/e, Addison-Wesley 2014
2. HerbtzSchildt, C++: The Complete reference, MGH, 4/ed.
3. P. C. Sethi, P. K. Behera, "Programming in C++"- Kalyani Publisher, Ludhiana

C–5: Practical/Tutorial: Programming using C++ Lab

1. Write a Program to find greatest among three numbers using nested if…else statement.
2. Write a Program to check a number is prime or not.
3. Write a Program to find the GCD and LCM of two numbers.
4. Write a program to print the result for following series: 1! + 2! + 3! + …………
5. Write a program to print multiplication table from 1 to 10.
6. Write a Program for Swapping of two numbers using pass by value.
7. Write a Program for Swapping of two numbers using pass by address.
8. Write a Program for Swapping of two numbers using pass by reference.
9. Write a Program to find sum of four numbers using default argument passing.
10. Write a Program to find square and cube of a number using inline function.
11. Write a Program to find the factorial of a number.
12. Write a Program to find reverse of a number.
13. Write a program to find sum of four numbers using default argument passing in member function.
14. Write a Program to find area of circle, triangle and rectangle using function overloading.
15. Write a program to distinguish the properties of static and non-static ata members.
16. Write a program to show the method of accessing static private member function.
17. Write a program to show the ways of calling constructors and destructors.
18. Write a program to perform ++ operator overloading using member function.
19. Write a program to perform ++ operator overloading using friend function.
20. Write a program to perform + operator overloading for two complex number addition.
21. Write a program to perform + operator overloading for string concatenation.
22. Write a program to perform single inheritance.
23. Write a program to perform multiple inheritance.

24. Write a program to create an integer array using new operator and find the sum and average of array elements.
25. Write a program to implement virtual destructor.
26. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
27. Write a program to Copy the contents of one file to other.

ITM (HONOURS)
SEMESTER III
Core Course
C-6: Database Systems (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Introduction to Database and Database Users, Database System Concepts and Architecture: data Models, schema, and instances, Conceptual Modeling and Database Design: Entity Relationship (ER) Model: Entity Types, Entity Sets, Attributes, Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, ER Naming Conventions. Enhanced Entity-Relationship (EER) Model.

Unit-2

Database Design Theory and Normalization: Functional Dependencies, Normal Forms based on Primary Keys, Second and third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

Unit-3

Relational data Model and SQL: Relational Model Concepts, Basic SQLs, SQL Data Definition and Data types, Constraints in SQL, Retrieval Queries in SQL, INSERT, DELETE, UPDATE Statements in SQL, Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT, Binary Relation: JOIN and DIVISION.

Unit-4

Introduction to Transaction ProcessingConcepts and Theory: Introduction to Transaction Processing, Transaction and System Concepts, Properties of Transactions, Recoverability, Serializability, Concurrency Control Techniques, Locking techniques for Concurrency Control, Concurrency Control based on Time-Stamp Ordering.

Text Book:

1. Fundamentals of Database Systems, 6th edition, RamezElmasri, ShamkantB.Navathe, Pearson Education

Reference Book:

1. An Introduction to Database System, Date C.J.- Pearson Education, New Delhi- 2005

C-6 Practical/Tutorial: Database Systems Lab

Create and use the following database schema to answer the given queries.

EMPLOYEE Schema				
Field	**Type**	**NULL KEY**		**DEFAULT**
Eno	Char(3)	NO	PRI	NIL
Ename	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	Yes	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES	FK	NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL
DEPARTMENT Schema				
Field	**Type**	**NULL KEY**		**DEFAULT**
Dno	Integer	No	PRI	NULL
Dname	Varchar(50)	Yes		NULL
Location	Varchar(50)	Yes		New Delhi

Query List

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.

2. Query to display unique Jobs from the Employee Table.

3. Query to display the Employee Name concatenated by a Job separated by a comma.

4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.

5. Query to display the Employee Name and Salary of all the employees earning more than $2850.

6. Query to display Employee Name and Department Number for the Employee No= 7900.

7. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.

8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.

9. Query to display Name and Hire Date of every Employee who was hired in 1981.

10. Query to display Name and Job of all employees who don't have a current Manager.

11. Query to display the Name, Salary and Commission for all the employees who earn commission.

12. Sort the data in descending order of Salary and Commission.

13. Query to display Name of all the employees where the third letter of their name is 'A'.

14. Query to display Name of all employees either have two 'R's or have two 'A's in their name and are either in Dept No = 30 or their Mangers Employee No = 7788.

15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.

16. Query to display the Current Date.

17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.

18. Query to display Name and calculate the number of months between today and the date each employee was hired.

19. Query to display the following for each employee <E-Name> earns <Salary> monthly but wants <3*Current Salary>. Label the Column as Dream Salary.

20. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with 'J', 'A' and 'M'.

21. Query to display Name, Hire Date and Day of the week on which the employee started.

22. Query to display Name, Department Name and Department No for all the employees.

23. Query to display Unique Listing of all Jobs that are in Department # 30.

24. Query to display Name, Department Name of all employees who have an 'A' in their name.

25. Query to display Name, Job, Department No. and Department Name for all the employees working at the Dallas location.

26. Query to display Name and Employee no. Along with their Manger's Name and the Manager's employee no; along with the Employees Name who do not have a Manager.

27. Query to display Name, Department No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who eans a commission.

28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100.

29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees.

30. Query to display the number of employees performing the same Job type functions.

31. Query to display the no. of managers without listing their names.

32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.

33. Query to display Name and Hire Date for all employees in the same dept. as Blake.

34. Query to display the Employee No. And Name for all employees who earn more thanthe average salary.

35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a 'T'.

36. Query to display the names and salaries of all employees who report to King.

37. Query to display the department no, name and job for all employees in the Sales department.

Core Course
C-7: Principle of Management (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Nature of Management: Meaning, Definition, it's nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization.

Evolution of Management Thought: Contribution of F.W.Taylor, Henri Fayol ,Elton Mayo, Chester Barhard& Peter Drucker to the management thought. Various approaches to management (i.e. Schools of management thought)Indian Management Thought.

Unit-2

Functions of Management (Part-I)

Planning - Meaning - Need & Importance, types levels– advantages & limitations, Forecasting - Need & Techniques, Decision making - Types - Process of rational decision making & techniques of decision making, **Organizing** - Elements of organizing & processes: Types of organizations, Delegation of authority - Need, difficulties in delegation – Decentralization,

Unit-3

Functions of Management (Part-II)

Staffing - Meaning & Importance, Direction - Nature – Principles, Communication - Types & Importance, Motivation - Importance – theories, Leadership - Meaning - styles, qualities & functions of leaders **Controlling**-Need, Nature, importance, Process & Techniques, Coordination - Need, Importance.

Unit-4

Strategic Management
Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India.

Text Books:

1. Horold Koontz and IteinzWeibrich, Essential of Management, McGraw Hills International
2. K.Aswathapa, Essential of Business Administration, Himalaya Publishing House

Reference Books:

1. L.M.Parasad Principles & practice of management - Sultan Chand & Sons - New Delhi
2. Tripathi, Reddy, Principles of Management, Tata McGraw Hill

C-7: Practical/Tutorial: Principles of Management

1. Assessing technological opportunities and threats: an introduction to technology forecasting.
2. Organisational Structure in IT / ITES Industries.
3. Presence of Web based Communication in Organisations with reference to Service Sectors
4. Role of Human Resource Information Systems (HRIS) in Strategic Human Resource Management (SHRM).
5. Forces of motivation in IT / ITES Sector. (video based)
6. Role of Strategic managers in ICT based Organisations.
7. IT Strategies in Organisational Administration
   Case Studies:
8. Case study on organisations adopting ERP.
9. Case study on Dropbox as a communication tool.
10. Case study on Leadership types and styles.
11. Case study on disaster and crisis management.
12. Case study on vision, goal and mission statement of IT / ITES industries.

Generic Elective Course
GE-3: Theory of Computation (Theory: 4 Credits; Practical: 2 Credits)
Full marks -75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Alphabet, Languages, Grammars, Chomsky Hierarchy Of Languages, Regular Grammars,
Regular Expressions, Finite Automata (DFA, NFA), Finite Automaton With E Moves, Equivalence of NFA and DFA

Unit-2

Minimization Of Finite Automata, Closure And Decision Properties Of Regular Sets, Pumping Lemma Of Regular Sets, Left And Right Linear Grammars

Unit-3

Types Of Grammar, Context Free Grammars, Context Free Languages, Derivation Tress, Ambiguity, Properties Of Context Free Languages, Simplification Of CFG, Elimination Of Useless Symbols, Unit Productions, Null Productions, Chomsky Normal Form.
Pushdown Automata, Deterministic Pushdown Automata, Equivalence Of Pushdown Automata And Context Free Languages, Pumping Lemma For Context Free Languages

Unit-4

Turing Machines, Turing Computability, Type 0 Languages, Techniques For Turing Machine Construction, Multihead And Multitape Turing Machines, Church Turing Hypothesis, Recursive and Recursively Enumerable Set.

Textbooks:
- Introduction To Automata Theory, Languages and Computation, J. E. Hopcrpft and J. D. Ullman, Pearson Education, 3rd Edition.
- Introduction to the theory of Computation, Michael Sipser, Cengage Learning

Reference books:
- JFLAP - An Interactive Formal Languages and Automata Package Rodger, Finley, ISBN: 0763738344
- JFLAP User Manual and Exercises, Tobias Fransson. Available in the Web.

GE-3 Practical/Tutorial: Theory of Computation Lab

Use Java Formal Language and Automata Language (FLAP) software Package (can be down load from www.jflap.org) to carry out the following experiments:

1. Regular Language - Create: DFA, NFA, Regular Grammar, and Regular Expression.
2. Regular Language – conversions: NFA to DFA to Minimal DFA, NFA to regular expression & viceversa,
NFA to regular grammar & vice-versa.
3. Context-free language – create: push-down automaton, context-free grammar.
4. Context-free language – transform: PDA to CFG, CFG to PDA (LL parser), CFG to PDA (SLR Parser), CFG to CNF, CFG to LL parse table and parser, CFG to SLR parse table and parser
5. Recursively Enumerable language: Turing machine (1 tape), Turing machine (multi tape), Turing machine (building blocks), unrestricted grammar.

Unit-1: Introduction
   (i)   What is communication?
   (ii) Types of communication (Horizontal, Vertical, Interpersonal, Grapevine),
   (iii)   Uses of Communication, Inter-cultural communication, Communication today: (iv)Distinct features of Indianisation, alternative texts of language learning, global English
      and English in the print and electronic media in India.

Unit-2: The Four Skills and Prospect of new material in language learning
   (i)   Listening-Passive and active, Speaking effective, intelligibility and clarity
   (ii) Methods and techniques of reading such as skimming, scanning and searching for information; Reading to understand the literal, metaphorical and suggested meaning of a passage,
   (iii) Identifying the tone (admiring, accusatory, ironical, sympathetic, evasive, indecisive, ambiguous, neutral) of the writer and view-points.
   (iv) Cohesive and Coherent writing

Unit-3: Grammatical and Composition Skills

   (i)   Doing exercises like filling in the blanks, correcting errors, choosing correct forms out of alternative choices, joining clauses, rewriting sentences as directed, and replacing indicated sections with single words / opposites / synonyms, choosing to use correct punctuation marks, getting to understand and use formal and informal styles, learning to understand the usages of officialese, sexism, racism, jargon.
   (ii) Learning to understand information structure of the sentence such as topic-focus relationship; strategies of thematization, postponement, emphasis, structural compression (deletion of redundant parts, nominalization, cleft and pseudo-cleft sentences, elliptical structures etc.), Logical Connectors between sentences, Methods of developing a paragraph, structure of an essay and methods of developing an essay

Unit-4: Exercises in Written Communication
   (i)   Précis writing
   (ii) Note-taking skills
   (iii) Writing reports
   (iv) Guidelines and essentials of official correspondence for making enquiries, complaints and replies

(v) Making representations; writing letters of application for jobs; writing CV, writing letters to the editor and social appeals in the form of letters/pamphlets.

Text Books:
1. State Model Syllabus for Under Graduate Couse in Skill Enhancement Course (I), pdf file is available in the internet: http://dheodisha.gov.in/Higher-Education/Listmodule-syllabus.aspx

Reference Books:

Ways of Reading: Advanced reading Skills for Students of English Literature. Martin Montgomery et al. London: Routledge, 2007.

    Applying Communication Theory for Professional Life: A Practical Introduction. Dainton and Zelley, http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25fVGhlb3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563

Literature and the art of Communication, Cambridge University Press.

    Vistas and Visions. Orient Black Swan (writing and grammar exercises at the end of lessons are recommended) From *Remapping An Anthology for Degree Classes*, ('Writing Skills'), Orient Black Swan.

*Indian English through Newspapers (*Chapter 4,5 and 6), Concept, New Delhi,2008.

Contemporary Communicative English, S Chand

    Technical Communication: A Reader Centred Approach. P.V. Anderson. Wadsworth, Cengage.

ITM (HONOURS)
SEMESTER IV
Core Course
C-8: Java Programming (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Introduction to Java: Java History, Architecture and Features, Understanding thesemantic and syntax differences between C++ and Java, Compiling andExecuting a Java Program, Variables, Constants, Keywords (super, this, final, abstract, static, extends, implements, interface) , Data Types, Wrapper class,Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, DoingBasic Program Output, Decision Making Constructs (conditional statements andloops) and Nesting, Java Methods (Defining, Scope, Passing and ReturningArguments, Type Conversion and Type and Checking, Built-in Java ClassMethods). Input through keyboard using Commandline Argument, the Scanner class, BufferedReader class.

Unit-2

Object-Oriented Programming Overview: Principles of Object-Oriented Programming, Defining & Using Classes, Class Variables & Methods, Objects, Object reference, Objects as parameters, final classes, Garbage Collection. Constructor- types of constructor, this keyword, super keyword. Method overloading and Constructor overloading. Aggregation vs Inheritance, Inheritance: extends vs implements, types of Inheritance, Interface, Up-Casting, Down-Casting, Auto-Boxing, Enumerations, Polymorphism, Method Overriding and restrictions. Package: Pre-defined packages and Custom packages.

Unit-3

Arrays: Creating & Using Arrays(1D, 2D, 3D and Jagged Array), Array of Object, Referencing Arrays Dynamically. Strings and I/O: Java Strings: The Java Stringclass, Creating & Using String Objects, Manipulating Strings, String Immutability& Equality, Passing Strings To & From Methods, StringBuffer Classes and StringBuilder Classes. IO package: Understanding StreamsFile class and its methods, Creating, Reading,Writing using

classes: Byte and Character streams,FileOutputStream, FileInputStream, FileWriter, FileReader, InputStreamReader, PrintStream, PrintWriter. Compressing and Uncompressing File.

Unit-4

Exception Handling, Threading, Networking and Database Connectivity:Exception types, uncaught exceptions, throw, built-in exceptions, Creating yourown exceptions; Multi-threading: The Thread class and Runnable interface,creating single and multiple threads, Thread prioritization, synchronization andcommunication, suspending/resuming threads. Using java.net package,Overview of TCP/IP and Datagram programming. Accessing and manipulatingdatabases using JDBC.

Text Books:

1. E. Balagurusamy, "Programming with Java", TMH, 4/Ed,

Reference books:

1. Herbert Schildt, "The Complete Reference to Java", TMH, 10/Ed.

C-8: Practical/Tutorial: Java Programming Lab

1. To find the sum of any number of integers entered as command line arguments.

2. To find the factorial of a given number.

3. To convert a decimal to binary number.

4. To check if a number is prime or not, by taking the number as input from the keyboard.

5. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument

6. Write a program that show working of different functions of String and StringBufferclasss like setCharAt( ), setLength( ), append( ), insert( ), concat( )and equals( ).

7. Write a program to create a – "distance" class with methods where distance is computed interms of feet and inches, how to create objects of a class and to see the use of this pointer

8. Modify the – "distance" class by creating constructor for assigning values (feetandinches)to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.

9. Write a program to show that during function overloading, if no matching argument is found, then Java will apply automatic type conversions(from lower to higher data type)

10. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword.

11. Write a program to show the use of static functions and to pass variable length arguments in a function.

12. Write a program to demonstrate the concept of boxing and unboxing.

13. Create a multi-file program where in one file a string message is taken as input from the userand the function to display the message on the screen is given in another file (make use of Scanner package in this program).

14. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate Fibonacci series is given in a different file belonging to the same package.

17. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages

15. Write a program – "DivideByZero" that takes two numbers a and b as input, computes a/b,and invokes Arithmetic Exception to generate a message when the denominator is zero.

16. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.

17. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).

18. Write a program to demonstrate priorities among multiple threads.

19. Write a program to demonstrate different mouse handling events like mouseClicked( ), mouseEntered( ), mouseExited( ), mousePressed( ), mouseReleased( ) &mouseDragged( ).

20. Write a program to demonstrate different keyboard handling events.

Core Course
C-9: Business Accounting (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Introduction: Financial Accounting-definition and Scope,objectives of Financial Accounting, Accounting v/s BookKeeping terms used in accounting, users of accountinginformation and limitations of Financial Accounting.
Conceptual Framework: Accounting Concepts,Principles and Conventions, Accounting Standardsconcept,objectives, benefits, brief review of AccountingStandards in India, Accounting Policies, Accounting as ameasurement discipline, valuation Principles, accountingestimates

Unit-2

Recording of transactions: Voucher system; AccountingProcess, Journals, Subsidiary Books, Ledger, Cash Book,Bank Reconciliation Statement, Trial Balance.
Depreciation: Meaning, need & importance ofdepreciation, methods of charging depreciation.

Unit-3

Preparation of final accounts: Preparation of Trading and Profit & Loss Account and Balance Sheet of soleproprietary business

Unit-4

Introduction to Company Final Accounts: Important provisions of Companies Act, 1956 in respect of preparation of Final Accounts, Understanding of finala ccounts of a Company. **Computerized Accounting:** Computers and Financial application, Accounting Software packages, An overviewof computerized accounting system - Salient features and significance,
Concept of grouping of accounts, Codification of accounts, Maintaining the hierarchy of ledger, Generating Accounting Reports.

Text Books :

1. Anil Chowdhry,"Fundamentals of Accounting & Financial Analysis", Pearson Education

2. Agarwal, R. Srinivasan,"Accounting Made Easy", TMH

Reference Books:

1. Amrish Gupta,"Financial Accounting for Management", Pearson Education

2. S. N. Maheshwari,"Financial Accounting for Management: Vikas Publishing House

C-9: Practical/Tutorial: Business Accounting Tutorial

1. Problems and prospects of computerised accounting systems in the BFSI Sector.
2. Adoption of computerised accounting techniques and its impact on the financial performance in organisations.
3. ICT and Accounting Information System.
4. Comparative analysis of Final Accounts in Organisations.
5. Online payment system and Customer Satisfaction.
6. Online interactive banking.
7. Phishing and fraud detection in online transactions.
8. Electronic transactions: current scenario and scope for improvements.
9. Cloud computing-based accounting
10. Evolution of the Companies Act – 2012: a meta-analysis.

ITM (HONOURS)
SEMESTER IV
Core Course
C-10: Operating System (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit–1

Introduction to Operating System, System Structures: Operating system services, system calls, system programs, Operating system design and implementation, Operating system structure.

Unit–2

Process Management: Process Concept, Operations on processes, Process scheduling and algorithms, Inter-process Communication, Concepts on Thread and Process, Deadlocks: Deadlock detection, deadlock prevention, and deadlock avoidance fundamentals.

Unit-3

Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management: Concepts, implementation (Demand Paging), Page Replacement, Thrashing.

Unit–4

Storage Management: File System concept, Access Methods, File System Mounting, File Sharing and File Protection, Implementing File Systems, Kernel I/O Systems.

Text book:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, Eighth Edition, Wiley Student Edition 2009.

Reference book:

1. Modern Operating System, Tanenbaum,Pearson, 4/Ed. 2014
2. Richard F Ashley, Linux with Operating System Concepts, Chapman and Hall/CRC Published August 26, 2014
3. Richard Blum, Linux Command Line and Shell Scripting Bible, O' Reilly

C-10: Practical/Tutorial: Operating System Lab

1. Write a program (using *fork()* and/or *exec()* commands) where parent and child execute:
   same program, same code.
   same program, different code.
   before terminating, the parent waits for the child to finish its task.
2. Write a program to report behavior of Linux kernel including kernel version, CPU type and model. (CPU information)
3. Write a program to report behavior of Linux kernel including information on configured memory, amount of free and used memory. (memory information)
4. Write a program to print file details including owner access permissions, file access time, where file name is given as argument.
5. Write a program to copy files using system calls.
6. Write a programusing C to implement FCFS scheduling algorithm.
7. Write a program using C to implement Round Robin scheduling algorithm.
8. Write a program using C to implement SJF scheduling algorithm.
9. Write a program using C to implement non-preemptive priority based scheduling algorithm.
10. Write a program using C to implement preemptive priority based scheduling algorithm.
11. Write a program using C to implement SRTF scheduling algorithm.
12. Write a program using C to implement first-fit, best-fit and worst-fit allocation strategies.

Generic Elective Course
GE-4: Quality Assurance and Testing (Theory: 4 Credits; Practical: 2 Credits)
Full marks - 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Quality Revolution, Software Quality, Role of Testing, Verification and Validation, Failure, Error, Fault and Defect, Notion of Software Reliability, Objective of Testing, What is a Test Case?, Expected Outcome, Concept of Complete Testing, Testing Activities, Test Oracle, Testing Levels, Regression Testing, White-Box and Black Testing, Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation

Unit Testing: Concept of Unit Testing, Static and Dynamic unit Testing, Mutation Testing, Debugging, Unit Testing in eXtreme Programming.

Unit-2

Control Flow Testing: Outline of Control Flow Testing, Control Flow Graph, Path in a CFG, Path selection Criteria, All-Path Coverage Criterion, Statement Coverage Criterion, Branch Coverage Criterion, Generation of Test Input, Example of Test Data Selection.

Data Flow Testing: Data Flow Anomaly,. Overview of Dynamic Data Flow Testing, Data Flow Graph, Data Flow Terms, Data Flow Testing Criteria, Comparison of Data Flow Test Selection Criteria, Feasible Paths and Test Selection Criteria, Comparison of Testing Techniques.

System Integration Testing: Concept of Integration Testing, Different Types of Interfaces and Interface Errors, Granularity of System Integration Testing, System Integration Techniques, Software and Hardware Integration, Test Plan for System Integration, Off-the-Shelf Component Integration, Off-the-Shelf Component Testing, Built-in Testing

Unit–3

System Test Categories: Basic Tests, Functionality Tests, Robustness Tests, Interoperability Tests, Performance Tests, Scalability Tests, Stress Tests, Load and Stability Tests, Reliability Tests, Regression Tests, Documentation Tests.

Functional Testing: Equivalence Class Partitioning, Boundary Value Analysis, Decision Tables, Random Testing, Error Guessing, Category Partition.

System Test Planning And Automation: Structure of a System Test Plan, Introduction and Feature Description, Assumptions, Test Approach, Test Suite Structure, Test Environment, Test Execution Strategy, Test Effort Estimation, Scheduling and Test Milestones, System Test Automation, Evaluation and Selection of Test Automation Tools, Test Selection Guidelines for

Automation, Characteristics of Automated Test Cases, Structure of an Automated Test Case, Test Automation Infrastructure.

Acceptance Testing: Types of Acceptance Testing, Acceptance Criteria, Selection of Acceptance Criteria, Acceptance Test Plan, Acceptance Test Execution, Acceptance Test Report, Acceptance Testing in eXtreme Programming.

Unit-4

Software Reliability: Definition, Factors Influencing Software Reliability, Application of Software Reliability, Operational Profiles.

Software Quality: Five Views of Software Quality, McCall's Quality Factors and Criteria, Quality Factors Quality Criteria, Relationship between Quality Factors and Criteria, Quality Metrics, ISO 9126 Quality Characteristics, ISO 9000:2000 Software Quality Standard ISO 9000:2000 Fundamentals, ISO 9001:2000 Requirements.

Maturity Models: Basic Idea in Software Process, Capability Model(CMM) Model, Architecture, Five Levels of Maturity and Key Process Areas, Common Features of Key Practices, Application of CMM, CMMI, Test Process Improvement (TPI), Testing Maturity Model (TMM).

Textbook:

- Software Testing and Quality Assurance: Theory and Practice, Kshirasagar (Sagar) Naik, University of Waterloo, Priyadarshi (Piyu) Tripathy, NEC, Wiley , 2008.

Reference Book:

- Software Quality Assurance, Daniel Galin, Pearson Education

GE-4: Practical/Tutorial: Quality Assurance and Testing.

1. Understand The Automation Testing Approach (Theory Concept): Introduction to Selenium- Selenium IDE, Selenium Core, Selenium RC and Selenium Grid. Installation of IDE. Opening the IDE.

2. Using Selenium IDE, write a test suite containing minimum 4 test cases

3. Conduct a test Suite for two web sites.

4. Understanding of Selenium – RC. Install Selenium server and demonstrate it using a script in Java/PHP. Installation of Selenium RC and Eclipse.

5. Write and test a program to login a specific web page.

6. Understanding of TestNG framework. Installation of TestNG in eclipse. Launch tests in Eclipse.

7. Selenium Tests with Microsoft Excel. Write and test a program to update 10 students records into table into Excel file.

8. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects).

9. Write and test a program to provide total number of objects present/available on the page.

10. Write and test a program to get the number of list items in a list/combo box.

11. Write and test a program to count number of check boxes on the page checked and unchecked count.

Skill Enhancement Course
SEC-2: Quantitative Aptitude and Logical Reasoning (4 Credits)
Full marks -100 (Mid-Sem: 20; End-Sem: 80)

Unit-1

Whole Numbers, Integers, Rational and irrational numbers, Fractions, Square roots and Cube roots, Surd and Indices, Problems with numbers, Divisibility.
Different formulae of Percentage, Profit and loss, Discount, Simple interest, Ratio and Proportion, Mixture, Mixture
Time and work, Pipes and Cisterns, Basic concepts of Time, Distance and Speed: relationship among them.

Unit-2

Concept of Angles, Different Polygons like triangles, rectangular, square, right angled triangle, Pythagorean Theorem, Perimeter and Area of Triangles, Rectangles, Circles
Raw and Grouped Data, Bar Graphs, Pie Chart, Mean, Median, Event and Sample Space, Probability.

Unit-3

Analogy basing on kinds of relationships, Simple Analogy: Pattern and Series of Numbers, Letters, Figures. Coding-Decoding of Numbers, Letters, Symbols (Figures), Blood relations.

Unit-4

Logical statement: Two premise argument, More than two premise argument using connectivity.
Venn Diagram, Mirror Images, Problems on Cubes and Dices.

Text Books:

2. State Model Syllabus for Under Graduate Couse in Skill Enhancement Course (II), pdf file is available in the internet: http://dheodisha.gov.in/Higher-Education/Listmodule-syllabus.aspx

ITM (HONOURS)
SEMESTER V
Core Course
C-11: Web Technology (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Web Essentials: Clients, Servers and Communication:
The Internet –Basic Internet protocols–The WWW,HTTP request message –response message,web clients web servers – case study.
Introduction to HTML: HTML, HTML domains, basic structure of an HTML document–creating an HTML document, mark up tags, heading, paragraphs, line breaks, HTML tags. Elements of HTML, working with text, lists, tables and frames, working with hyperlink, images and multimedia, forms and controls

Unit-2

Introduction to cascading style sheets: Concepts of CSS, creating style sheet, CSS properties, CSS styling(background, text format, controlling fonts), working with the block elements and objects. Working who lists and tables, CSS ID and class.Box model(introduction, border properties, padding properties, margin properties), CSS colour, groping, Dimensions, display, positioning, floating, align, pseudo class, Navigation bar, image sprites.

Unit-3

Java scripts: Client side scripting, what is java script, simple java script, variables, functions, conditions, loops and repetitions. Java scripts and objects, java script own objects, the DOM and web browser environment, forms and validations. DHTML: Combining HTML, CSS, java scripts, events and buttons, controlling your browser.

Unit-4

PHP: Starting to script on server side, PHP basics, variables, data types, operators, expressions, constants, decisions and loop making decisions. Strings – creating, accessing strings, searching, replacing and formatting strings.Arrays: Creation, accessing array, multidimensional arrays, PHP with Database.

Text Book:

1. Web Technologies – Black Book – DreamTech Press

2. Matt Doyle, Beginning PHP 5.3 (wrox-Willey publishing)

3. John Duckett, Beginning HTML, XHTML, CSS and Java script.

   Reference Book:

   1. HTML, XHTML and CSS Bible, 5ed, Willey India-Steven M. Schafer.

C-11: Practical/Tutorial: Web Technology Lab

1. Acquaintance with elements, tags and basic structure of HTML files.

2. Practicing basic and advanced text for formatting.

3. Practice use of image, video and sound in HTML documents.

4. Designing of web pages- Document layout, list, tables.

5. Practicing Hyperlink of web pages, working with frames.

6. Working with forms and controls.

7. Acquaintance with creating style sheet, CSS properties and styling.

8. Working with background, text, font, list properties.

9. Working with HTML elements box properties in CSS.

10. Develop simple calculator for addition, subtraction, multiplication and division operation using java script.

11. Create HTML page with java script which takes integer number as a input and tells whether the number is odd or even.

12. Create HTML page that contains form with fields name, Email, mobile number, gender, favoritecolour and button; now write a java script code to validate each entry. Also write a code to combine and display the information in text box when button is clicked.

13. Write a PHP program to check if number is prime or not.

14. Write a PHP program to print first ten Fibonacci numbers.

15. Create a MySQL data base and connect with PHP.

16. Write PHP script for string and retrieving user information from my SQL table.

    a. Write a HTML page which takes Name, Address, Email and Mobile number from user (register PHP).

    b. Store this data in MySQL data base.

    c. Next page display all user in HTML table using PHP (display .PHP).

17. Using HTML, CSS, Javascript, PHP, MySQL, design a authentication module of a web page.

C-12: Software Engineering (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Introduction: Evolution of Software to an Engineering Discipline, Software Development Projects, Exploratory Style of Software Development, Emergence of Software Engineering, Changes in Software Development Practices, Computer Systems   Engineering.
Software Lifecycle Models: Waterfall Model and its Extensions, Rapid Application Development (RAD), Agile Development Models, Spiral Model.

Unit-2

Software Project Management: Software Project Management Complexities, Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO,   Halstead's   Software Science, Staffing Level Estimation, Scheduling, Organization and Team Structures, Staffing, Risk Management, Software Configuration Management.

Unit-3

Requirement Analysis and Specification: Requirements Gathering and Analysis, Software Requirement Specifications, Formal System Specification Axiomatic Specification, Algebraic Specification, Executable Specification and 4GL. Software Design: Design Process, Characterize a Good Software Design, Cohesion and Coupling, Layered Arrangements of Modules, Approaches to Software Design (Function Oriented & Object-Oriented).

Unit-4
Coding and Testing: Coding: Code Review, Software Documentation, Testing, Unit Testing, Black Box and White Box Testing, Debugging, Program Analysis Tools, Integration Testing, System Testing, Software Maintenance.

Text Book:

1. Fundamental of Software Engineering, Rajib Mall, Fifth Edition, PHI Publication, India.

Reference Books:

1. Software Engineering– Ian Sommerville, 10/Ed, Pearson.

2. Software Engineering Concepts and Practice – Ugrasen Suman, Cengage Learning India Pvt, Ltd.

C-12: Practical/Tutorial: Software Engineering Lab

S. No. Practical Title

1. Problem Statement,
   * Process Model
2. Requirement Analysis:
   * Creating a Data Flow
   * Data Dictionary, Use Cases
3. Project Management:
   * Computing FP
   * Effort
   * Schedule, Risk Table, Timeline chart

4. Design Engineering:

   * Architectural Design
   * Data Design, Component Level Design
5. Testing:
   * Basis Path Testing

Sample Projects:

1. **Criminal Record Management:** Implement a criminal record management system forjailers, police officers and CBI officers.
2. **Route Information**: Online information about the bus routes and their frequency andfares
3. **Car Pooling**: To maintain a web based intranet application that enables the corporateemployees within an organization to avail the facility of carpooling effectively.

4. Patient Appointment and Prescription Management System

5. Organized Retail Shopping Management Software

6. Online Hotel Reservation Service System

7.   Examination and Result computation system

8.   Automatic Internal Assessment System

9.   Parking Allocation System

10.   Wholesale Management System

Discipline Specific Elective Course
DSE-1: Computer Network Security (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1
Introduction to Security: What is security? Why we need Security? Security concerns, Security Goals: Confidentiality, Integrity, Availability, Authenticity and Accountability, Computer security challenges, Security Breach Impact levels: Low, Moderate and High, Security threats/attacks: passive and active, Security Policy, Security issues, Brief History of Malware, Types of Malware, Network Security Audit, The Orange Book, Legal Issues.

TCP/IP Security Attacks:
TCP Segment Format, TCP Connection Setup, TCP Disconnection, IP Address Spoofing, Covert Channel, IP Fragment Attacks, TCP Flags, Syn Flood, Ping of Death, Smurf, Fin, UDP Flood Attack, Connection Hijacking, ARP Spoofing, DNS Spoofing, E-Mail Spoofing, Web Spoofing.

Unit-2

Introduction to Cryptography, Symmetric-Key Cryptography: Traditional Ciphers, Simple Modern Ciphers, Modern Round Ciphers, Mode of Operations. Asymmetric-key Cryptography: RSA and Diffie-Hellman.

Network Security: Security Services, Message Confidentiality, Message Integrity, Message Authentication: MAC and HMAC, Digital Signature, Key Management: Symmetric-key Distribution: KDC, Session Keys, Kerberos, Public-key Distribution: Certification Authority, X.509, PKI.

Unit-3

Authentication, Authentication methods, Passwords, Challenge-Response, Biometrics, Something you have, Two-factor authentication., Single Sign-On and Web Cookies. Authorization, A brief history of authorization, Access control matrix, Compartments, Covert Channel, Inference Control, CAPTCHA, Firewalls and Proxies, Defense in depth, Computer Networks security zones, Concept of Demilitarized Zones (DMZ) in designing Corporate Networks, Analysis of Network Infrastructure, DMZ: Mail server, WWW Server, DNS Server. Network flooding, Anticipating attacks, IDS.

Unit-4

Simple Security Protocols, Authentication Protocols: authentication using symmetric keys, authentication using public keys, session keys, perfect forward secrecy, mutual authentication, session keys, and PFS, Timestamps, Authentication and TCP, Zero knowledge proofs.

SSH, SSL/TSL: SSL and Man-in-the-Middle, SSL connections, SSL Versus IPSec, , IPSec: IKE Phase I: Digital Signature, Symmetric Key, Public Key Encryption, IPSec Cookies, IKE Phase II, IPSec and IP Datagrams, Transport and Tunnel Modes, ESP and AH, Application Layer Security: Pretty Good Privacy (PGP).

Textbooks:

- Mark Stamp, Information Security: Principles and Practices, John Wiley & Sons, Hoboken, NJ, 2011. Chapters 1, 7, 8, 9, 10, 11, 13
- Behrouza Forouzan, Data Communications and Networking, McGraw-Hill, 2006. Chapters 30, 31, 32.
- Matt Bishop, Introduction to Computer Security, Addison-Wesley, 2005. Chapters 9, 10.4.2, 11, 22, 23.
- Gert De Laet and Gert Schauwere, Network Security Fundamentals, Cisco Press, Indiana, 2004. Chapters 1, 2, 9. 10.

Reference books:
- Richard Bejtlich, The Tao of Network Security Monitoring: Beyond Intrusion Detection, Addison-Wesley. **Use this book for Practical**.

DSE-1: Practical/Tutorial: Computer Network Security

1. **Experiment # 1 Objective:** Learn about IPconfig, ping, arp, nslookup, whois, tracert, netstat, route, hosts file
1. Find the IP addresses of www.google.com
2. Modify the hosts file to map www.google.com to yahoo's IP address and do a google search. Remove the modification to the host file and repeat.
3. Find the domain name of 128.272.165.7 (reverse the address and add .in-addr. arpa)
4. Find the owner of www.google.com domain
5. Find route from your computer to www.google.com
6. Find the MAC address of your computer
7. Print your ARP cache table. Find a server on your local network. Change its ARP entry in your computer to point to your computer's MAC address. Print new ARP cache table. Now use the service and see what happens.
8. Print your routing table and explain each line (up to line #20 if too many)
9. What is the number of packets sent with "destination unreachable"
10. Find the location of 128.252.166.33 (use www.ipaddresslocation.org)
In addition, students should have hands on experience in the following topics:
   1. IP addressing
   2. IP Configuring
   3. Proxy Address
   4. Domain name finding
   5. Tracing of Google IP
   6. Finding MAC address
   7. TTL, Pinging LAN/WAN

2. **Experiment # 2 Objective:** Familiarize TCPDUMP Packet capture and analysis utility.

Lab task: Use the TCPDUMP to parse and analyze Traffic. The following tasks must be performed in this Lab
- Basic usage of TCPDUMP tool.
- Use TCPDUMP tool to store full content data.
- Use TCPDUMP tool to read stored content data.
- Verify Timestamps in stored full content data.
- Use of –e and –v switches to increase detail in TCPDUMP full content data.

In addition, students must be familiar with:
1. Client/server network.
2. Creating Domain name with its directories.
3. Finding local and domain machine.
4. Applying security in a DC network.

3. **Experiment # 3 Objective:** Familiarize with the basic network security tools i.e. Ethereal.
Lab Task: Read about the following tools
- **Ethereal**, network protocol analyzer, www.ethereal.com
- Start Ethereal to capture all traffic. Open www.google.com in a web browser. Stop Ethereal. List all packets seen and interpret them.

In addition, students must be familiar with:
1. Basic network security.
2. Protocols and Resources sharing security in a network.

4. **Experiment # 4 Objective:** Familiarize with the basic network security tools i.e. Superscan and Network surveyor.
Read about the following tools
- **Superscan4**, network port scanner (like nmap),
http://www.lock-mypc.com/SuperScan4.html
- **Network Surveyor**, network mapping,
http://www.solarwindssoftware.com/lansurveyor.aspx

- Use superscan4 to scan one to three hosts on your local net to find their open ports. Select scan type "connect" in the Host and Service discovery panel.

- Use network surveyor to show the map of all hosts on your local net.

In addition, students must be familiar with:
1. Security of server.
2. Security policy management by system network.
3. Policy block inheritance.

5. **Experiment # 5 Objective:** To analysis the secure connection establishment through SSH and Telnet on client server application.
This Lab experiment requires two computers with OpenSSH and Telenet client and servers installed. You can use 1st PC as client and 2nd PC as server.
- Start ethereal (or wire shark) on the client machine.
- telnet to the server and login with your username and password. Logout.
- Ssh to the server and login with your username and password. Logout.
- Stop ethereal and read the trace.

Note the difference in the two logins?

In addition, students must be familiar with:

1. Implementation of Telnet and SSH.
2. Starting of a router.
3. Host naming, IP address assignment.
4. Connection establishment of WAN by router.
5. Applying Telnet, SSH in router with login username/password.

6. **Experiment # 6 Objective:** Familiarize them with the basic functionality of the Nmap scanning tool using Windows.

Lab Task includes

- Use NMAP in command line to scan a host/network, so to find out the possible vulnerable points in the hosts.

In addition, students must be familiar with:

1. Router security.
2. Security of different terminals of Router.

7. **Experiment # 7 Objective:** Familiarize with a common free Intrusion Detection System called Snort. Snort was written initially for Linux/Unix, but most functionality is now available in Windows. In this lab, we will use the windows version.

Lab Tasks:

- What is Snort, when and how would you use it?.
- List all the possible "action"s you can use in snort and what do they do?
- What are the different "protocol"s that may be used?
- Explain what these rules do:

log udp any any -> 10.1.1.0/24 1:1024
log tcp any any -> 10.1.1.0/24 :5000
log tcp any :1024 -> 192.168.1.0/24 500:
log tcp any any -> 192.168.1.0/24 !5000:5010
alert tcp any any -> 192.168.1.0/24 21 (content: "user root"; msg: "Alert";)

- Write a Snort rule that will display an alert when it detects both the SYN and FIN flags are set on the same time.

- Write a Snort rule that will log all root login to any ftp box on the 10.1.1.0/24 network.

In addition, students must be familiar with:

1. Snort in Window version and maintenance site.
2. Configuring sites
3. Security sites.
4. Maintaining replication in a sites, site link, and site link bridge.

ITM (HONOURS)
SEMESTER V
Discipline Specific Elective Course
DSE-2: Organizational Behavior (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1
Organizational Behaviour - Meaning, Definition and importance, Foundations of OB, OB Models, and Challenges to OB.

Unit-2
Individual Behaviour
Perception: Definition &Concept; Personality: Concept, Determinants and Personality Types (Type A and Type B, Big Five Model, MBTI Model); Learning: Concept and Theories (Classical and Operant Conditioning); Attitude: Components & Formation

Unit-3
Group Behaviour
Group Dynamics: Meaning, Formation and Types of Groups (Formal & Informal Groups), Stages of Group Development, Individual vs. Group decision making. Group vs Team. Types of Team.
Group Communication
Communication Types, Communication Process, Barriers to communication; Effective Communication Methods.

Unit-4
Motivation - Meaning, Nature &Importance. Motivational Theories (Maslow's Need Hierarchy Theory, Herzberg's two factor Theory, McClelland's Need Theory, Vroom's Expectancy Theory, Equity Theory); Motivational Challenges.
Leadership - Leadership: Nature and Importance; Leadership Styles; Leadership Theories (Trait Theory, Behaviour Theory, Contingency Theory)

Textbooks:
1. Organisational Behaviour: L.M. Prasad
2. Organisational Behaviour: Rao & Narayana
3. Organizational Behaviour: Gupta and Joshi (KP)

Reference books:
1. Organisational Behaviour: K Aswathappa (HPH)
2. Organisational Behaviour: Stephen Robbins (PHI)

DSE-2 Practical/Tutorial: Oraganizational Behavior Tutorial

1. Organisation's adaptability towards artificial intelligence.
2. Leadership Challenges and transformation using AI.
3. Social media and group behaviour.
4. People analytics in organisational behaviour.
5. Technology enabled work practices in organisations.
6. Converging technologies and employee perception.
7. Industry 4.0
8. Case Study Need Hierarchical theory in Team building.
9. Expectancy Theory towards Technological Adaptation
10. Practice of Telecommuting and remote working in IT / ITES.
11. Team building Exercises.
12. Personality Types.

Skill Enhancement Course
SEC-3: Python Programming (4 Credits)
Full marks -75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Python: Features of Python , Installing Python for windows and setting up paths, writing and Executing of a python programs, Python Virtual machine, Frozen binaries, Comparison between C, Java and python , Comments , Docstrings ,How python sees variables, Data types in Python, built in types, sequences in python, sets, literals in Python, user defined data types, identifiers & reserved words, Naming convention in python,

Unit-2

various Operators in Python , Input & Output , Control statements, if statements, while loop, for loop, infinite loop, nested loop ,else suit, break, continue, pass ,assert, return statements, command line arguments.

Arrays in python, advantages using arrays, creating arrays, importing the array module, indexing and slicing on arrays, Processing the arrays, Comparing arrays.

Strings in Python, Creating strings, Length of a string, Indexing in strings, Slicing strings, Concatenation and Comparing strings,Finding SubStrings,Replacing a String.

Unit-3

Functions in Python , Define a function, Calling a function, return from function, pass by object Reference, Positional arguments, Default arguments, Recursive functions.

Introduction to OOP, features of OOP, creating classes, the self variable, constructor, types of variables, namespaces, types of methods.

Unit-4

Inheritance: Define inheritance, types of inheritance, constructors in inheritance, overriding super class constructors & methods, the super() method, MRO

Polymorphism: Duck typing philosophy of Python, operator overloading, method overriding, interfaces in python

Exceptions: Errors in a python program, Exceptions, Exception handling, Types of Exceptions, The Exception block, the assert statement, user defined exceptions

Python Database Connectivity: DBMS, types of databases used with Python, installation of MySQL database , setting path, verifying MySQL , installing MySQL connector, Working with MySQL database, Using MySQL from python, retrieving rows ,deleting rows, updating rows in a table.

Text Books

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011.
2. Core Python Programming, Dr. R. Nageswar Rao , Dreamtech Press
3. Python Programming for Absolute Beginners, Michael Dawson, CENGAGE Learning

Reference Books

1. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012

OnlineReferences:

1. Python Tutorial/Documentation www.python.or 2015

2. http://docs.python.org/3/tutorial/index.html

3. http://interactivepython.org/courselib/static/pythonds

4. http://www.ibiblio.org/g2swap/byteofpython/read/

SEC-3: Software Lab based on Python Programming:

1.   Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon users choice.

2.   Write a Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:

Grade A: Percentage >=80

Grade B: Percentage>=70 and <80

Grade C: Percentage>=60 and <70

Grade D: Percentage>=40 and <60

Grade E: Percentage<40

3.   Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.

4.   Write a Program to display the first n terms of Fibonacci series.

5.   Write a Program to find factorial of the given number.

6.   Write a Program to find sum of the following series for n terms: $1 - 2/2! + 3/3! - - - - - n/n!$

7.   Write a Program to calculate the sum and product of two compatible matrices.
8.   Install MySQL and connector. Write Python programs to retrie, inserting, delete, update rows in a table.

ITM (HONOURS)
SEMESTER VI
Core Course
C-13: Management Accounting (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Nature, Scope of Management Accounting: Meaning, definition, nature and scope of Management Accounting; Comparison of Management Accounting with Cost Accounting and Financial Accounting. Cost concepts: Meaning, Scope, Objectives, and Importance of Cost Accounting; Cost, Costing, Cost Control, and Cost Reduction; Elements of Cost, Components of total Cost, Cost Sheet. Classification of Costs: Fixed, Variable, Semi-variable, and Step Costs; Product, and Period Costs; Direct, and Indirect Costs; Relevant, and Irrelevant Costs; Shut-down, and Sunk Costs; Controllable, and Uncontrollable Costs; Avoidable, and Unavoidable Costs; Imputed / Hypothetical Costs; Out-of-pocket Costs; Opportunity Costs; Expired, and Unexpired Costs; Conversion Cost. Cost Ascertainment: Cost Unit and Cost Center. Introduction to Overhead allocation, Overhead apportionment, and Overhead absorption.

Unit-2

Cost-Volume-Profit Analysis: Contribution, Profit-Volume Ratio, Margin of safety, Cost Break-even Point, Composite Break-even Point, Cash Break-even Point, Key Factor, Break-even Analysis. Relevant Costs and Decision Making: Pricing, Product Profitability, Make or Buy, Exploring new markets, Export Order, Sell or Process Further, Shut down vs. Continue.

Unit-3

Budgets and Budgetary Control: Meaning, Types of Budgets, Steps in Budgetary Control, Fixed and Flexible Budgeting, Cash Budget. Responsibility Accounting: Concept, Significance, Different responsibility centers, Divisional performance – Financial measures, Transfer pricing.

Unit-4

Standard Costing and Variance Analysis: Meaning of Standard Cost and Standard Costing, Advantages, Limitations and Applications; Material, Labor, Overhead and Sales variances. Introduction to Target Costing, Life Cycle Costing, Quality Costing, and Activity based Costing.

Text Books:

1. C.T. Horngren, Gary L. Sundem, Jeff O. Schatzberg, and Dave Burgstahler:Introduction to Management Accounting, Pearson
2. M.N. Arora: A Textbook of Cost and Management Accounting, Vikas PublishingHouse Pvt. Ltd.

Reference Books:

1. M.Y. Khan, and P.K. Jain, Management Accounting: Text Problems and Cases,McGraw Hill Education (India) Pvt. Ltd.
2. A. K. Nadhani, and K. K. Nadhani, Implementing Tally 7.2, BPB Publication.
3. Sudalaimuthu, Computer Application in business, Himalaya Publishing House, Mumbai
4. Vishnu Priya Singh, Learn Tally 7.2, Asian computech Book.

CORE – 13 Practical/Tutorial: Management Accounting Tutorial

1. Introduction to Tally, Features and Versions of Tally.
2. Components of Tally Screen, Creation, Alteration & Deletion of Company.
3. Primary Group & Sub group, Creation.
4. Alteration & Display of Ledger Accounting.
5. Recording of Transactions through vouchers.
6. Display of Financial reports F11 and F12 configuration.
7. Introduction to Inventory system: Advantages of maintaining inventory system in Tally stock group Stock category, stock item units of measure, creation of inventory system.
8. Zero based budgeting and performance / outcome budgeting

Core Course
C-14: Computer Networks (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Introduction to Data Communications and Network Models: Protocols and Standards, Layers in OSI Models, Analog and Digital Signals, Transmission Modes, Transmission Impairment, Data Rate Limits, Performance, Digital Transmission, Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridge (fundamental concepts only).

Unit-2

Signal Conversion: Digital-to-Digital Conversion, Analog-to-Digital Conversion, Digital-to-analog Conversion, Analog-to-analog Conversion.
Transmission Media: Guided Media, Unguided Media, Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, Virtual-Circuit Networks, and Structure of a Switch.

Unit-3

Error Detection and Correction: Checksum, CRC, Data Link Control: Framing, Flow and Error Control, Noiseless Channels, Noisy channels, (Stop and Wait ARQ, Slidding Window Protocol , Go Back N, Selective Repeat) HDLC, Point-to-Point Protocol. Access Control: TDM,CSMA/CD, and Channelization (FDMA, TDMA, and CDMA).

Unit-4

Network Layer: Logical Addressing, IPv4 Addresses, IPv6 Addresses, Virtual-Circuit Networks: Frame Relay and ATM, Transport Layer: Process-Process Delivery: UDP, TCP. Application layers: DNS, SMTP, POP, FTP, HTTP, Basics of WiFi (Fundamental concepts only), Network Security: Authentication, Basics of Public Key and Private Key, Digital Signatures and Certificates (Fundamental concepts only).

Text Books:
1. Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan,T

Reference Books:
Computer Networks, A.S.Tanenbaum, 4th edition, Pearson Education.

C-14: Practical/Tutorial Computer Networks Lab
Use C/C++/ any Network Simulator
1.   Simulate Even Parity generator and checker.

2.   Simulate two dimensional Parity generator and checker.

3.   Simulate checksum generator and checker.

4.   Simulate Hamming code method.

5.   Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.

6.   Simulate and implement stop and wait protocol for noisy channel.

7.   Simulate and implement go back n sliding window protocol.

8.   Simulate and implement selective repeat sliding window protocol.

9.   Simulate and implement distance vector routing algorithm.

Discipline Specific Elective Course
DSE-3: Marketing Management (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Concepts of Marketing, Objectives of Marketing, Marketing vs Selling, Marketing Environment, Consumer Behaviour, Consumer Buying Process, Factors influencing consumer decision making

Unit-2

Product: Product concept, Product classification, New Product Development, Product life cycle, Product mix, Branding – Meaning & Types, Packaging – Meaning & Types, Meaning of Product Labelling.

Unit-3

Price: Objective of pricing, Factors Influencing Product Pricing, Methods of Price Determination. Place – Classification of Markets, Classification of Distribution Channels, Types of Intermediaries.

Unit-4

Promotion: Meaning, Importance of Promotion, Promotional Mix: Personal Selling – Merits, Limitations, Methods, Process; Advertising – Meaning, Role, Methods of Advertising Appropriation; Sales Promotion – Objectives, Tools; Public relation – Meaning, Significance, Tools.

Text Books
1. Marketing Management in Indian Context, Sontakki, KP
2. Marketing Management, Karunakaran,
Reference Books:
1. Marketing Management, Kotler, Keler, Koshi, Jha, Pearson

DSE-3 Practical/Tutorial: Marketing Management Tutorial
1. Case study on Marketing Mix
2. Role of MIS in Enhancing Sales
3. Impact of ICT on advertisement
4. Case study: Branding on Consumer Buying Behaviour
5. Case study: Impact of product quality brand loyalty
6. Effect of product innovation on the productivity of IT industry.
7. Case study: Impact of branding and packaging on sales promotion
8. Significance of price in consumer purchase decision
9. Effect of price changes on sales of consumer goods
10. Product differentiation strategies on sales performance of IT/service industry
11. Case study: Impact of distribution channel to the marketing of a product
12. Case study: Marketing through social media sites.
13. Measuring the impact of AI on customer satisfaction
14. Analysis of Promotion Mix as a tool of marketing communication.

ITM (HONOURS)
SEMESTER VI
Discipline Specific Elective Course
DSE-4: E-Commerce (Theory: 4 Credits; Practical: 2 Credits)
Theory Full marks: 75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Introduction to E-Commerce: Definition and scope of E-Commerce and M-Commerce, Ecommerce trade cycle, Electronic Markets, Internet Commerce, Benefits and Impacts of ECommerce.

Elements of E-Commerce: Various elements, e-visibility, e-shops, Delivery of goods and services, Online payments, After- sales services, Internet E-Commerce security.

Unit-2

EDI and Electronic Payment Systems: Introduction and definition of EDI, EDI layered Architecture, EDI technology and standards, EDI communications and transactions, Benefits and applications of EDI with example, Electronic Payment Systems: credit/debit/smart cards, e-credit accounts, e-money.

Unit-3

Introduction to EC models: Inter-organization and intra-organization E-Commerce, ECommerce
Models: B2B, B2C, C2B, C2C, G2C, C2G

E-Business: Introduction to Internet bookshops, Grocery Suppliers, Software Supplies and support, Electronic newspapers, Virtual auctions, Online share dealing, e-diversity.

Unit-4

E-Security and Legal Issues: Security concerns in E-Commerce, Privacy, integrity, authenticity, non-repudiation, confidentiality, SSL, Digital Signatures and fire walls, IT Act 2000, Cyber-crimes and cyber laws

Mobile Commerce and Future of E-Commerce: Introduction to Mobile Commerce, Benefits of Mobile Commerce, Impediments of M-Commerce, M-Commerce framework, Emerging and future trends.

Text Books

1. G.S.V.Murthy, E-Commerce Concepts, Models, Strategies, Himalaya Publishing House.
2. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, "E-Commerce Fundamentals and Applications, Wiley Student Edition.

Reference Books:

1. Gray P. Schneider , Electronic commerce, International Student Edition.

DSE-4: Practical/Tutorial: E-Commerce

1. Role of ICT In Business
2. M- Commerce and Its Revolution
3. Security, Legal and Ethical issues in M- Commerce
4. Potential benefits and limitations of ecommerce
5. Ecommerce on business models
6. Issues of EDI: legal, security and privacy issues
7. E – Payment systems
8. Applications of M- Commerce
9. Rise of ecommerce
10. EPS: A user centered perspective

ITM (HONOURS)
SEMESTER VI
Discipline Specific Elective Course
DSE-4: Project (6 Credits)

Objective:
An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.

Guidelines:
As the project work constitutes a major component in most of the professional programs and it is to be carried out with due care and should be executed with seriousness by the candidates.

Type of Project
As majority of the students are expected to work out a real-life project in some industry/research and development laboratories/educational institutions/software companies, it is suggested that the project is to be chosen which should have some direct relevance in day-to-day activities of the candidates in his/her institution. It is not mandatory for a student to work on a real-life project. The student can formulate a project problem with the help of Guide.

Project Proposal (Synopsis)
The project proposal should be prepared in consultation with the guide. The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken. The project work should compulsorily include the software development. The project proposal should contain complete details in the following form:

1. Title of the Project
2. Introduction and Objectives of the Project
3. Project Category (RDBMS/OOPS/Networking/Multimedia/Artificial Intelligence/Expert Systems etc.)
4. Analysis (DFDs at least up to second level, ER Diagrams/ Class Diagrams/ Database Design etc. as per the project requirements).
5. A complete structure which includes: Number of modules and their description to provide an estimation of the student's effort on the project. Data Structures as per the project requirements for all the modules. Process Logic of each module. Testing process to be used. Reports generation
6. Tools / Platform, Hardware and Software Requirement specifications
7. Future scope and further enhancement of the project.

Evaluation of the Project
Following Scheme shall be followed for evaluation of the project:

Background of the Problem: 10 marks
Review of Literature: 20 marks
Methodology: 10 marks
Observation and Analysis: 20 marks
Viva Voce: 20 marks
Seminar: 20 marks
Total: 100 marks

Skill Enhancement Course
SEC-4: Android Programming (4 Credits)
Full marks -75 (Mid-Sem: 15; End-Sem: 60)
Practical Full marks: 25 (End semester evaluation)

Unit-1

Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture.

Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.

Unit-2

Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating an android project – Hello Word, run on emulator, Deploy it on USB-connected Android device.

Unit-3

User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes.

User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners(Combo boxes),Images, Menu, Dialog.

Unit-4

Database: Understanding of SQLite database, connecting with the database.

Text Books:

1. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

Reference Book:

1. James C. Sheusi, "Android application Development for Java Programmers", Cengage Learning, 2013.
2. M. Burton, & D. Felker, "Android Application Development for Dummies", 2/e, Wiley India.

OnlineReferences:

1. http://www.developer.android.com
2. http://docs.oracle.com/javase/tutorial/index.htm (Available in the form of free downloadable ebooks also).
3. http://developer.android.com/guide/components/fundamentals.html
4. http://developer.android.com/training/multiscreen/screensizes.html
5. http://developer.android.com/guide/topics/ui/controls.html

SEC-4: Practical/Tutorial Android Programming

1. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the emulator. Also display "Hello World" in the middle of the screen in the Android Phone.
2. Create an application with login module. (Check username and password).
3. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
4. Create a menu with 5 options and selected option should appear in text box.
5. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
6. Create an application with three option buttons, on selecting a button colour of the screen will change.
7. Create and Login application as above. On successful login, pop up the message.
8. Create an application to Create, Insert, update, Delete and retrieve operation on the database.

THE END