SWAMI VIVEKANAND

SUBHARTI UNIVERSITY, MEERUT

EVALUATION SCHEME

B.TECH

(Computer Science & Engineering)

W.E.F. SESSION 2018-19

SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
Subhartipuram, NH-58 Delhi-Haridwar Bypass Road,
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SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME
B.Tech 2nd Year/3rd Semester (Computer Science & Engineering)
w.e.f academic Session 2018-19

S.No	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	BECE-307	Analog Electronic Circuits	ESC-1	3	0	0	20	10	30	-	70	-	100	3
2	BCSE-301	Data structure & Algorithms	PCC-1	3	0	0	20	10	30	-	70	-	100	3
3	BECE-306	Digital Electronics	ESC-2	3	0	0	20	10	30	-	70	-	100	3
4	BAS-302	Mathematics-III (Differential Calculus)	ESC-3	2	0	0	20	10	30	-	70	-	100	2
5	BHU-301	Humanities-I	HSMC-2	3	0	0	20	10	30	-	70	-	100	3
6	BECE-357	Analog Electronic Circuits Lab	ESC-4	0	0	4	-	-	-	15	-	35	50	2
7	BCSE-351	Data structure & Algorithms Lab	PCC-2	0	0	4	-	-	-	15	-	35	50	2
8	BCSE-352	IT Workshop (Sci Lab/MATLAB)	PCC-3	1	0	4	-	-	-	15	-	35	50	3
9	BECE-356	Digital Electronics Lab	ESC-5	0	0	4	-	-	-	15	-	35	50	2
TOTAL													700	23

SEMESTER III

SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME
B.Tech 2nd Year/4th Semester (Computer Science & Engineering)
w.e.f academic Session 2018-19

S.No.	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	BCSE-401	Discrete Mathematics	PCC-4	3	1	0	20	10	30	-	70	-	100	4
2	BCSE-402	Computer Organization & Architecture	PCC-5	3	0	0	20	10	30	-	70	-	100	3
3	BCSE-403	Operating Systems	PCC-6	3	0	0	20	10	30	-	70	-	100	3
4	BCSE-404	Design & Analysis of Algorithms	PCC-7	3	0	0	20	10	30	-	70	-	100	3
5	BMG-401	Management 1(Organizational Behaviour/ Finance &Accounting)	MGT-1	3	0	0	20	10	30	-	70	-	100	3
6	BMC-403	Environmental Sciences(MANDATORY)	MC-1	3	0	0	20	10	30	-	70	-	100	0
7	BCSE-452	Computer Organization & Architecture Lab	PCC-8	0	0	4	-	-	-	15	-	35	50	2
8	BCSE-453	Operating Systems Lab	PCC-9	0	0	4	-	-	-	15	-	35	50	2
9	BCSE-454	Design & Analysis of Algorithms Lab	PCC-10	0	0	4	-	-	-	15	-	35	50	2
			TOTAL										**650**	**22**

SEMESTER IV

List of Mandatory Courses (Non-Credit)
BMC-301/BMC-401/BMC-501: Constitution of India
BMC-302/BMC-402/BMC-502: Universal Human Values -1 (during Induction Program)
BMC-303/BMC-403/BMC-503: Environment Science
BMC-304/BMC-404/BMC-504: Essence of Indian Knowledge Tradition
BMC-305/BMC-405/BMC-505: Learning an art form (during Induction Program)

List of Management Courses
BMG-401/BMG-402:Management1(Organizational Behaviour / Finance &Accounting)

SUBHARTI INSTITUTE OF TECHNOLOGY & ENGINEERING

SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT

STUDY & EVALUATION SCHEME

YEAR II, SEMESTER-IV

Branch/Course: Computer Science and Engineering/B.Tech

BECE-307	Analog Electronic circuits	3L:0T:0P	3 credits

Objective: To Study of Amplifier, Frequency transition models, about oscillators, OP-Amp. Digital to analog converter.

UNIT-1: Diode Circuits, Amplifier models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.

UNIT-2: Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators.

Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load. Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR. OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages, compensation.

UNIT-3: OP-AMP applications: review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications. Active filters: Low pass, high pass, band pass and band stop, design guidelines.

UNIT-4: Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, resistor string etc. Analog- to-digital converters (ADC): Single slope, dual slope, successive approximation, flash etc.

UNIT-5: Switched capacitor circuits: Basic concept, practical configurations, application in amplifier, integrator, ADC etc.

Text/Reference Books:

1. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.
2. J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988
3. P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.
4. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College11
5. Paul R. Gray and Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Understand the characteristics of diodes and transistors
2. Design and analyze various rectifier and amplifier circuits
3. Design sinusoidal and non-sinusoidal oscillators
4. Understand the functioning of OP-AMP and design OP-AMP based circuits
5. Design ADC and DAC

BCSE-301	Data Structure & Algorithms	3L:0T: 4P	5 credits

Pre-requisites ESC 201

Objectives of the course:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques.
3. To understand basic concepts about stacks, queues, lists trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures.

UNIT-1: **Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure. **Operations:** insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off.

Searching: Linear Search and Binary Search Techniques and their complexity analysis.

UNIT-2: **Stacks and Queues**: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

UNIT-3: **Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

UNIT-4: **Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

UNIT-5: **Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Suggested books: "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

Suggested reference books:

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company.
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.

Course outcomes

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to

implement it.

3. For a given problem of Stacks, Queues and linked list student will able to implement it   and analyze the same to determine the time and computation complexity.

4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.

5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

BECE-306	Digital Electronics	3L:0T:0P	3 credits

Unit-I
Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion.

Unit-II
MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

Unit-III
Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation.

Unit-IV

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Device.

Unit-V

VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Text/Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition ,2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

Course outcomes:

At the end of this course students will demonstrate the ability to

1. Design and analyze combinational logic circuits
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
3. Design & analyze synchronous sequential logic circuits
4. Use HDL & appropriate EDA tools for digital logic design and simulation

BAS-302	Mathematics-III	3L:0T:0P	3 Credits

Objectives:

- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To introduce effective mathematical tools for the solutions of differential equations that model physical processes.
- To introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems

Unit No.	Particulars	Contact Hours
1	***Partial Differential Equations – First order*** -First order partial differential equations, solutions of first order linear and non-linear PDEs.	8
2	***Partial Differential Equations*** – **Higher order-** Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method	8
3	**Integral Transforms:** Laplace transform, Inverse Transforms, Convolution Theorems, Applications of Laplace transform to ordinary differential equation. Z- transform and its application to solve difference equations.	9
4	**Numerical Techniques – I** Zeroes of transcendental and polynomial equations using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods. **Interpolation:** Finite differences, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals**.**	8
5	**Numerical Techniques –II** Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss- Seidal method. Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson's one third and three-eight rules, Solution of ordinary differential equations (first order,second order and simultaneous) by Euler's, Picard's and fourth-order Runge- Kutta methods.	8

Course Outcomes:
- Ability to know and understand various Mathematical Function, Laplace Transform.
- Analyze boundary value problem related to Laplace Transform
- Ability to Numerical Techniques.

Text/Reference Books

- Higher Engg. Mathematics : B.S. Grewal
- Advanced Engg. Mathematics : E. Kreyzig
- Complex variables and Applications : R.V. Churchil; Mc. Graw Hill
- Engg. Mathematics Vol. II: S.S. Sastry; Prentice Hall of India.

- Operation Research : H.A. Taha
- Probability and statistics for Engineer : Johnson. PHI

BECE-356	Digital Electronics lab	0L:0T:4P	2 Credits

Objective: To understand the digital logic and create various systems by using these logics.

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of V_{cc} and ground, verification of the truth tables of logic gates using TTL ICs.

2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.

3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.

4. Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.

5. Implementation of 4x1 multiplexer using logic gates.

6. Implementation of 4-bit parallel adder using 7483 IC.

7. Design, and verify the 4-bit synchronous counter.

8. Design, and verify the 4-bit asynchronous counter.

BCSE-351	Data Structure & Algorithms lab	0L:0T:4P	2 Credits

Write Program in C or C++ for following.

- Array implementation of Stack, Queue, Circular Queue, List.

- Implementation of Stack, Queue, Circular Queue, List using Dynamic memory Allocation.

- Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion in BST.

- Implementation of Searching and Sorting Algorithms.

- Graph Implementation, BFS, DFS, Min. cost spanning tree, shortest path algorithm.

BECE-357	Analog Electronic circuits lab	0L:0T:4P	2 Credits

1. Design and set up the following rectifiers with and without filters and to determine ripple factor and rectifier efficiency: (a) Full Wave Rectifier (b). Bridge Rectifier
2. Conduct experiment to test diode clipping (single/double ended) and clamping circuits (positive/negative).
3. Conduct an experiment on Series Voltage Regulator using Zener diode and power transistor to determine line and load regulation characteristics
4. Realize BJT Darlington Emitter follower with and without bootstrapping and determine the gain, input and output impedances.
5. Design and set up the BJT common emitter amplifier using voltage divider bias with and without feedback and determine the gain- bandwidth product from its frequency response.
6. Plot the transfer and drain characteristics of a JFET and calculate its drain resistance, mutual conductance and amplification factor.
7. Design, setup and plot the frequency response of Common Source JFET/MOSFET amplifier and obtain the bandwidth.

8. Plot the transfer and drain characteristics of n-channel MOSFET and calculate its parameters, namely; drain resistance, mutual conductance and amplification factor.
9. Set-up and study the working of complementary symmetry class B push pull power amplifier and calculate the efficiency.

BCSE-352	IT workshop Lab	0L:0T:4P	3 Credits

1. a. To Know the history and features of MATLAB b. To Know the local environment of MATLAB
2. Write a program in MATLAB to perform Union,Intersection and Complement operations
3. Write a program in MATLAB to implement De-Morgan's Law.
4. Write a program in MATLAB to plot various membership functions
5. Use Fuzzy toolbox to model tip value that is given after a dinner which can be-not good,satisfying,good and delightful and service which is poor,average or good and the tip value will range from Rs. 10 to 100.
6. Generate ANDNOT function using McCulloch-Pitts neural net by MATLAB program.
7. Generate XOR function using McCulloch-Pitts neural net by MATLAB program.
8. Write a MATLAB program for Hebb Net to classify two dimensional input patterns in bipolar with their targets given below: '*' indicates a '+' and '.' Indicates '-'
9. Write a MATLAB program for Perceptron net for an AND function with bipolar inputs and targets.
10. Write a M-file to calculate the weights for the following patterns using hetero-associative neural net for mapping four input vectors to two output vectors.
11. Write an M-file to store vector[-1 -1 -1 -1] and [-1 -1 1 1] in an auto-associative net.Find weight matrix.Test the net with [1 1 1 1] as input.

BCSE-401	Discrete Mathematics	3L:1T:0P	4 Credits

Objectives of the course

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

1. Use mathematically correct terminology and notation.
2. Construct correct direct and indirect proofs.
3. Use division into cases in a proof.
4. Use counter examples.
5. Apply logical reasoning to solve a variety of problems.

Unit- 1:

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of arithmetic.

Unit-2:

Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

Unit-3:

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. **Proof Techniques:** Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

Unit-4:

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.

Unit-5:

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

Suggested books :

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Suggested reference books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

Course Outcomes

1. For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives

2. For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference

3. For a given a mathematical problem, classify its algebraic structure

4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra

5. Develop the given problem as graph networks and solve with techniques of graph theory.

BCSE-402	Computer Organization &Architecture	3L:0T:4P	5 Credits

Pre-requisites	ESC 302

Objectives of the course:

To expose the students to the following :

1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles.
5. To provide the knowledge on Instruction Level Parallelism
6. To impart the knowledge on micro programming
7. Concepts of advanced pipelining techniques.

Unit-1

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

Unit- 2:

Introduction to x86 architecture.

CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU.

Memory system design: semiconductor memory technologies,memory organization.

Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers –program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes–role of interrupts in process state transitions, I/O device interfaces – SCII, USB

Unit-3:

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

Unit-4:

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Suggested books:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.

2. "Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.

Suggested reference books:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill

2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.

3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

Course outcomes

1.Draw the functional block diagram of a single bus **architecture of a computer and describe the function of the** instruction execution cycle, RTL interpretation of Instructions, addressing modes, instruction set.

2. **Write** assembly language program for specified microprocessor for computing

16 bit multiplication, division and I/O device interface (ADC,

a. Write a flowchart for Concurrent access to memory and cache coherency in **Parallel Processors** and describe the process.
b. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
c. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

BCSE-403	Operating Systems	3L:0T:4P	5 Credits

Pre-requisites	PCC – CS402

Objectives of the course

To learn the fundamentals of Operating Systems.

1. To learn the mechanisms of OS to handle processes and threads and their communication
2. To learn the mechanisms involved in memory management in contemporary OS
3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
4. To know the components and management aspects of concurrency management

Unit 1:

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Unit 2:

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, **Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Unit 3:

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

Unit 4:

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Unit 5:

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation–Hardware support for paging, Protection and sharing, Disadvantages of Paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set , Dirty page/Dirty bit –Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

Unit 6:

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management(bit vector, linked list, grouping), directory implementation (linear list, hash table),efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

Course Outcomes

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Suggested books:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.

2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

Suggested reference books:

3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing

4. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley

5. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India

6. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

BCSE-404	Design and Analysis of Algorithms	3L:0T: 4P	5 Credits

Pre-requisites	ESC 201

Objectives of the course

1. Analyze the asymptotic performance of algorithms. Write rigorous correctness proofs for algorithms.
2. Demonstrate a familiarity with major algorithms and data structures.
3. Apply important algorithmic design paradigms and methods of analysis. Synthesize efficient algorithms in common engineering design situations.

Unit 1:

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Unit 2:

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch-and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

Unit 3:

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

Unit 4:

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

Unit-5:

Selected Topics: Algebraic Computation, Fast Fourier Transform, String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

Text books:

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.

2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",

3. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.

References:

1. Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005.

2. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.

3. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997

4. Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.

5. Harsh Bhasin,"Algorithm Design and Analysis",First Edition,Oxford University Press.

6. Gilles Brassard and Paul Bratley,Algorithmics:Theory and Practice,Prentice Hall,1995.

Courses BMG-401 Management I (Organizational Behavior)

l3L 0T 0P 0Credits

Course Objectives

1. Objective of the course is to give a basic perspective of Management theories andPractices.

2. This will form foundation to study other functional areas of management and to

3. Provide the students with the conceptual framework and the theories underlying

4. Organizational Behavior.

Unit 1

Role of Management – Concept – Significance – Functions – principles of Management - Patterns of

Management: Scientific – Behavioral – Systems – Contingency

Unit 2

Decision Making & Controlling – Process – Techniques. Planning – Process – Problems —— Making It

Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling

Effective

Unit 3

Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types –

Making Organizing Effective - Understanding Individual Behavior – Perception – Learning –

Personality Types – Johor window- Transactional Analysis

Unit 4

Group Dynamics & Motivation – Benefits of Groups – Types of Groups – Group Formation and

Development, Motivation – Concept of Motivation - Motivational Theories of Maslow, Herzberg,

David McClelland, and Porter and Lawler

Unit 5

Leadership and Organizational Culture and Climate: Leadership – Traits Theory – Managerial Grid –

Transactional Vs Transformational Leadership – Qualities of good Leader, Change Management –
Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types –

Making Organizing Effective - Understanding Individual Behavior – Perception – Learning –

Personality Types – Johor window- Transactional Analysis

Outcomes

1. Demonstrate an understanding of the forces that shape the business and economic structure

2. Explain why business ethics is an integral part of every business organization.

3. Understand the business and related factors; and business's dependency on the interactions with

different environmental variables.

4. Develop analytical skills and widen the understanding of macro environmental issues by applying the

knowledge of macroeconomic policies and their impact on business organization and strategy

Text/Reference Books:

1. Organizational Behavior, Stephen P. Robbins, Pearson Education

2. Organizational Behaviour, S.S.Khanka, S.Chand

3. Organizational Behavior , Mishra .M.N ,Vikas

BCSE-452	Computer organization and architecture Lab	0L:0T: 4P	2 Credits

1.   Bread Board Implementation of Flip-Flops.

2. Experiments with clocked Flip-Flop.

3. Design of Counters.

4. Bread Board implementation of counters & shift registers.

5. Implementation of Arithmetic algorithms.

6. Bread Board implementation of Adder/Subtractor (Half, Full)

7. Bread Board implementation of Binary Adder.

8. Bread Board implementation of Seven Segment Display.

Institute may also develop the experiment based on the infrastructure available with them.

BCSE-453	Operating system Lab	0L:0T: 4P	2 Credits

1. Basics of UNIX commands.
2. Shell programming
3. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
5. Implement Semaphores
6. Implement ll File Organization Techniques.
7. Implement Bankers algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique for memory management.
12. Implement Threading & Synchronization Applications

BCSE-454	Design and analysis of algorithm Lab	0L:0T: 4P	2 Credits

1. PROGRAM TO IMPLEMENT INSERTION SORT.
2. PROGRAM TO IMPLEMENT MERGE SORT
3. PROGRAM TO IMPLEMENT BUCKET SORT.
4. PROGRAM TO IMPLEMENT HEAP SORT.
5. PROGRAM TO IMPLEMENT COUNTING SORT
6. Wap to implement quick sort.
7. Wap to implement radix sort.
8. WAP to implement shell sort

BHU-301	Effective Technical Communication	3L:0T:0P	3 credits

Course Objective

The goal of this course is to prepare engineering students with the individual and collaborative technical writing, presentation, and research skills necessary to be effective technical communicators in academic and professional environments. This course meets the criteria for a Communications Intensive

UNIT 1:

Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

UNIT 2:

Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

UNIT 3:

Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

UNIT 4:

Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

UNIT 5:

Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

Course Outcomes

1. Clearly convey specialized information from a technical field to a non-specialized audience. 2. Identify and use appropriate formats and conventions derived from individual disciplines. 3. Assess effectiveness and validity of information sources, such as web sites, business documents, and professional journals. 4. Develop strategies for information design, to include producing visually enhanced documents. 5. Summarize larger texts in clear, direct style for practical applications. 6. Design and produce a research project appropriate to the student's major and/or career interests. 7. Edit documents with peer exchange and according to professional guidelines.

Text/Reference Books:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York,

2003. (ISBN 0312406843)

3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.

4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

ENVIRONMENTAL SCIENCES (BMC-403) SYLLABUS

UNIT-1

Environment: Definition, Concept and Scope, Multidisciplinary approach of environmental sciences.
Physical and Biotic Component of environment, Need for public awareness. Concept of ecosystem structure and function.
Concepts: Carbon credits, Acid rain, Sustainability and Global warming.

UNIT-2

Ecosystem: Structure and Function of ecosystem; Energy flow in ecosystem: food chain, food web and ecological succession. Case study of the following ecosystems: Forest ecosystem, Grassland ,Desert and Pond ecosystem
Biodiversity in global communities, Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

UNIT-3

Environmental Pollution: Sources , Effect and control measures of Air, Water and Land pollution. Solid waste management: causes, effects and control measures, 3R's policy. Role of an individual in prevention of pollution. Pollution case studies. Climate change , Global warming, Ozone layer depletion, acid rain and impacts on human communities and agriculture.

UNIT-4

Natural Resources and associated problems: Mining, Deforestation, Dams. Conservation of scarce resources , water management practices. Role of an individual in conservation of environment.
Energy resources: Conventional and Nonconventional resources. Environmental ethics, EIA principles and process; ISO standards, ISO 9000 AND 14000.
Disaster Management: its objective and main features, national environmental policy.

UNIT-5

Introduction to legal and regulatory framework.
Salient features of The Air (Prevention & Control of Pollution) Act 1981;
The Water (Prevention and Control of Pollution) Act, 1974;

The Noise Pollution (Regulation and Control) Rules 2000
The Environment (Protection) Act 1986