

Syllabus for Bachelor of Computer Application (BCA) Programme
(Effective for Students Admitted in Academic Session 2018-2019)

Detailed Syllabus
Semester II

Paper: Computer Architecture

Code : BCAN-201

Contacts Hours / Week : 4L+1CE

Credits : 3

1. Module I: Data Representation (4L)

1. Number Systems – decimal, binary, octal, hexadecimal, alphanumeric representation, 2. Complements – 1's complement, 2' complement, 9's complement, 10' complement, (r-1)'s complement, r's complement, 3. Fixed point representation – Integer representation, arithmetic addition, arithmetic subtraction, overflow, decimal fixed point representation, 4. Floating point representation, 5. IEEE 754 floating point representation

2. Module II: Computer arithmetic (5L)

1. Addition algorithm of sign magnitude numbers, 2. Subtraction algorithm of sign magnitude numbers, 3. Addition algorithm of signed 2's complement data, 4. Subtraction algorithm of signed 2's complement data, 5. Multiplication algorithm, Booth's algorithm, 6. Division algorithm

3. Module III: Register transfer and micro-operations (5L)

1. Register transfer language, 2. Register transfer, 3. Bus system for registers, 4. Memory transfers – memory read, memory write, 5. Micro operations – register transfer micro operations, arithmetic micro operations, logic micro operations, shift micro operations, 6. Binary adder, binary adder subtractor, binary incrementer, arithmetic circuit for arithmetic micro operations, 7. One stage logic circuit, 8. Selective set, Selective complement, Selective clear, Mask, Insert, Clear

4. Module IV: Basic Computer organization and design (4L)

1. Instruction codes, 2. Direct address, Indirect address & Effective address, 3. List of basic computer registers, 4. Computer instructions: memory reference, register reference & input-output instructions, 5. Block diagram & brief idea of control unit of basic computer, 6. Instruction cycle

5. Module V: Micro programmed control (2L)

1. Control memory, 2. Address sequencing, 3. Micro program examples

6. Module VI: Central processing unit (5L)

1. General register organization, 2. Stack organization, Register stack, Memory stack, Stack operations – push & pop, 3. Evaluation of arithmetic expression using stack, 4. Instruction format, 5. Types of CPU organization (single accumulator, general register & stack organization) & example of their instructions, 6. Three, two, one & zero address instruction, 7. Definition and example of data transfer, data manipulation & program control instructions, 8. Basic idea of different types of interrupts (external, internal & software interrupts), 9. Difference between RISC & CISC

7. Module VII: Pipeline and vector processing (3L)

1. Parallel processing, 2. Flynn's classification, 3. Pipelining, Example of pipeline, space time diagram, speedup, 4. Basic idea of arithmetic pipeline, example of floating point addition/ subtraction using pipeline

8. Module VIII: Input – output organization (6L)

1. Peripheral devices, 2. Input – output interface, 3. Isolated I/O, Memory mapped I/O, 4. Asynchronous data transfer: strobe & handshaking, 5. Programmed I/O, 6. Interrupt initiated I/O, 7. Basic idea of DMA & DMAC 8. Input – output processor

9. Module IX: Memory organization (6L)

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1. Memory hierarchy, 2. Main memory definition, types of main memory, types of RAM, ROM, difference between SRAM & DRAM, 3. Cache memory, Cache memory mapping – Direct, Associative, Set Associative, 4. CAM, hardware organization of CAM, 5. Virtual memory, mapping using pages, page fault, mapping using segments, TLB, 6. Auxiliary memory, diagrammatic representation of magnetic disk & hard disk drive, 7. Definitions of seek time, rotational delay, access time, transfer time, latency

Suggested Readings:

- 1. Computer System Architecture, M. Morris Mano, PEARSON**
- 2. Computer Organization & Architecture – Designing For Performance, William Stallings, PEARSON**
- 3. Computer Architecture & Organisation, J.P. Hayes, TATA MCGRAW HILL**
- 4. Computer Organization and Architecture, T. K. Ghosh, TATA MCGRAW-HILL**
- 5. Computer Architecture, Behrooz Parhami, OXFORD UNIVERSITY PRESS**

Syllabus for Bachelor of Computer Application (BCA) Programme
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Paper: Software Engineering

Code : BCAN-202

Contacts Hours / Week : 4L+1CE

Credits : 4

1. Module I: (12L)

Overview of Computer Based Information System- TPS, OAS, MIS, DSS, KBS
Development Life Cycles- SDLC and its phases Models- Waterfall,
Prototype, Spiral, Evolutionary Requirement Analysis and Specification, SRS
System analysis- DFD, Data Modeling with ERD

2. Module II: (9L)

Feasibility Analysis System design tools- data dictionary, structure chart, decision table, decision tree.
Concept of User Interface, Essence of UML. CASE tool.

3. Module III: (9L)

Testing- Test case, Test suit, Types of testing- unit testing, system testing, integration testing,
acceptance testing Design methodologies: top down and bottom up approach, stub, driver,
black box and white box testing.

4. Module IV: (10L)

ERP, MRP, CRM, Software maintenance SCM, concept of standards (ISO and CMM)

Suggested Readings:

- 1. System analysis and design, Igor Hawryszkiewicz, Pearson**
- 2. Analysis and design of Information System, V Rajaraman, PHI**
- 3. Software Engineering, Ian Sommerville, Addison-Wesley**

Syllabus for Bachelor of Computer Application (BCA) Programme
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Paper: Data Structure with C

Code : BCAN-203

Contacts Hours / Week : 4L+1CE

Credits : 4

1. Module I: Concepts of Abstract data type(4L) Concept of abstract data types, Structure, union, enum, pointer to structure, Self referential structure, Pointer to pointer
2. Module II: Dynamic Memory Allocation (4L) Difference between static and dynamic memory allocation, Using functions such as malloc(), calloc(), realloc(), free().
3. Module III: File Management (4L) Application of functions such as fopen(), fclose(), getc(), putc(), fprintf(), fscanf(), getw(), putw(), command line argument.
4. Module IV: Data Structure using Array(4L) stack, queue, circular queue, priority queue, dequeue and their operations and applications.
5. Module V: Searching and Sorting(6L) Searching: linear search, Binary search, their comparison, Sorting: insertion sort, Selection sort. Quick sort, Bubble sort Heap sort, Comparison of sorting methods , Analysis of algorithm, complexity using big 'O' notation
6. Module VI: Linked List (4L) Linear link lists, doubly linked lists, stack using linked list, queue using linked list, circular linked list and their operations and applications.
7. Module VII: Trees (5L) Binary trees, binary search trees, representations and operations, thread representations, sequential representations, B tree , B+ tree,
8. Module VIII: Graphs (5L) Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs, Graph Traversal: Depth first search and Breadth first search. Spanning Trees, minimum spanning Tree, Shortest path algorithm
9. Module IX: Hashing (4L) Definition, Hashing functions, Load factor and collision, open addressing (linear probing) and chaining method to avoid collision

Suggested Readings:

1. **Data Structures in C, Ajay Agarwal, Cyber Tech**
2. **Data Structures Using C, Radhakrishnan & Shrinivasan, ISTE/EXCEL BOOKS**
3. **C and Data Structure, Radhaganesan, Scitech**
4. **Data Structure Using C & C++, Tannenbaum, PHI**
5. **Mastering Algorithms with C, Loudon, SPD/O'REILLY**

Syllabus for Bachelor of Computer Application (BCA) Programme
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Paper: Advanced Mathematical Computation

Code : BMN-201

Contacts Hours / Week : 4L+1CE

Credits : 3

1. Module I: Algebra (20L)

Abstract Algebra: Sets, Algebra of sets and their applications, Relations, Mapping, Compositions, Groups, Abelian groups, Sub-groups, Cyclic groups, Notion of ring and fields.

Complex numbers, Modulus and amplitudes, De Moivre's theorem

Polynomials, Division algorithm, Fundamental theorem of classical algebra (statement only), Descart's rule of sign, Relation between roots and coefficients, symmetric function of the roots, transformation of polynomial equations, Binomial equations

2. Module II: Differential Equations (14L)

Order, degree, formation of a differential equation, Solutions of ODE, First order and first degree: Variable separation method, Homogeneous equations, Exact equations, Condition of exactness (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation. General solution of ODE of first order and higher degree, Clairaut's equation, second order linear ODE with constant coefficients, Solutions using D operator method. Cauchy-Euler equations and their solutions

3. Module III: Sequence and Series (6L)

Bounded and unbounded sequences, convergence or divergence of a sequence, behaviour of monotone sequences, algebra of convergent sequences, Cauchy's sequence, Cauchy's general principle of convergence, infinite series – its convergence and sum, series with positive terms and standard tests of convergence (without proof), alternating series, Leibnitz test, absolute convergence.

Suggested Readings:

1. **Higher Algebra, S. K. Mapa, Levant Books**
2. **Advanced Higher Algebra, Chakravorty and Ghosh, U N Dhar Pvt. Ltd**
3. **Differential Equations, Shepley L Ross, Wiley**
4. **Differential Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd**