1.0 Objectives of the MCA course
The M.C.A. program prepares students to take up positions as systems analysts, systems designers, programmers, and managers in any field related to information technology. The program, therefore, aims at imparting comprehensive knowledge with equal emphasis on theory and practice. The M.C.A. students are encouraged to spend a full semester working in the industry/in the institute giving them insight into the workings of the IT world. However, the course curriculum will have enough flexibility to enable a student to undertake advance studies in Computer Science later on.

2.0 Course Outline Semester Wise

<table>
<thead>
<tr>
<th>Semester-I</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Contact Hrs.</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCC101</td>
<td>Programming in C</td>
<td>3-1-0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MCC102</td>
<td>Micro-processors and Assembly Language Programming</td>
<td>3-1-0</td>
<td>4</td>
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</tr>
<tr>
<td>MCC103</td>
<td>Discrete Mathematics</td>
<td>3-1-0</td>
<td>4</td>
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<tr>
<td>MCC104</td>
<td>Engineering Economics and Costing</td>
<td>3-0-0</td>
<td>3</td>
<td></td>
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<tr>
<td>MCC105</td>
<td>Financial Accounting</td>
<td>3-0-0</td>
<td>3</td>
<td></td>
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<tr>
<td>MCC106</td>
<td>Communicative English</td>
<td>2-0-0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MCL107</td>
<td>Communicative English Lab-I</td>
<td>0-0-3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MCL108</td>
<td>Lab – I (C Programming Lab)</td>
<td>0-0-6</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MCL109</td>
<td>Lab – II (Assembly Language Programming Lab)</td>
<td>0-0-3</td>
<td>2</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>28</strong></td>
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<table>
<thead>
<tr>
<th>Semester-II</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Contact Hrs.</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCC201</td>
<td>Data Structures Using C</td>
<td>3-0-0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MCC202</td>
<td>Computer Organization and System architecture</td>
<td>3-1-0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MCC203</td>
<td>Object orientated Programming using C++</td>
<td>3-0-0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MCC204</td>
<td>Theory of Computation</td>
<td>3-0-0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MCC205</td>
<td>Computer Based Numerical Methods</td>
<td>3-0-0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MCC206</td>
<td>Business Communication in English</td>
<td>2-0-0</td>
<td>2</td>
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<tr>
<td>MCL207</td>
<td>Communicative Practice Lab-II</td>
<td>0-0-3</td>
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<tr>
<td>MCL208</td>
<td>Lab – III (Data Structure in C Lab)</td>
<td>0-0-6</td>
<td>4</td>
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<tr>
<td>MCL209</td>
<td>Lab – IV (C++ Programming Lab.)</td>
<td>0-0-3</td>
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<tr>
<td>MCS210</td>
<td>Seminar</td>
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<table>
<thead>
<tr>
<th>Semester-III</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Contact Hrs.</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCC301</td>
<td>Analysis and Design of Algorithms</td>
<td>3-1-0</td>
<td>4</td>
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<tr>
<td>MCC302</td>
<td>Operating Systems</td>
<td>3-1-0</td>
<td>4</td>
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<tr>
<td>MCC303</td>
<td>Computer Networks</td>
<td>3-0-0</td>
<td>3</td>
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<tr>
<td>MCC304</td>
<td>Data Base Systems</td>
<td>3-1-0</td>
<td>4</td>
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<tr>
<td>MCC305</td>
<td>Probability and Statistics</td>
<td>3-0-0</td>
<td>3</td>
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<tr>
<td>MCC306</td>
<td>Management Information System</td>
<td>3-0-0</td>
<td>3</td>
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<tr>
<td>MCL307</td>
<td>Lab – V (Operating System &amp; Network Lab.)</td>
<td>0-0-6</td>
<td>4</td>
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<tr>
<td>MCL308</td>
<td>Lab – VI (Data base Lab)</td>
<td>0-0-3</td>
<td>2</td>
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<tr>
<td>MCL309</td>
<td>Communication and Interpersonal Skills for Corporate Readiness</td>
<td>0-0-2</td>
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<td><strong>Total</strong></td>
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## Semester – IV

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>MCC401</td>
<td>Programming with Java</td>
<td>3-1-0</td>
</tr>
<tr>
<td>MCC402</td>
<td>Computer Graphics &amp; Multimedia</td>
<td>3-0-0</td>
</tr>
<tr>
<td>MCC403</td>
<td>Software Engineering</td>
<td>3-0-0</td>
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<td>MCC404</td>
<td>Compiler Design</td>
<td>3-1-0</td>
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<tr>
<td>MCC405</td>
<td>Quantitative Techniques-I (Operations Research)</td>
<td>3-0-0</td>
</tr>
<tr>
<td>MCC406</td>
<td>E-Commerce &amp; ERP</td>
<td>3-0-0</td>
</tr>
<tr>
<td>MCL407</td>
<td>Lab – VII (Programming with Java Lab.)</td>
<td>0-0-6</td>
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<tr>
<td>MCL408</td>
<td>Lab – VIII (Comp. Graphics &amp; Multimedia Lab.)</td>
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<td>MCS409</td>
<td>Seminar</td>
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## Semester – V

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<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>MCC501</td>
<td>Artificial Intelligence and Expert system</td>
<td>3-1-0</td>
</tr>
<tr>
<td>MCC502</td>
<td>Object Oriented Analysis and Design with UML</td>
<td>3-0-0</td>
</tr>
<tr>
<td>MCC503</td>
<td>Internet Technology and enterprise Java</td>
<td>3-1-0</td>
</tr>
<tr>
<td>MCC504</td>
<td>Quantitative Techniques-II (Modeling &amp; Simulation)</td>
<td>3-0-0</td>
</tr>
<tr>
<td>ELECTIVE –I</td>
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<tr>
<td>ELECTIVE –II</td>
<td></td>
<td>3-0-0</td>
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<tr>
<td>Elective-I</td>
<td>Distributed Systems</td>
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<tr>
<td>MCE505</td>
<td>Parallel Computing</td>
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<tr>
<td>MCE506</td>
<td>Image Processing</td>
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<tr>
<td>MCE507</td>
<td>Web Engineering</td>
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<tr>
<td>Elective-II</td>
<td>Computer Security</td>
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<tr>
<td>MCE509</td>
<td>Software Design</td>
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<tr>
<td>MCE510</td>
<td>Bioinformatics</td>
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<tr>
<td>MCE511</td>
<td>Soft Computing</td>
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<tr>
<td>MCA513</td>
<td>Assignment *</td>
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<tr>
<td>MCL514</td>
<td>Lab – X (Enterprise Web Computing Java Lab.)</td>
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<tr>
<td>MCV515</td>
<td>Comprehensive Viva-voce</td>
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## Semester – VI

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MCP601</td>
<td>Project work for 16 weeks**</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>20</strong></td>
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</tbody>
</table>

* There will be atleast 10 weekly assignments to be submitted by students on the subject “object oriented Analysis and design with UML”. Weekly evaluation will be done by a group of teachers of the department of 10 marks each taking personal viva of the students for a total of 100 marks.

** There will be a 16 weeks project work to be undertaken by the students in any Industry / Institution. At the end of the project there will an evaluation of the project for 20 credits by a group of experts including one external expert and teachers of the department.
CREDIT DISTRIBUTION

Total Proposed Credit: 162

Distribution of credits in different disciplines:-

<table>
<thead>
<tr>
<th>Proposed</th>
<th>Approval by B.P.U.T.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td>1. Basic Sciences (Math.)</td>
<td>12</td>
</tr>
<tr>
<td>2. Humanities and English</td>
<td>18</td>
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<tr>
<td>3. Professional Core</td>
<td>98</td>
</tr>
<tr>
<td>4. Professional Elective</td>
<td>04</td>
</tr>
<tr>
<td>5. Seminar</td>
<td>04</td>
</tr>
<tr>
<td>6. Comprehensive Viva-Voce</td>
<td>04</td>
</tr>
<tr>
<td>7. Projects</td>
<td>20</td>
</tr>
<tr>
<td>Total Credits:</td>
<td><strong>162</strong></td>
</tr>
</tbody>
</table>
1st Semester

MCC101 - Programming in C (3-1-0)

Module-I (12 hours)
Introduction to computer: Evolution of computer, Computer system, Compiling environment, Time sharing, Client-Server environment, Distributed computing, Programming languages, Writing and editing programs, Compiling, linking and executing programs, System development, Life cycle, Program development.
Number representation in computer: Number systems, Storing of integers and real numbers, Overflow and underflow, exceptions, Flow chart
C language fundamentals: Character set, Key words, Identifiers, data types, Constants and variables, Statements, Expressions, Operators, Precedence and associativity of operators, Side effects, Type conversion, Managing input and output
Control structures: Decision making, branching and looping.

Module-II (15 hours)
Arrays: one dimensional, multidimensional array and their applications, Declaration and manipulation of arrays
Strings: String variable, String handling functions, Array of strings
Functions: Designing structured programs, Functions in C, User defined and standard functions, Formal vs. actual arguments, Function category, Function prototype, Parameter passing, Recursive functions.
Storage classes: Auto, Extern, register and static variables

Module-III (13 hours)
Pointers: Pointer variable and its importance, pointer arithmetic and scale factor, Compatibility, Dereferencing, L-value and R-value, Pointers and arrays, Pointer and character strings, Pointers and functions, Array of pointers, pointers to pointers
Dynamic memory allocation
Structure and union: declaration and initialization of structures, Structure as function parameters, Structure pointers, Unions.
File Management: Defining and opening a file, Closing a file, Input/output Operations in files, Random Access to files, Error handling
The Pre-processor directives, command line arguments, Macros.

Text books:

Reference books:
Module I: (15 Hours)


Microprocessor History, 8085 Architecture and Register organization, Functional Block Diagram, Bus Organization, 8085 Instruction Set, Instruction classifications, Instruction word size, Instruction format, Addressing modes, Assembly Language programming.

Memory, I/O devices, Addressing memory and I/O devices, Memory mapping, Memory Interfacing, Tri-State Devices, Buffers.

Module II: (13 Hours)

Programming techniques with additional instructions: Looping, Counting, Indexing, Introduction to Advanced Instructions, Instruction cycle, Machine cycle, Timing Diagram, Stack and subroutine, Counter and Time delay, Debugging.

Module III: (12 Hours)

Interfacing Chips: 8255A (PPI), 8155 (Multipurpose Programmable Device), Interrupts, 8259A (PIC), Serial I/O and Data communication, Serial Data communication standard (RS 232C) 8257 or 8237A (DMA Controller), 8251A (USART).

16 bit processor 8086: Introduction, Architecture, Pin Diagram, Min & Max Mode, Addressing Modes.

Text Books:


2. D V Hall, “Microprocessor & Interfacing” McGraw Hill Education India

Reference Books:

3. P K Ghosh, P R Sridhar, “0000 to 8085 Introduction to microprocessor to Engineers & Scientists” Prentice-Hall of India.
4. M. Mano”Logic and Computer Design Fundamentals” Pearson Education/PHI.
Module-I (15 hours)

Logic, Relation & Functions:

Logic: Propositions and logical Operations, Conditional statements; Predicate Calculus-
First order logic, universal and existential quantifiers; Proof Techniques- methods of
proof, Mathematical induction, recurrence relations.

Relation and Diagraphs- Properties of relations, composition of relations, closure
operation on relations, equivalence relations and partitions, paths in relation and
diagraphs, Operations on relations, Transitive closure and Warshall’s Algorithm.
Partial ordered sets (poset), Hasse diagram, External elements of partially ordered sets

Functions, Functions for computer science, Growth of functions, Permutation functions

Module -II (13 hours)

Topics in Graph Theory: Directed and undirected graphs, basic terminology, paths and
circuits, Eulerian paths and circuits, Hamiltonian paths and circuits, Transport Network,
Graph coloring.
Trees: definition and properties, rooted trees, tree traversals— preorder, inorder,
postorder, binary trees, labeled trees, spanning trees, cut sets, Graph traversals — BFS
and DFS, Minimum cost spanning trees-Prim’s and Kruskal’s algorithm, Shortest paths
in weighted graphs- Dijkstra’s algorithm.

Module-III (12 hours)

Algebraic Structures and Applications: Binary operations, semi-groups and groups,
subgroups, cosets, Lagrange’s theorem, Product and quotient semi-groups and groups,
Normal subgroup, Homomorphism; coding of binary information and error detection,
group codes, decoding and error correction.

Lattices, finite Boolean algebra, functions of Boolean algebra.

Recommended Text Books:

1. Bernard Kolman, Robert Busby, Sharon C. Ross, “Discrete Mathematical

Reference Books:

**MCC 104 - ENGINEERING ECONOMICS AND COSTING (3-0-0)**

**Module-I (12 hours)**

**Module-II (12 hours)**

**Module- III (12 hours)**

**Text Books:**
2. C. T. Horngreen, “Cost Accounting “, Pearson Education India
4. H.L. Ahuja , “Principle of Economics”, S. Chand & Co

**MCC 105 - FINANCIAL ACCOUNTING (3-0-0)**

**Module-I (12 hours)**
Fundamentals of Accounting; Accounting as a business function and language of business, Functions and objective of Accounting, Users of Accounting information, Limitations of Accounting, Cyclical nature of business and Accounting cycles, Accounting equations, Accounting events and transactions, Classification of transaction and their effect on Accounting Equation, Statement showing the effect of transaction on assets, liabilities and capital, Accounting concepts – as applicable to Balance sheet and Income Statements, The rule of debit and credit

**Module-II(12 hours)**
Recording transaction: The journal, The ledger postings, Subsidiary Books ao Accounts, Capital and revenue transactions, Fixed assets and depreciation policy

Preparation of Financial Statements: Trial balance, Trading Account, Manufacturing Account, Profit and Loss account, Balance sheet
Module-III (12 hours)

Text books:
2. Jain and Narang, “Financial Accounting” Kalyani Publisher

Reference

MCC106- English Communication Skills (Theory) (2-0-0)

Module-I
The elements of communication (6 hours)
1.1 the importance of communication through English at the present time
1.2 the process of communication & factors that influence communication: sender, receiver, channel, code, topic, message, context, feedback, ‘noise’, filters and barriers
1.3 the importance of audience and purpose
1.4 the information gap principle: given and new information; information overload
1.5 verbal and non-verbal communication: body language
1.6 comparing general communication and business communication

Module-II
The sounds of English (14 hours)
2.1 vowels, diphthongs, consonants, consonant clusters
2.2 the International Phonetic Alphabet (IPA); phonemic transcription
2.3 problem sounds
2.4 syllable division and word stress
2.5 sentence rhythm and weak forms
2.6 contrastive stress in sentences to highlight different words
2.7 intonation: falling, rising and falling-rising tunes
2.8 varieties of Spoken English: Standard Indian, American and British

(Note: This unit should be taught in a simple, non-technical manner, avoiding technical terms as far as possible.)

Module-III
Review of English grammar (10 hours)
3.1 stative and dynamic verbs
3.2 the auxiliary system; finite and non-finite verbs
3.3 time, tense and aspect
3.4 voices: active and passive
3.5 modality
3.7 negation
3.8 Interrogation; reported and tag questions
3.9 conditionals
3.10 concord
3.11 Phrasal verbs

(Note The teaching of grammar should be treated as a diagnostic and remedial activity and integrated with communication practice. The areas of grammar in which errors are common should receive special attention when selecting items for review. Teaching need not be confined to the topics listed above.)

Books recommended
1. A course in communication skills by Dutt, Rajeevan & Prakash (Foundation Books, Cambridge)
2. Business Communication by Meenakshi Raman and Prakash Singh (Oxford)

MCL107 - Communicative Practice Lab - I (0-0-3)
Lab sessions will be devoted to practice activities based on all three modules of theory.

a. phonemic transcription 5 hours

Students will be trained to find out the correct pronunciation of words with the help of a dictionary, to enable them to monitor and correct their own pronunciation.

i transcription of words and short sentences in normal English orthography (writing) into their IPA equivalents;

ii transcription of words presented orally;

iii conversion of words presented through IPA symbols into normal orthography

iv syllable division and stress marking (in words presented in IPA form)

b. Listening 10 hours

i listening with a focus on pronunciation (ear-training): segmental sounds, stress, weak forms, intonation

Students should be exposed, if possible, to the following varieties of English during listening practice: Standard Indian, British and American.

c. Speaking 15 hours

i pronunciation practice (for accent neutralization), particularly of problem sounds, in isolated words as well as sentences

ii practising word stress, rhythm in sentences, weak forms, intonation

ii reading aloud of dialogues, poems, excerpts from plays, speeches etc. for practice in pronunciation

d. Grammar and usage 12 hours
The focus will be on the elimination of common errors. Some writing activities (e.g. writing of short paragraphs on assigned topics) can be used to identify these errors.

* identifying the central idea as well as supporting ideas
* preparing notes in diagrammatic form after reading a text, showing the main idea and supporting ideas and the relationships between them.

**Project Work**

Students will be required to produce and submit by the end of Semester 1 a 350-500 word project report on a topic of their choice. The project should involve data collection, analysis and reporting. Ten marks (out of the 70 marks allocated for the test at the end of Semester 1) will be set apart for the project.

---

**MCL108 - PROGRAMMING IN ‘C’ LAB (0-0-6)**

**Topics**

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Introduction to OS: Linux/Unix, DOS, and Windows.</td>
</tr>
<tr>
<td>02.</td>
<td>vi editor basics, common commands on UNIX.</td>
</tr>
<tr>
<td>03.</td>
<td>File handling, directory structures, file permissions, Creating and editing simple C programme, Compilation and execution.</td>
</tr>
<tr>
<td>04.</td>
<td>C programming on variables and expressions.</td>
</tr>
<tr>
<td>05.</td>
<td>Precedence of operators, Type casting.</td>
</tr>
<tr>
<td>06.</td>
<td>Decision control structures— if and nested if-else.</td>
</tr>
<tr>
<td>07.</td>
<td>Loop controls— do, while, for and case control structure.</td>
</tr>
<tr>
<td>08.</td>
<td>Unconditional jumps— break, continue, goto.</td>
</tr>
<tr>
<td>09.</td>
<td>Modular program development using functions.</td>
</tr>
<tr>
<td>10.</td>
<td>Arrays and matrix operations—add, subtract, multiply.</td>
</tr>
<tr>
<td>11.</td>
<td>Recursion</td>
</tr>
<tr>
<td>12.</td>
<td>Pointers, address operators and pointer arithmetic.</td>
</tr>
<tr>
<td>13.</td>
<td>Structures and Unions, Accessing their members.</td>
</tr>
<tr>
<td>15.</td>
<td>Files and file operations, standard streams.</td>
</tr>
<tr>
<td>17.</td>
<td>Different mathematical operations using &lt;math.h&gt;.</td>
</tr>
<tr>
<td>18.</td>
<td>Pointers to pointers, arrays, functions, structures and unions.</td>
</tr>
<tr>
<td>19.</td>
<td>Command line arguments, enums and preprocessors.</td>
</tr>
</tbody>
</table>

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**MCL109 - Assembly Language Programming Lab (0-0-3)**

**Topics**

1. Verification of 8085 Instruction Set.
2. Addition, Subtraction, Multiplication & Division of two 8-bit numbers.
3. Development of code conversion programs:
   a) Binary to Gray
   d) Gray to Binary
   c) ASCII to Binary
   d) Binary to ASCII
4. Identification of the ports and pins of I/O ports of Intel 8255.
5. Generation of Square, Triangular and Sinusoidal waveforms using DAC.
6. Study of Interrupt RST 7.5.
7. Stepper Motor control using 8085 Microprocessor.
2nd Semester

MCC201 - DATA STRUCTURE USING ‘C’ (3-0-0)

Module-I (15 Hours)
Linked Lists: Singly linked lists, Linked stacks and queues, Operation on polynomial, Linked dictionary, Doubly linked list, Circular linked list, Doubly circular linked lists.

Module-II (12 hours)
Dynamic storage Management, Garbage collection and compaction, Hashing functions. Hash tables and collision resolution techniques.

Trees: Binary trees, Terminologies and memory representation, Binary search trees, General trees, Tree traversing, Operations on binary trees, Expression manipulations, Threaded binary trees, Height balancing trees, Heaps, forest, File structures, Introduction to multi-way search trees, B-tree and B+-trees.

Module-III (10 hours)
Graphs: Terminologies and representation, Path matrix, graph traversal, DFS and BFS, shortest path problems, Bi-connected graphs, Topological sort.
Sorting techniques: Bubble sort, selection sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, Shell sort and address calculation sort, Linear search and binary search.

Text books:

Reference Books:

MCC202 - COMPUTER ARCHITECTURE & ORGANIZATION(3-1-0)

Module I: (15 Hours)
Introduction: Basic architecture of computer, Functional units, Operational concepts, Bus structures, Von Neumann Concept.

Basic Processing: Instruction code, Instruction set, Instruction sequencing, Instruction
cycle, Instruction format, Addressing modes, Micro instruction, Data path, Hardwired controlled unit, Micro programmed controlled unit.

**Arithmetic:** Design of ALU, Binary arithmetic, Addition and Subtraction of signed number, Multiplication of Positive number, Signed operand multiplication, Division, Floating point number representation and arithmetic.

**Module II: (12 Hours)**

**Memory:** Memory Hierarchy, RAM, ROM, Cache memory organization, Mapping techniques, Virtual memory, Mapping technique, Associative memory, Memory Interleaving, Secondary Storage, Flash drives.

**Module III (13 Hours)**

**Input/Output:** Accessing I/O devices, I/O mapped I/O, Programmed I/O, Memory Mapped I/O, Interrupt Driven I/O, Standard I/O interfaces, Synchronous and Asynchronous Data transfer, DMA data transfer.

**Introduction to Parallel processing:** Flynn’s Classification, Pipelining, Array processing, vector processing

**Text Books:**

**Reference Books:**

**MCC203 - OBJECT ORIENTED PROGRAMMING USING C++ (3-0-0)**

**Module-I (12 hrs)**

Introduction to C++ : C++ as multi-paradigm language, features supported by C++, syntax, data-type, const and bool qualifiers, variables, strings, operators

Control Structures, Decision and Loop Control Statements, Modular program design using functions, Top down program design with examples, parameter passing mechanisms, inline functions, recursion, Arrays and pointers, dynamic arrays, structures and unions in C++, Coding Style in C++

Object Oriented Programming in C++: Abstraction, OOP concepts, software life cycle, Abstraction Mechanisms: Procedural Abstraction and data abstraction; Classes and objects, object creation, access specifier-private, public and protected, constructors, default constructors, copy constructors, destructors, member functions, static members, references; Message communication using objects
Module-II (12 hrs)

**Inheritance:** Is-a Vs. Has-a relationships, simple inheritance—Class hierarchy, derived classes, Multiple inheritance, multileveled and hybrid inheritance, Abstract Base Classes, Composition and aggregation with example, polymorphism—compile time & run time polymorphisms, object slicing, base class initialization, virtual functions and Dynamic Binding.

Overloading: Function overloading and Operator overloading, ambiguity, Overloading Restriction, friends function, member operators, operator function, I/O operators, Automatic Conversions and Type Casts for Classes, Memory management in C++: new, delete, object copying—deep & shallow copy, this pointer.

Module-III (12 hrs)

Exception Handling Mechanisms: Exceptions and exception class, exception declarations, unexpected exceptions, RTTI, Calling abort(), Returning an Error Code, Exception Mechanism, Using Objects as Exceptions

Templates and Standard Template Library (STL): Generic Programming in C++, Template classes, declaration, Template functions, Template Classes and Friends, Namespaces and separate compilation; String class, Containers, Iterators, Vectors

Files in C++: Buffers, and the iostream File, redirection, streams and I/O streams classes, File Input and Output, Stream Checking and is_open(), Opening Multiple Files, Command-Line Processing, File Modes

Recommended Texts:

Reference Books:
4. Stephen Prata,” C++ Primer plus”, Pearson Education

MCC204 - THEORY OF COMPUTATION_3-0-0)

Module- I (12 hours)
Introduction of Automata, Computability, and Complexity ; Mathematical notations and terminology; Finding proofs and types of proofs.
Finite Automata and regular languages: Formal definitions, Designing finite automata, Deterministic finite automata, Non-deterministic finite automata, Equivalence of NFAs and DFAs, finite automata with ε-transition; regular expressions and languages, Properties of Regular languages, conversion of RE to FA and vice versa.
Module –II (12 hours)
Push down Automata and Context free languages: Context free grammars, Designing context free grammar, Ambiguity in CFG and its removal, Chomsky normal form
Push down Automata: formal definition, graphical notations, Languages accepted by PDA, Equivalence of PDA and CFG, Non-context free languages.

Module-III (12 hours)
Turing Machines and Computability: Formal definition of Turing machines with examples, Graphical notations, Variants of Turing machines, Church-Turing thesis, Hilbert’s problem
Decidability, undecidability and reducibility: Decidable languages; Decidable problems concerning regular languages and context free languages, The halting problem, Post correspondence problems, Undecidable problems, Mapping reducibility, Decidability of logical theories, Turing reducibility.

Recommended Texts:


Reference Books:


MCC205 - COMPUTER BASED NUMERICAL METHODS (3-0-0)
(Students are required to write C programming of the numerical methods)

Module-I (14 Hrs)


Module-II (12 Hrs)
Interpolation: Newton’s forward and backward interpolation formulae, Lagrange’s interpolation formula, divided differences, Newton’s divided difference formula, Inverse interpolation.
Numerical differentiation based on Newton’s forward and backward interpolation formula, Numerical integration by Trapezoidal rule, Simpson’s $\frac{1}{3}$ rd rule (with linear multiple application), Simpson’s $\frac{3}{8}$ rule, error estimates of the rules, Gaussian quadrature formulae (2-point, 3-point and 4-point).

Module-III (10 Hrs)

Recommended Text Book:

Reading Chapters: 1, 3.0-3.4, 4.1, 4.2, 4.4, 7.0-7.7, 9.0-9.4, 9.6, 9.8, 10.0, 10.2, 10.5, 11.0-11.7, 11.9 (from Book-1) and Chapter-9 (from Book-2)

Reference Books:

MCC206 - Business Communication (2-0-0)

Module-I The Elements of Business Communication (5 hours)

1.1 patterns of communication in the business world: upward, downward, horizontal, grapevine etc
1.2 internal and external channels of communication; formal and informal channels
1.3 cross-cultural communications
1.4 avoiding gender, racial and other forms of bias in communication
1.5 common forms of oral and written communication in the business world:
   Oral presentations, interviews and group discussions
   Memos, reports, summaries and abstracts, e-mails

Module-II Reading and writing (15 hours)

2.1 the importance of developing reading skills
2.2 the sub-skills of reading:
2.3 the importance of writing skills  
2.4 the differences between speech and writing  
2.5 the qualities of effective writing: coherence, cohesion, logical structuring and organization, clarity of language, stylistic variation etc.  
2.6 the writing process: pre-writing, drafting, re-writing  

Module -III Personality development and soft skills (10 hours)  
4.1 personality theories: Carl Rogers, Maslow, Eysenck, Murray  
4.2 emotional Intelligence  
4.3 lateral thinking: Edward De Bono  
4.4 soft skills: becoming a good leader and team-player  
4.5 inter-relating soft skills and communication skills  

Books recommended  
1 Business Communication Today by Bovee et al (Pearson)  
2 Business Communication by Meenakshi Raman and Prakash Singh (Oxford)  
3 Personality: Classic Theories and Modern Research by H.S.Friedman and M.W.Schustack (Pearson Education)  
4 Personality Theories by Barbara Engler (Houghton Mifflin Company)  
5 Crash Course in Personal Development by Brian Clegg (Kogan Page)  
6 Activities for Developing Emotional Intelligence by Adele B.Lynn (HRDPress)  
7 Lateral Thinking by Edward De Bono (Penguin)  

MCL207 - Communicative Practice Lab II (0-0-3)  

a. Communication Practice  
i. Speaking: oral communication in social and Work-related situations, e.g.:  
Greeting an acquaintance/friend, introducing oneself, introducing a friend to another friend, breaking off a conversation politely, leave-taking; making and responding to inquiries; expressing an opinion; expressing agreement/disagreement, contradicting/refuting an argument; expressing pleasure, sorrow, regret, anger, surprise, wonder, admiration, disappointment etc.  
Narrating or reporting an event;  
Describing people, objects, places, processes etc.  
Ordering/directing someone to do something  
Making requests; accepting/refusing a request  
Expressing gratitude; responding to expressions of gratitude  
Asking for or offering help; responding to a request for help
Asking for directions (e.g. how to reach a place, how to operate a device etc.) and giving directions
asking for and granting/ refusing permission
prohibiting someone from doing something
suggesting, advising, persuaded, dissuading, making a proposal
praising, complimenting, felicitating
expressing sympathy (e.g. condolence etc.)
Complaining, criticizing, reprimanding

ii  Reading  10 hours

Students will be given practice in reading and comprehending 6-8 simple passages of 100-300 words each, on topics of general as well as professional interest. The texts will be supported by suitable exercises designed to foster comprehension skills and vocabulary enrichment, together with study skills (note making) and reference skills (using a dictionary).

Practice will be provided in the important sub-skills of reading which are introduced in Module 2 of the theory component.

iii  Writing  10 hours

Writing short paragraphs on given topics or topics of one’s choice; social and business letters; reports; applications; resumes; summaries

The principles of ‘Process Writing’ should be used to teach writing skills.

i  pre-writing : generating ideas, brain-storming, idea mapping, outlining

ii  writing : generating a first draft; reviewing, redrafting, editing

iii  post-writing : making a presentation; discussion and feedback, preparing the final draft.

b.  Soft skills practice  10 hours

Activities designed to highlight leadership and ‘team’ skills; Group discussion

MCL208 - DATA STRUCTURE USING ‘C’ LABORATORY  (0-0-6)

<table>
<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td>01……….Matrix Operations-Add, Multiply, Rank, Det.etc.</td>
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<tr>
<td>02……….Stack &amp; Queue operations using Arrays.</td>
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<tr>
<td>03……….Self-referential structures &amp; single linked list operations.</td>
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<td>04……….Implementing Stack and queues using linked lists.</td>
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<tr>
<td>05……….Implementing Polish Notations using Stacks.</td>
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<tr>
<td>06……….Circular and double linked list operations.</td>
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<td>07……….Implementing priority queue &amp; dequeue using lists.</td>
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<td>08……….Evaluating polynomial operations using Linked lists.</td>
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<tr>
<td>09……….Implementing set related operations &amp; Hashing.</td>
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<td>10……….Linear &amp; binary search, bubble sort technique.</td>
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<tr>
<td>11……….Insertion sort, selection sort &amp; merge sort techniques.</td>
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<tr>
<td>12……….Quick sort, counting sort &amp; Shell sort techniques.</td>
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<tr>
<td>13……….Radix (bucket) and address calculation sort methods.</td>
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<tr>
<td>14……….Binary tree traversals (preorder, inorder, postorder).</td>
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<tr>
<td>15……….Heap sort &amp; AVL tree implementations.</td>
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<tr>
<td>16……….Graph representation with matrix &amp; adjacency lists.</td>
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</tbody>
</table>
01. Implementing classes and creation of objects.
02. Checking Precedence of operators & side effects.
03. Implementing various control structures & loops.
04. Making structured programming & stepwise refinement.
05. Implementing Procedural abstraction with functions.
06. Implementing Constructors and destructors.
07. Implementing Data abstraction & inheritance.
08. Implementing Multiple & hybrid inheritance.
09. Implementing Polymorphism concepts.
10. Implementing Operator overloading & friend’s functions.
11. Working with new & delete, object copying.
12. Implementing Object slicing, this operator.
13. Exception handling mechanisms.
15. Working with STL.