# Master of Computer Applications

## FIRST SEMESTER EXAMINATION

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Paper Code</th>
<th>Paper</th>
<th>L</th>
<th>T/P</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>044101</td>
<td>MCA 101</td>
<td>Fundamentals of IT</td>
<td>3</td>
<td>1</td>
<td>4</td>
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<tr>
<td>044103</td>
<td>MCA 103</td>
<td>Programming in C</td>
<td>3</td>
<td>1</td>
<td>4</td>
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<tr>
<td>044105</td>
<td>MCA 105</td>
<td>Discrete Mathematics</td>
<td>3</td>
<td>1</td>
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<tr>
<td>044107</td>
<td>MCA 107</td>
<td>Computer Organization</td>
<td>3</td>
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<tr>
<td>044109</td>
<td>MCA 109</td>
<td>Principles and Practices of Management</td>
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**Practical**

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<tr>
<th>Paper ID</th>
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<th>Credit</th>
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<tbody>
<tr>
<td>044151</td>
<td>MCA 151</td>
<td>Fundamentals of IT Lab.</td>
<td>0</td>
<td>2</td>
<td>1</td>
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<tr>
<td>044153</td>
<td>MCA 153</td>
<td>Programming in C Lab</td>
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<td>044155</td>
<td>MCA 155</td>
<td>Computer Organization Lab.</td>
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**NUES**

<table>
<thead>
<tr>
<th>Paper ID</th>
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<th>T/P</th>
<th>Credit</th>
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<tbody>
<tr>
<td>044161</td>
<td>MCA 161</td>
<td>General Proficiency – I*</td>
<td>0</td>
<td>2</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td>(It is suggested to have Personality Development and Communication Skills - I Course)</td>
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| Total    | 15         | 17 | 26 |

* Non-University Examination System (NUES)
OBJECTIVE: This course is an introductory course in information technology. Topics include foundations in hardware, software, data and an overview of the use of information technology in organizations. Topics include basics of graphics, systems development, database design and networking. Upon completion of this course the student should be able to:

- Describe the major components of information technology applications:
  - Hardware, computer networks, software, data, processes, and people.
- Describe the different components of a computer network.
- Demonstrate an understanding of different types of networks.
- Define "Software Engineering".
- Demonstrate an understanding of the importance of algorithms in the development of IT applications.
- Discuss the role of databases in IT applications.

PRE-REQUISITE:
- None

UNIT – I
Digital Signals and Logic gates, Number systems: Binary, octal and hexadecimal number systems, signed binary number, binary arithmetic, 2's complement arithmetic, Microprocessors: Introduction, System Bus, Architecture and operation of 8085 microprocessor and instruction set.  
[No. of Hrs: 10]

UNIT – II
Introduction to software: Software types and Software Development activities (Requirement, Design (algorithm, flowchart, decision table and tree), Coding, Testing, Installation, Maintenance). Low and high level languages, assemblers, compilers, interpreters, linkers.  
[No. of Hrs: 12]

UNIT - III
Introduction to Operating system, Different types of operating systems and its working, DOS commands, File Structure and Storage, Introduction to process management: process, threads, scheduling and synchronization. Introduction to Database Management System and its types. 
[No. of Hrs: 10]

UNIT – IV
Basic elements of a Communication System, Data transmission media, Digital and Analog Transmission, Network topologies, Network Types (LAN, WAN and MAN), Introduction to Communication protocols, Inter networking tools. 
[No. of Hrs: 10]
TEXT BOOKS:

REFERENCES:
INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVES: After covering the core C in about 25 lectures the course shall aim to acquaint the students about advanced features of the language the following features are listed as suggested guideline for the teacher.
- Passing by value and pass by reference
- Difference between array names and pointers
- Allocating memory over the heap to two dimensional array (Matrices application could be taken as a case study)
- Pointer and pointer operations (Linked lists, doubly linked lists circular linked lists can be taken as a case study)
- Pointers to functions and call back functions
- Bitwise operations and a case based upon these operations
- MACROS and their pitfalls
- Final case study could be an application making extensive handling of binary files.

PRE-REQUISITE:
- Basic Programming

UNIT- I
[No. of Hrs. : 10 Hrs]

UNIT-II
Further Data Types: Defining New Data Types, Structures, Unions, Type-Casting, Enumerated Types, Low Level Operators and Bit Fields (Bitwise Operators, Bit Fields)
Pointers: Pointers arithmetic and Arrays, const pointers, void pointers, near, far and huge pointers
Dynamic Memory Allocation and Dynamic Structures: (malloc, calloc, realloc; sizeof, free, introduction to Linked Lists and dynamic 2- dimensional arrays)
Advanced Pointer Topics: (Pointers to Pointers, Pointer to array, Array of pointers, Command line input, Pointers to a Function, Implementing Callbacks) [No. of Hrs. : 12 Hrs]

UNIT-III
The C Preprocessor: (#define, #undef, #include, #if -- Conditional inclusion, Other Preprocessor Commands) C, Linux and Standard Libraries: (Advantages of using Linux with C, Using Linux System Calls and Library Functions) Integer Functions, Random Number, String Conversion, Searching
Mathematics: <math.h> (Math Functions, Math Constants), Input and Output (I/O): stdio.h Reporting Errors (perror(), errno, exit() ) Streams (Predefined Streams, Redirection) Basic I/O (Formatted I/O, printf, scanf ), String Handling: <string.h> (Basic String Handling Functions and safety issues, String Searching), Character conversions and testing: ctype.h, Files Character and Line Based I/O, Formatted I/O, Block I/O, File Positioning, Status Functions, Deletion and Renaming, Temporary Files

UNIT - IV
File Accessibility and Directories (access, stat, chmod, chown . . ., chdir, chroot . . .), Process Control: (Running Linux Commands from C, fork(), the exec family, wait(), exit() ), Thread creation-a simple implementation.

[No. of Hrs.: 11 Hrs]

TEXT BOOKS:

REFERENCE:
OBJECTIVES: This course covered the mathematical topics most directly related to computer science. Learning Outcome of this course is to prepare students to take courses related with Data Structure, Algorithm analysis and Cryptography. This course develops ability to write independent mathematical Proofs.

PRE-REQUISITE:
- Basic Mathematics

UNIT – I

UNIT – II
Lattices: sub lattices, direct product, definition of Boolean algebra, properties, isomorphic structures (in particulars, structures with binary operations) sub algebra, direct product and homo-morphism, Boolean function, Boolean expression, representation & minimization of Boolean function. Principle of Well Ordering Recursive definitions, solution methods for linear, first-order recurrence relations with constant coefficients.

UNIT – III
GCD, LCM, Permutation function, composition of cycles. Fundamental Theorem of Arithmetic, primes, Congruence, Euler Phi function, Fermat’s Little Theorem, Primality and Factoring, Simple Cryptosystems, RSA Cryptosystem. Groups, Group identity and uniqueness, inverse and its uniqueness, isomorphism and homomorphism, subgroups, Cosets and Lagrange’s theorem, Permutation group and Cayley’s theorem (without proof), Error Correcting codes and groups, Normal subgroup and quotient groups.

UNIT – IV
Graph Terminology, Isomorphism, Isomorphism as relations, Cut-Vertices, Planar graphs, Euler’s formula (proof), four color problem and the chromatic number of a graph, Euler graphs, Hamiltonian graphs, five color theorem, Vertex Coloring, Edge Coloring. Trees terminology, in order, preorder & post order trees traversal algorithms, directed graphs, Computer representation of graphs.
TEXT BOOKS:

REFERENCES:
OBJECTIVE: The main objective of the syllabus is to make students understand the relevance Computer Organization in the software oriented course. It aims at introducing basic digital concepts and then use them to explain details of computer organization.

PRE-REQUISITE:
- Basics of Digital Electronics
- Internal Components of the CPU

UNIT – I
Register Transfer and Microoperation: Register transfer language, register transfer, bus and memory transfer, arithmetic microoperations, logic microoperations, shift microoperations. [No. of Hrs: 12]

UNIT – II
Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing & control, instruction cycle, memory reference instructions, input-output and interrupts, design of basic computer, design of accumulator logic.
Microprogrammed Control Unit: Control memory, address sequencing.
Central Processing Unit: Introduction, general register organization, stack organization, instruction formats, addressing modes. [No. of Hrs: 11]

UNIT – III
Pipeline and Vector processing: Parallel Processing, pipelining, arithmetic pipeline, RISC Pipeline, Vector Processing, Array Processors.
Input-Output Organization: Peripheral devices, input-output interface, asynchronous data transfer, modes of data transfer, priority interrupt, direct memory access, input-output processor. [No. of Hrs: 10]

UNIT – IV
Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.
Multiprocessors: Characteristics of multiprocessor, Interconnection Structure, Interprocessor Communication & Synchronization. [No. of Hrs: 09]

TEXT BOOKS:

REFERENCES:
INSTRUCTIONS TO PAPER SETTERS:
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OBJECTIVE: The purpose of this course is to expose the student to the basic concepts of management in order to aid the student in understanding how an organization functions, and in understanding the complexity and wide variety of issues managers face in today’s business firms.

PRE-REQUISITE:
- None

UNIT – I

UNIT – II

UNIT – III

UNIT – IV

[No. of Hrs.: 11]
TEXT BOOKS:

REFERENCES:
There will be following Practical:

1. Fundamentals of IT Lab  
   MCA 111
2. Problem Solving Using C Lab  
   MCA 113
3. Computer Organization Lab  
   MCA 115
Code No. : MCA 161  
Paper: General Proficiency – I*

It is suggested to have a fundamental course on Personality Development and Communication Skills – I in this semester.

This paper is under Non University Examination system its detail content will be decided by the respective Institute, under approval of the coordination committee based on the requirement of individual institution.

*Non University Examination Scheme (NUES)*

There will not be any external examination of the university. The performance of the candidates should continuously be evaluated by an internal committee. The committee may conduct viva- voce at the end for the award of the marks.