APPENDIX B

Syllabus For MCA Bridge Course

"Fundamentals In Computer Science"

Effective from AY 2021-22 Onwards

Mode of conduct: Self-Study via MOOCs

To be qualified for the MCA degree, candidates are required to pass the test in the individual theory and laboratory components of the Bridge course (40% marks to be obtained in theory and lab separately) which will be conducted by the programme. However, the marks obtained, although shown on the final year grade sheet, will not be added to the CPI/SPI.

The content of the Bridge course(s) will consist of the fundamentals in the following topics (percentages indicate weightage assigned to the topic for the purpose of evaluation)

Part A **(100 marks)**

Programming and Simple Linear Data Structures: (70%)

Introduction to Algorithms, Flow charts, Assembly language and high-level language

Programming in C: Tokens, Identifiers, Data Types, Sequence Control, Subprogram Control, Arrays, Structures, Union, String, Pointers, Functions, File Handling, Command Line Arguments, Pre-processor directives.

Data Structures: Abstract data types, Linear Data Structures: stacks, queues, and their applications. Linked Lists: singly linked list.

Basic sorting algorithms: bubble sort, selection sort, insertion sort

Computer Organization and Architecture & Fundamentals of Operating Systems: (30%)

Data Representation: Data Types, Number Systems and Conversion, Complements, Fixed Point Representation, Floating Point Representation,

Binary Arithmetic - Addition and Subtraction.

Computer System: Computer Components and Functions, interconnection structures, Bus Interconnections.

Processor Organization: Instruction Formats, addressing modes, Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining.

Memory System Organization: Memory Hierarchy, Internal Memory, Cache Memory.

Input/output Organisation: Peripheral devices. I/O interface, Asynchronous Data Transfer, I/O Processor.

Introduction to Operating Systems, Structures and Basic functions of monolithic OS, System services.

Part B **(100 marks)**

Discrete Mathematics: **(50%)**

Set Theory: Concepts of sets – Union, Intersection, Cardinality.

Elementary counting; permutations and combinations.

Fundamentals of logic: Propositional and Predicate Logic, Propositional Equivalences, Predicates and Quantifiers, Rules of Inference.

Relations and Functions: Cartesian Product, Relations and their types, Properties of Relations Functions, Types of Functions, Operations on Functions

Counting Techniques: Basics of Counting, Pigeonhole Principle, Recurrence relations.

Boolean Algebra, Boolean Expression, Boolean Functions.

Web Basics (HTML, CSS) **(50%)**

Web browsers

HTML Overview, DOCTYPE, HTML page structure, structural HTML tags, formatting text tags, semantic & generic HTML tags, HTML links, adding image and other page elements, Tables, frames, image mapping, HTML forms, attributes, form elements, type types, HTML entities, symbols, charset, comments, HTML audio, video

CSS overview, inline/internal/external css, @import, CSS selectors, combinators, pseudo-class & pseudo element, attribute selectors, colours, backgrounds, Border, padding, margin, box model, CSS width/height, min-/max- width/height, CSS text and font properties, CSS text and element alignment, CSS table & list, CSS units, CSS display, position, float, overflow, visibility, z-index, CSS 2D transform

Suggested links to MOOCs Courses

Course name	Organized by	Link
Computer Organization	Prof. S. Raman, Department of Computer Science and Engineering, IIT Madras.	http://www.nptelvideos.in/2012/11/computer-organization.html
Programming and data structure	Dr. P.P. Chakraborty, Department of Computer Science and Engineering, IIT Kharagpur.	http://www.nptelvideos.in/2012/11/programming-and-data-structure.html
Operating system	PROF.SANTANU CHATTOPADHYAY Department of Computer Science Engineering IIT Kharagpur	https://nptel.ac.in/courses/106/105/106105214/ First two weeks
Discrete Mathematical Structure	Prof. Kamala Krithivasan, Department of Computer Science and Engineering, IIT Madras	http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html
Web Basics		https://www.youtube.com/watch?v=mU6anWqZJcc
UNIX fundamentals		https://nptel.ac.in/courses/117/106/117106113/ first 4 Modules