Bridge Course for MCA
Syllabus

Mathematics (*Lecture - 25 Hours*)

Review of basic single variable calculus: functions, limit, derivatives, integrals.

Essentials of Linear algebra: scalar vectors, linear combinations span and basis, linear independence. Matrices: matrix operations, scalar multiplication, vector multiplication, inverse and transpose, dot product, cross product, eigen values and eigen vectors.

Real Number System, Linear inequalities, Sets, Relations, Functions, Permutations and Combinations, Prime numbers, Polynomials.

Introduction to probability, experiments, outcome, events, sample space and probability, Random variables, probability distributions, binomial distribution, normal distribution, central limit theorem.

Reference Book:

1. Ian Jacques “Mathematics for Economics and Business”, Pearson Education Limited

Online Resources:

1. https://www.youtube.com/playlist?list=PLZHQObOWTQDMsr9Krj53DwVRMYO3t5Yr
2. https://www.youtube.com/playlist?list=PLZHQObOWTQDPD3MizzM2xVFitgF8hE_ab
3. https://www.youtube.com/watch?v=LYCwHcHRhCg&list=PLKc2XOQp0dMwj9zAXD5LlWpriIXIrGaNb
4. https://www.khanacademy.org/math/statistics-probability/probability-library

Digital Fundamentals and Basics of Computer Architecture (*Lecture - 25 Hours*)

Introduction to number systems: Efficiency of number systems, Decimal, Binary, Octal, Hexadecimal number systems, conversion from one to another. Binary addition, subtraction, multiplication and division. Representation of signed numbers, BCD representation-BCD addition and subtraction.

Introduction to computers: Overview of PC architecture, Basic components of computer, Input output devices, Printers, Display devices, Scanners, Motherboard, Expansion Board, Secondary storage devices, Hard disk, Data storage in Hard disk, disk geometry, CD family, DVD.

Analog and Digital Signals: Periodic analog signals and its parameters, Digital signals and its characteristics, Transmission of digital signals, Transmission impairment, Network performance.

Reference Books:

1. Thomas L Floyd, “Digital Fundamentals”, 11th Edition, Pearson
2. M Moris Mano, “Digital Design”, 3rd Edition, Pearson

3. Behrouz A Forouzan, “Data Communications and Networking”, 4th Edition, (Chapter 3) McGraw-Hill

Online Resources:

1. https://www.youtube.com/watch?v=4ae9sJBBkvw
2. https://youtu.be/xOOiWK_Dcz4
3. https://youtu.be/saZhNTu_dDg

Operating Systems (*Lecture - 20 Hours*)

Overview of operating systems, functionalities and characteristics of OS.

Concept of a process, operations on processes, process states, concurrent processes, process control block, process context, processor scheduling, scheduling algorithms, problems of concurrent processes, critical sections, mutual exclusion, synchronisation, producer and consumer processes, deadlock.

Inter Process Communication (IPC), Memory organisation and management, Storage allocation, Virtual memory concepts.

File organisation: blocking and buffering, file descriptor, directory structure

Reference Book:

1. A. Silberchatz et.al., “Operating System Concepts”, 9th Edition Wiley (2015)

Online Resource:

1. https://www.coursera.org/learn/os-power-user

Basics of C Programming & Data Structures (*Lecture - 26 Hours, Lab – 24 Hours*)

Algorithm, Pseudocode, Structured Programming, Introduction to C Language, Operators and expressions, Data input and output, Control statements, Functions, Arrays, Familiarity with Structures, Pointers, Linked List.

Introduction to Data Structures, Basic operations on different Data Structures: Stack, Queue & Tree, Basic Sorting and Searching techniques.

Reference Books:

1. Byron S Gottfried, “Programming with C”, Schaum’s outline, 3 rd Edition, McGraw Hill
2. Brian W Kernighan & Dennis Ritchie, “The C programming language”, 2nd Edition, Prentice Hall (2015)
3. Ellis Horowitz, Anderson-Freed, Sahni, “Fundamentals of Data Structures in C”, 2nd Edition, Universities Press

Online Resources:

1. https://www.edx.org/course/programming-basics-iitbombayx-cs101-1x
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/
3. https://www.geeksforgeeks.org/introduction-to-data-structures/