NATIONAL UNIVERSITY

Second Year Fourth Semester Syllabus

Department of Computer Science and Engineering

Four Year B.Sc. Honours Course

National University

Subject: Computer Science and Engineering
Syllabus for Four Year B.Sc. Honours Course
Year wise courses and marks distribution

SECOND YEAR FOURTH SEMESTER

Course Code	Course Title	Credit Hours
520221	Database Management System	3.0
520222	Database Management System Lab	1.5
520223	Microprocessor and Assembly Language	3.0
520224	Microprocessor and Assembly Language Lab	1.5
520225	Design and Analysis of Algorithms	3.0
520226	Design and Analysis of Algorithms Lab	1.5
520227	Numerical Analysis	3.0
	Total Credits in 4th Semester	**16.5**

Course Code : 520221	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Database Management System		

Introduction: Database system concept, Purpose of Database system; View of data: Data abstraction; Data models: Relational model, Network model, Hierarchical model; Database languages: DDL, DML; Conventional file processing; Transaction management; Storage management; Database Administrator; Database users; Overall system structure.

Database model: Entity-Relationship model; Attributes; Mapping Cardinalities; Existence Dependencies; Weak entity set & Strong entity set; Relational model and its language (Relational algebra and SQL).

Database design: Decomposition; Normalization; Object-oriented Databases; Centralized systems; Distributed Databases; Data Fragmentation; Parallel Databases.

Integrity Constraints: Domain constraints, Referential constraints, Functional Dependencies. **Indexing:** Basic concept; Ordered index; Primary index; Dense index and Sparse index; Multilevel index; Secondary index.

Reference Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, *Database System Concepts.*
2. R. Ramakrishnan, *Database Management System.*
3. James Martin, *Principles of Database Management*.

Course Code : 520222	Marks : 40	Credits : 1.5	Class Hours : --
Course Title :	Database Management System Lab		

Objectives: Database labs are based on the theory course CSE 520208. One large or several small database applications will be developed in the lab. Student will be given the ER model or description of a real problem. Based on the description they will design the ER model or convert the ER model to relational model using the features of relational database design(such as functional dependency, normalization etc) and finalize the relational model. After finalizing the relational model, student will go for implementation. In the implementation phases they should design the sql statements, stored procedure, trigger, views etc. whatever is required to complete the implementation. In the implementation phase should also be the main concern about query optimization, transaction, recovery and backup. Any database such as Oracle/MySql/PostGress SQL can be used.

Course Code : 520223	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Microprocessor and Assembly Languages		

Microprocessors: Evolution of microprocessors, register base and accumulator based microprocessor, programmable logic devices; main memory array design, memory management concepts, input/ Out techniques, internal architecture of microprocessor: 8085, 8086, addressing mode, instruction format, instruction set, pin configuration and function, maximum/ minimum mode, read/write cycle, memory bank, interrupt and interrupt handling, interrupt controller,

DMA.

Advanced microprocessors:Internal architecture, memory management, protection, an overview of Intel 80186, 80286, 80386, 80486, Pentium microprocessors, RISC processor, Coprocessor, Alpha processor.

Assembly Language: Programming with 8086 instruction, conditional and unconditional jump, string instruction, stacks operation, procedure, reentrant and recursive procedure, macro.

Reference Books:

1. D.V Hall, *Microprocessors and Interfacing*, McGraw-Hill
2. M. Rafiquzzaman, *Microprocessors and Microprocessor Based System Design* 3. Y. Liu and G.A. Ginson, *Microcomputer System: 8086/8088 Family*

Course Code : 520224	Marks : 40	Credits : 1.5	Class Hours : --
Course Title :	Microprocessor and Assembly Languages Lab		

Objectives: Laboratory classes are based on **CSE 520210**. Firstly, students will be introduced with Assembly Language and Assembler (NASM, TASM and/or MASM). Several experiments will be performed with the assemblers: I/O operations, Integer programming, String programming, Graphics programming, etc.

Display message (n) times in different line; simple arithmetic operation; Convert a lowercase letter to an uppercase letter and vice versa; Display all alphabetic characters; Input two numbers, compare them and display the smaller one and vice versa; Accept a string from keyboard and display the string in reverse order; Find the largest element from an array and vice versa; perform bubble sort; display first ten numbers by Fibonacci Series; Calculate sum and average of few numbers; Convert hexadecimal number to binary equivalent; If a character is "y" or "Y", Display it, otherwise terminate; Calculate the

following expression=M+N-P+1(Using Subroutine); Calculate following operation: if x>y then (M/N) +P else (M-N)*P ;(IF-ELSE Statement).

Reference Books:

1. Marut, *Assembly Language Programming*
2. Richard C. Detmer, *Assembly Language Programming*
3. Vanugopal, *Assembly Language Programming*
4. Alan R. Miller, *Techniques for the IBM PC*

Course Code : 520225	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Design and Analysis of Algorithms		

Introduction to algorithm: Analysis of algorithm, design of algorithm, mathematical foundation of algorithm, asymptotic notations, summations, recurrences, sets etc.

Divide and Conquer: General method, Binary Search, Finding the Maximum and Minimum, Quick Sort, Selection.

The Greedy method: General method, Knapsack problem, Minimum cost spanning trees, Single Source Shortest path.

Dynamic programming: General method, Multistage Graphs, All pair's shortest paths, Single Source Shortest path, Knapsack problem, Optimal Binary search Tree, Traveling salesperson.

Basic Traversal & Search technique: Techniques for Binary trees, Techniques for Graphs

Backtracking: General method, The 8-Queens problem, Sum of subsets, Graph Coloring

Branch and Bound: The method, 0/1 Knapsack problem, Traveling salesperson

NP-hard and NP-complete problems: Basic concept, NP-hard graph problems, NP-hard scheduling problems, NP-hard code generation problems.

Reference Books:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms*, Published by Galgotia Publications Pvt. Ltd, 2nd Edition.
2. How to Solve it by Computer, R.G.Dromey.

3. Data Structure & Programming Design, Robert L. Kruse.

4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, *Introduction to Algorithms*, Published by The MIT Press, 3rd Edition.

Course Code : 520226	Marks : 40	Credits : 1.5	Class Hours : --
Course Title :	Design and Analysis of Algorithms Lab		

Laboratory classes are based on the course **CSE 520212**. Students will be given various algorithmic problems on different domains. By solving those problems students will gain knowledge on algorithmic techniques and their relative performances.

Divide and conquer: Binary Search, finding the maximum and minimum.

Performance measurement using time Function: quick sort and marge sort, marge sort and Bubble sort, Quick sort and Heap sort.

Greedy Method: Knapsack problem, Minimum cost spanning tree, Prim's algorithm, Single source shortest path.
Dynamic Programming: All pair shortest path, 0/1 kanpsack problem, the traveling salesperson problem.

Backtracking: the 8 Queens Problem, Graph coloring problem.

Course Code : 520227	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Numerical Analysis		

Solutions of equation in one variable: Bisection algorithm. Method of false position. Fixed point iteration, Newton-Raphson method, Error Analysis iteration for iterative method, Accelerating limit of convergence.

Interpolation and polynomial approximation : Taylor polynomial, interpolation and Lagrange polynomial. Iterated Interpolation. Extrapolation.

Differentiation and Integration : Numerical differentiation. Richardson's extrapolation. Elements of Numerical integration. Adaptive quadrature method, Romberg's integration, Gaussian quadrature.

Solutions of linear system, pivoting strategies, L U decomposition method.

Reference Books:

1) Vatista, *Numerical Analysis*
2) S. S. Sastry, *Introductory Methods of Numerical Analysis*
3) J.H. Mathews, *Numerical Methods for Computer Science, Engineering and Mathematics, PrenticeHall, 1987*.
4) B. Irons and N.G. Shrive, *Numerical Methods in Engineering and Applied Science, Ellis Horwood, 1987*.