FACULTY OF SCIENCE

SYLLABI
FOR
M.Sc. (HONOURS SCHOOL) COMPUTER SCIENCE
(SEMESTER SYSTEM)

EXAMINATIONS 2020 - 2021
## SYLLABUS FOR M. Sc. (H.S.) COMPUTER SCIENCE

**PANJAB UNIVERSITY, CHANDIGARH**

Outlines of Tests, Syllabi and Courses of Reading for M. Sc. (H.S.) Computer Science (Two Year Degree Programme) for Session 2020-2021

<table>
<thead>
<tr>
<th>Paper Code</th>
<th>Paper Name</th>
<th>Theory/ Practical Lectures</th>
<th>Univ. Exam Marks</th>
<th>Int. Ass. Marks.</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS-1901</td>
<td>Software Engineering</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1902</td>
<td>Data Base Management System</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1903</td>
<td>Operating Systems</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1904</td>
<td>Analysis and Design of Algorithms</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1905</td>
<td>Practical based on MCS-1902 and 1904</td>
<td>8</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>FIRST SEMESTER</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total 20</strong></td>
</tr>
<tr>
<td>MCS-1906</td>
<td>Advance Java and Network Programming</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1907</td>
<td>Artificial Intelligence (Using LISP)</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1908</td>
<td>Interactive Computer Graphics</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1921</td>
<td>Theory of Computations</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1910</td>
<td>Practical based on MCS-1906 and 1908</td>
<td>8</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1920</td>
<td>MOOC</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td><strong>SECOND SEMESTER</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total 24</strong></td>
</tr>
<tr>
<td>MCS-1911</td>
<td>Soft Computing Techniques using Neural Networks</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1912</td>
<td>Software Project Management</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1913</td>
<td>ASP.NET Using C#</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1914</td>
<td>Computer Based Optimization Techniques</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1915</td>
<td>Practical based on MCS-1911</td>
<td>8</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>MCS-1916</td>
<td>Practical based on MCS-1913</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>THIRD SEMESTER</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total 24</strong></td>
</tr>
<tr>
<td>MCS-1917</td>
<td>Major Project (SRS, DFD, Database Design, Input/output Design, Coding, Testing &amp; Deployment)</td>
<td>-</td>
<td>250</td>
<td>--</td>
<td>10</td>
</tr>
<tr>
<td>MCS-1918</td>
<td>Seminar (Based on MCS-1917)</td>
<td>-</td>
<td>150</td>
<td>--</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>FOURTH SEMESTER</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total 16</strong></td>
</tr>
</tbody>
</table>

- MOOC Courses available on the UGC Portal (SWAYAM) will be finalized at the start of the Semester by Board of Control in Computer Science and Applications.

- The evaluation of the MOOC Courses will be either in the online mode through the UGC Portal or in the offline mode by the Department of Computer Science & Applications.
GUIDELINES FOR SUBMISSION OF PROJECT REPORT (MCS-1917)

The report should consist of the following:

- Cover page including Project title, Name of the student, Name of the Department and Names of the Project Guides (both External and Internal).
- Acknowledgements.
- Certificates from company and department duly signed by external guide, Principal and internal guide.
- Contents with page numbers.

- Introduction (includes background and application or importance of the project)
  - Objectives
  - System Analysis

System Feasibility study

- Software requirement specifications
- Design with system flowcharts and input/output design.
- Implementation and Testing
  - Hardware and software used
  - Listing of well commented programs with result/output or detailed algorithms with input and output.

Further scope of the project

- Bibliography
- Appendices (any other information related to project)

Each student should observe the following norms while submitting the synopsis/thesis for the Project:

(a) Use both sides of the paper instead of only single side.
(b) Use one and half interline spacing in the text (instead of double space)
(c) Stop using a blank sheet before the page, carrying figure or table.
(d) Try to insert figure/table in the text page itself (instead of using a fresh page for it, each time.)

Students must consult/inform the internal guides regarding the progress of their work at least once in 20 days. It is the duty of the student to be in touch with his internal guide. The student must prepare 5 copies of the report including one copy for self. The remaining four are to be submitted before 31st May every year as per the following:

1. Main Library
2. Department Library
3. Internal Guide
4. Company

One softcopy of the work is to be submitted to the concerned head of the department/institution along with the report. The student must present his/her work in 15 minutes mainly focusing on his/her contribution with the help of slides followed by demonstration of the practical work done. The project Viva will be completed before 15th June every year exact dates will be informed before 31st May every year.

An external examiner, internal examiner and the internal guide will conduct project viva.
SYLLABUS FOR M. Sc. (H.S.) COMPUTER SCIENCE

SYLLABUS AND COURSE OF READINGS
FIRST SEMESTER

Paper Title: SOFTWARE ENGINEERING

Paper Code: MCS-1901     Max. Marks : 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objectives: The course aims to give students a theoretical foundation in Software Engineering and help them learn its principles and methods including emerging practices and support tools. It also familiarizes students with concepts of software testing and quality assurance and its various techniques.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction:
Software Engineering goals, SDLC, Software Process Models : Waterfall, Prototyping, Spiral; S/w Inspection, Preview and Inspection Procedures, Communication skills for Software Engineer. Software requirements, Definition, Software requirements specifications (SRS): Components & Structure of SRS.

2. Software Project Planning:
Objectives, Decomposition techniques: Problem based estimation(LOC,FP); Empirical Estimation Models: COCOMO model; Risk in estimation.

UNIT II

3. Software Design:

4. Quality Assurance:
UNIT III

5. Software Testing and Techniques:  

6. Software Testing Strategies:  

UNIT IV

7. Software Maintenance  
Characteristics, Components of Software Maintenance Process, Types of software maintenance, Software maintenance process models, Reverse Engineering.

8. System Configuration Management (SCM):  

Suggested Readings:  
Paper Title: DATABASE MANAGEMENT SYSTEM

Paper Code: MCS-1902      Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: The objective of this course is to teach a student concepts related to database, database design techniques, transaction management, Crash recovery, Backup and security of databases.

Note:
(i) The Question Paper will consist of Four UNITS.
(ii) Examiner will set total of nine questions comprising two questions from each UNIT and one compulsory question of short answer type covering whole syllabi.
(iii) The students are required to attempt one question from each UNIT and the compulsory question.
(iv) All questions carry equal marks.

UNIT-I

1. Basic Concepts: Database, DBMS: Need, Characteristics, Database users, 3-tier architecture, advantages over 2-tier, Components, Advantages, Disadvantages, Views of data-schemas and instances, Data independence, Conventional data models & systems.


UNIT-II

3. Storage and File Organization: Overview of physical storage media, RAID, Storage access; File organization: Organization of records in files, Operations on Files, Serial Files, Sequential Files, Index-Sequential Files, Direct Files.


UNIT-III

4. Relational Algebra and Relational Calculus: Relational Algebra: Operations- union, intersection, difference, Cartesian product, projection, selection, division and relational algebra queries; Relational Calculus: Tuple oriented and domain oriented relational calculus and its operations.
6. Transaction and Concurrency control: Concept of transaction, ACID properties, Serializibility, States of transaction, Concurrency control: Locking techniques, Time stamp based protocols, Granularity of data items, Deadlock.

UNIT-IV


8. Security and privacy: Database security issues, Discretionary access control based on grant & revoking privilege, Mandatory access control and role based access control for multilevel security, Encryption & public key infrastructures.

Suggested Readings:

1. Introduction to database systems: C.J.Date
2. Database Management Systems: Bipin Desai
3. Database system concepts: Korth
4. Principles of Database Management: James Martin
5. Computer Database organization: James Martin
7. Object-oriented modeling and design: Rumbaugh and Blaha
8. Object-oriented analysis and design: Grady Booch
SYLLABUS FOR M. Sc. (H.S.) COMPUTER SCIENCE

Paper Title: OPERATING SYSTEMS
Paper Code: MCS-1903 Max. Marks: 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objectives: To understand the various concepts of Operating System like process management, synchronization, deadlocks, storage and memory management.

Note:
(i) The Question Paper will consist of Four UNITS.
(ii) Examiner will set total of nine questions comprising two questions from each UNIT and one compulsory question of short answer type covering whole syllabi.
(iii) The students are required to attempt one question from each UNIT and the compulsory question.
(iv) All questions carry equal marks.

UNIT-I

1. Introduction to Operating System:
Introduction to operating system, its need and services; Operating system classification: Single user, Multi user, Simple batch processing, Multiprogramming, Multitasking, Parallel systems, Distributed system, Real time system;

2. Process Management:

UNIT-II

3. Synchronization:
Critical section problem, Peterson’s solution, Synchronization hardware, Semaphores: Mutual exclusion, Binary semaphores, Bounded concurrency, Producer-consumers, Reader-writers problem; Deadlocks & starvation, Problems of synchronization: Bounded buffer, Dining philosophers; Monitors.

4. Deadlocks:
System model, Deadlock characterization: Necessary conditions, Resource allocation graph, Method for handling deadlock; Deadlock prevention: Mutual exclusion, Hold and wait, No preemption, Circular wait, Deadlock avoidance: Safe state, Resource allocation graph algorithm, Banker’s algorithm; Deadlock detection, Recovery from deadlock.
UNIT-III

5. Memory Management-I:
Static and dynamic memory allocation, Memory allocation to process: Stacks, Heap, Memory allocation model; Reuse of memory: Performing fresh allocations using a free list, memory fragmentation, Merging free areas; Contiguous memory allocation: Fragmentation, Swapping;

6. Memory Management-II:

UNIT-IV

7. Storage Management I:
File Concept: Attributes, Operations, Types, Structure; Access methods: Sequential and direct access, Index; Directory structure: Single level, Two Level, Tree Structured, acyclic Graph directories; File System mounting, File sharing, Protection: Types of access, access Control.

8. Storage Management II:
File system structure, File system implementation, Directory implementation, Allocation methods, Free space management, Disk scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK; Disk management, Swap space management, RAID.

Suggested Readings:
5. Richie: Operating System, BPB.
Paper Title: ANALYSIS AND DESIGN OF ALGORITHMS

Course Duration: 60 Lectures of one hour each.

Objective: The objective of the module is to create skills in students to design and analyze algorithms.

Note:
(i) The Question Paper will consist of Four UNITS.
(ii) Examiner will set total of nine questions comprising two questions from each UNIT and one compulsory question of short answer type covering whole syllabi.
(iii) The students are required to attempt one question from each UNIT and the compulsory question.
(iv) All questions carry equal marks.

UNIT-I

1. Algorithms and Analysis:
Introduction, Algorithms specification, Recursive algorithms, space and time complexity, Asymptotic Notation (O, _, and Θ, o) practical complexities, Best, average and worst case performance of algorithms, examples, Introduction to recurrence relations.

2. Divide and Conquer:
General method, Binary search, Merge sort, Quick sort, Selection problem, Strassen's matrix multiplication and analysis of these problems.

UNIT-II

3. Greedy Method:
General Method, Knapsack problem, Job sequencing with deadlines, Minimum spanning Trees, Single source shortcut paths and analysis of these problems.

4. Dynamic Programming:
General method, Optimal binary search trees, 0/1 Knapsack, the travelling salesperson problem.

UNIT-III

5. Back Tracking:
General method, 8 queen's problem, Graph coloring, Hamiltonian cycles, Analysis of these problems.

6. Branch-And-Bound:
Method, 0/1 Knapsack and Travelling Salesperson problems, Efficiency considerations.
UNIT-IV

7. **Lower-Bound Theory:**
   Introduction to Algebraic problems, Introduction to lower bounds, Comparison Trees,
   Techniques for Algebraic problems, Some Lower Bounds on Parallel Computation.

8. **NP-hard and NP-complete problems:**
   Basic concepts, Statement of Cook’s Theorem, Examples of NP-hard graph and NP-scheduling
   problems, some simplified NP-hard problems.

**Suggested Readings:**
   McGraw- Hill Book Comp.
   Naresh Publ. House.
SYLLABUS FOR M. Sc. (H.S.) COMPUTER SCIENCE

SEMESTER II

Paper Title: ADVANCED JAVA AND NETWORK PROGRAMMING


Course Duration: 60 Lectures of one hour each.

Objectives: To create enterprise application development skills among students using Advanced Java.

Note:
(i) The Question Paper will consist of Four UNITS.
(ii) Examiner will set total of nine questions comprising two questions from each UNIT and one compulsory question of short answer type covering whole syllabi.
(iii) The students are required to attempt one question from each UNIT and the compulsory question.
(iv) All questions carry equal marks.

UNIT-I

1. Review of Java Basic Features, Applets, AWT Controls, Event handling, Multithreading, I/O files.

2. Swing: Features, components, swing vs AWT, swing containers, controls, using Dialogs, sliders, progress bars, tables, creating user interface using swing.

UNIT-II

3. Java Database Connectivity: Connectivity model, Java.SQL package, JDBC Exception classes, Database connectivity, Data manipulation and navigation, creating database applications.

4. Java RMI: Distributed object technologies, RMI architecture, creating RMI applications.

UNIT-III

5. Java Servlets: Servlets vs CGI, Servlet lifecycle, creating and running servlets.

UNIT-IV

7. **Java Beans**: Component architecture, Components, Advantages of Beans, Bean Developer kit (BDK), JAR files, introspection, developing Beans, Using Bound properties, The Java Beans API, Introduction to EJB (Enterprise Java Beans), Types of EJB, Uses of EJB.

8. **Java Server Pages**: Introduction, JSP Architecture, JSP objects, developing Web Applications.

*Suggested Readings:*
1. Schildt, Herbert: The Complete Reference Java 2, TMH.
2. Ivan Bayross: Web Enabled Commercial Application Development using Java 2.0, BPB.
7. Jim Keogh/Davidson: Data Structures—Principles and fundamentals, Wiley India Pvt. Ltd.
SYLLABUS FOR M. Sc. (H.S.) COMPUTER SCIENCE

Paper Title: ARTIFICIAL INTELLIGENCE (USING LISP)

Paper Code: MCS-1907

Max. Marks: 80

Time: 3 Hrs.

Course Duration: 60 Lectures of one hour each.

Objectives: The objective of this course is to familiarize students with concepts of AI, its tools & technologies.

Note:
(i) The Question Paper will consist of Four UNITS.
(ii) Examiner will set total of nine questions comprising two questions from each UNIT and one compulsory question of short answer type covering whole syllabi.
(iii) The students are required to attempt one question from each UNIT and the compulsory question.
(iv) All questions carry equal marks.

Prerequisite: System Software, Operating System, Data and File Structure.

UNIT-I

1. Introduction to Artificial Intelligence (AI) and Problem Space:
   Introduction AI technique, Turing test, History and developments in AI, applications of AI, State space representation, production systems, systematic control strategies: Breadth first search and Depth first search, problem characteristics, product system characteristics, issues in the design of search programs.

2. Heuristic Search Technologies:
   Introduction to heuristic search, Generate and test, Hill Climbing, Best First search, A*, Problem reduction, AO*, constraint satisfaction and Means-ends-analysis techniques.

UNIT-II

3. Knowledge representation:
   Information and knowledge, Knowledge acquisition and manipulation, Issues in knowledge representation, Knowledge representation methods - Propositional logic and first order predicate logic, Resolution principle, Horn's clauses, Features of language PROLOG, Semantic networks, Partitioned semantic nets, Frames, Scripts and conceptual dependencies.

4. Game playing:
   MiniMax search procedure, reducing alternatives using Alpha-Beta pruning method examples.

UNIT-III

5. Expert systems:
   Introduction, examples, characteristics architecture, people involved and their role in building an expert systems, case studies of expert systems, MYCIN and DENDRAL; features of knowledge acquisition systems: MOLE and SALT.
6. **Natural Language understanding and processing:**
   Introduction, Complexity of the problem, Chomsky hierarchy of grammars, Techniques for Syntactic processing, Semantic Analysis, Discourse and pragmatic processing

**UNIT-IV**

7. **Tools and Technologies for AI:**
   Introduction to AI language LISP: Symbolic expression, creating, appending and modifying lists, defining functions, Predicates, Conditionals, Recursion, Iteration, Printing and reading, Lambda expressions and higher order function, List storage.

**Laboratory work:**
1. Programming in LISP & PROLOG.
2. Hands on experience with expert system shell.

**Suggested Readings:**
**SYLLABUS FOR M. Sc. (H.S.) COMPUTER SCIENCE**

**Paper Title:** INTERACTIVE COMPUTER GRAPHICS

**Paper Code:** MCS-1908  
**Max. Marks:** 80  
**Time:** 3 Hrs.  
**Course Duration:** 60 Lectures of one hour each.

**Objectives:** The aim is to introduce the students to key concepts of Computer Graphics like display devices, co-ordinate system, transformations, line and circle drawing, pointing, positioning, projections, etc.

**Note:**
(i) The Question Paper will consist of Four UNITS.  
(ii) Examiner will set total of nine questions comprising two questions from each UNIT and one compulsory question of short answer type covering whole syllabi.  
(iii) The students are required to attempt one question from each UNIT and the compulsory question.  
(iv) All questions carry equal marks.

**UNIT-I**

1. **Display Devices:**  
Line and point plotting systems, Raster, vector, pixel and point plotters, Continual Refresh and storage displays, Digital frame buffer, Plasma panel displays, Display processors, Character generators, Colour-display techniques: shadow mask and penetration CRT, Colour look-up tables, hard-copy colour printers.

**UNIT-II**

2. **Display Description:**  
Screen co-ordinates, user co-ordinates, use of homogeneous coordinates, Display code generation, Graphical functions, the view algorithm, Two-dimensional transformation, Line-drawing, Circle drawing algorithms.

**UNIT-III**

3. **Interactive Graphics:**  
Pointing and positioning devices (cursor, light pen, digitizing tablet, the mouse, track balls), Interactive graphical techniques, Positioning, (Elastic or Rubber Band lines, Linking, zooming, panning, clipping, windowing, scissoring), Mouse Programming.

4. **3-D Graphics:**  
Wire-frame, perspective display, perspective depth, Projective transformations, Hidden line and surface elimination (Black face removal algorithm).
UNIT-IV

5. **Turbo-C Graphic Language:**
Primitives (constants, actions, operators, variables), plotting and geometric transformations, display subroutines, Concept of Animation, Saving, Loading and Printing graphics images from/to disk, Animated algorithms for Sorting, Towers of Hanoi.

6. **Open GL:** Primitives of the language and interface with C/C++.

7. **Programming Projects:** Two Dimensional Transformations, 3-dimensional Transformations, Interactive Graphical Techniques, GUI, Turbo C (Graphics Routines) is to be used as the standard teaching tool.

**Suggested Readings:**
Objectives: The goal of this course is to provide students with an understanding of basic concepts of Theory of Computation.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Recursive Languages:

Recursive definition, Alphabets, Language, Regular expression, definitions of Finite state machine, Transition graphs, Deterministic & non-deterministic finite state machines, Regular grammar, Left-linear and right linear, Thomson’s construction to convert regular Expression to N DFA & subset algorithm to convert NDFA to DFA. Minimization of DFA, Finite state machine with output (Moore and Meally Machine), Conversion of Moore machine to Meally machine & vice-versa.

UNIT II

2. Properties of Regular languages:

Conversion of DFA to regular expression, Pumping lemma, Properties and limitations of finite state machine, Decision properties of regular languages, Applications of finite automata.

3. Context Free Grammar:

Context free grammar, Writing context free grammar for problems, Derivation tree and ambiguity, Application of context free grammars, Chomsky and Greibach Normal form, Conversion of CFG to CNF and GNF. Properties of context free grammar, CYK algorithm.

UNIT III

4. PDA:

Push down stack machine, Design of deterministic and non-deterministic push-down stack, Parser design.
5. Turing Machine:


UNIT IV

6. Incommutability:

Halting problem, Turing enumerability, Turing acceptability and Turing decidabilities, Unsolvable problems about Turing machines.

7. Computation Complexity:

P, NP and NP Complete Problems.

Suggested Readings:

Paper Title: MOOC / Elective / Generic Elective

Paper Code: MCS-1920          Max. Marks: 100  Time: 3 Hrs.

Course Duration: 60 Lectures of one hour each.
SEMESTER III

Paper Title: SOFT COMPUTING TECHNIQUES USING NEURAL NETWORKS

Paper Code: MCS-1911      Max. Marks: 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objectives: To get the knowledge and exposure for Advanced AI Techniques to solve the problem lying in fuzzy environment.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I

Fundamentals:
1. Introduction to Soft Computing: Basic soft computing techniques: Neural networks, Fuzzy logic, Genetic algorithms; Hybrid systems, Application to soft computing.

2. Basics of Neural Networks: Characteristics of neural networks; Comparison between Artificial & Biological Neural Networks, Basic Building Blocks of artificial neural network; Connections; Learning methods, Activation functions; Neural network architectures.

UNIT II

Neural Network Learning Models:
3. Supervised Learning Networks: Introduction to supervised learning, Architecture and training algorithms for perception network and back propagation networks


UNIT III

Fuzzy Logic:


UNIT IV

Genetic Algorithms:

8. Introduction to genetic algorithms; Biological background, Genetic algorithms versus traditional algorithms. Basic terminologies in genetic algorithm: Genes, fitness and populations.


Suggested Readings:

5. Rao and Rao: C++ Neural Networks & Fuzzy Logic, BPB.
Paper Title: SOFTWARE PROJECT MANAGEMENT

Paper Code: MCS-1912      Max. Marks : 80 Time : 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objective: To familiarize the students with Project management, Project Planning and Scheduling, advance DSS, ERP and Software metrics.

Note:
(i) The Question Paper will consist of Four UNITS.
(ii) Examiner will set total of nine questions comprising two questions from each UNIT and one compulsory question of short answer type covering whole syllabi.
(iii) The students are required to attempt one question from each UNIT and the compulsory question.
(iv) All questions carry equal marks.

UNIT-I

1. Project Management: Introduction to project and project management, problems with software projects, Project management knowledge area and framework, Stages of project: feasibility study: cost-benefit analysis, Planning, project execution, project and product life cycle; Project stakeholders: All parties of project, role of project manager; Exploration of open source software tools for project management.


UNIT-II

3. Project Planning: Integration management: Introduction, Project plan development, Plan execution; Scope management: Introduction, methods for selecting projects, project charter, scope statement, work breakdown structure; Stepwise project planning: Overview, Main steps in project planning.

4. Project Scheduling: Time Management: Importance of project schedules, Schedules and activities, Sequencing and scheduling activity; Project network diagrams: Network planning models, Duration estimating and schedule development, Critical path analysis, Program evaluation and review Techniques.


**UNIT-IV**

7. **Introduction to ERP**: Overview, Benefits, Technologies related to ERP, ERP packages, Business process re-engineering, Implementation life cycle of ERP, Training: Team training, End user training; Post implementation (maintenance mode), Implementation in large-scale organization, Applications of ERP in functional areas: Marketing, Personnel, Financial & Production.

8. **DSS**: Decision structure, Decision support trends, DSS components, Using DSS: What-if analysis, sensitivity analysis, Goal seeking analysis, Optimization analysis, Executive information systems, Enterprise portals and decision support, knowledge management systems.

**Suggested Readings:**

Paper Title: ASP .NET Using C#

Paper Code: MCS-1913 Max. Marks: 80 Time: 3 Hrs.

Course Duration: 60 Lectures of one hour each.

Objectives: The objective of the course is to enable a student to develop web based applications in ASP.NET using C# programming language.

Note: (i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.

UNIT I

1. Introduction to .NET environment:
The .NET strategy, the origins of the .NET technology, the .NET framework, the common language runtime, framework base classes, user and programs interface, visual studio .NET, .NET languages, benefits of the .NET approach.

2. Introduction to C#:
Overview of C#: History, Structure of C# Program, Namespaces, Using Aliases, Multiple Main Methods; Literals, Variables, Data Types: Value types ,Reference types; Boxing and Unboxing; Operators and Expressions, Branching and Looping, Methods: Declaration, Method Parameters: value, ref, out and variable argument lists, Method Overloading; Arrays: Declaration, Initialisation, Overview of methods used in System.Array class; Strings : Creating mutable and immutable strings; Difference between C++ and C#, Difference between Java and C#.

UNIT II

3. C# programming concepts I:
Classes and Objects : Defining a class, Member Access Modifiers, Creating objects, Accessing class members and functions; Types of Constructors: Default, Parameterized, Copy, Static, Private; Working of Destructors, Constant and read only members, Overview of Properties: Read only and write only properties; Inheritance : Defining a base class and sub class, visibility control, defining subclass constructors, Types of inheritance, Overriding methods, Abstract classes and methods, Usage of Sealed; Implementing Dynamic Polymorphism;

4. C# programming concepts II:
Interfaces: Defining interface, Extending interface, implementing interface, explicit interface implementation; Delegates: Introduction, Steps for creating a delegate, Multicast Delegates, Covariance and Contra variance; Errors and Exceptions : Introduction, Types of Errors, Exceptions, Syntax of exception handling code, multiple catch statements, Exception Hierarchy,
general catch handler, using finally, Nested try block, throwing own exceptions, Checked and Unchecked operators; I/O: System.IO Namespace, Streams, TextWriter, TextReader, BinaryWriter, BinaryReader, FileStream;

UNIT III

5. Developing ASP.NET web applications I:
Understanding ASP.NET: Adding an ASP.NET webpage, web.config file, ASP.NET standard controls: Label, Textbox, Checkbox, radiobutton, button, linkbutton, imagebutton, Image, ImageMap, Panel, Hyperlink; Using Validation Controls: Overview, RequiredFieldValidator, RangeValidator, CompareValidator, RegularExpressionValidator, CustomValidator, ValidationSummary; Master Pages: Introduction and use, creating master pages, Creating default content, Using images and hyperlinks in master pages, Registering master pages in web configuration, Modifying master pages content;

6. Developing ASP.NET web applications II:
Creating and registering user controls in web.config file; Using Login Controls: Login control, CreateUserWizard control, LoginStatus, LoginName, ChangePassword, PasswordRecovery, Loginview; ASP.NET membership: Configuring authentication: windows, forms, .net passport; Configuring authorization: By role, by location, with images; Maintaining Application State: Introduction, Cookies: creation, reading, deletion, multivalued cookies; Session state: Session Object, Handling session events; Using Profiles;

UNIT IV

7. Accessing data with ADO.NET:
ADO.NET: Architecture, Components, Steps for creating Database Connectivity, Overview, usage and Implementation of basic data manipulation operations using: Data Reader, Data Adapter, Dataset and DataGrid;

Suggested Readings:

2. Walther, Stephen: ASP.NET 2.0 Unleashed SAMS, Pearson Education (Unit III)
Paper Title: COMPUTER BASED OPTIMIZATION TECHNIQUES

Paper Code: MCS - 1914  Max. Marks: 80 Time: 3 Hrs.
Course Duration: 60 Lectures of one hour each.

Objectives: To introduce linear programming, dynamic programming and related Optimization Theories to solve real life / simulated problems.

Note:
(i) The Question paper will consist of four units.
(ii) Examiner will set total of nine questions comprising two questions from each unit and one compulsory question of short answer type covering whole syllabi and having equal distribution of marks from all the units.
(iii) The students are required to attempt one question from each unit and the compulsory question.
(iv) All questions carry equal marks.
(v) The students can use only Non-programmable & Non-storage type Calculator.

UNIT I


UNIT II

2. Special types of linear programming problems -Transportation and assignment problems.

UNIT III

4. Travelling salesman problems, TSP using Hungarian method.
5. Dynamic Programming, Deterministic and probabilistic dynamic programming.

UNIT IV

6. Queuing models: Application and characteristics of queuing models, Structure of basic queuing system.
7. PERT and CPM: Phases of project management, PERT and CPM computations.
8. Simulation: Definition: Types of simulation models; Phases of simulation; Applications of simulation; Inventory and queuing problems; Advantages and disadvantages.
Suggested Readings:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>ECTS</th>
<th>LP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS-1917</td>
<td>Major Project (SRS, DFD, Database Design, Input/output Design, Coding, Testing &amp; Deployment)</td>
<td>-</td>
<td>250</td>
<td>--</td>
</tr>
<tr>
<td>MCS-1918</td>
<td>Seminar (Based on MCS-1917)</td>
<td>-</td>
<td>150</td>
<td>--</td>
</tr>
</tbody>
</table>