

**PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR**



Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Computer Science

Name of the Course: M.Sc. I (Sem.–I & II)

(Syllabus to be implemented from w.e.f. June 2020)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

M. Sc. I year (Computer Science)

Syllabus (Semester – I and II)

(Choice Based Credit System)

With Effect from June 2020

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
M.Sc. (Computer Science)

1. Introduction: A broad introduction of computer science is provided, including the key technologies and skills needed for employment. Student can explore his / her personal interests through a variety of optional modules. Advanced intellectual, teamwork, communication and other transferable skills are developed. These students are expected to lead new generation of computer scientist. The students would be true knowledge workers prestigious to the Nation.

2. Eligibility: The candidate passing any of the under graduate degree, namely, B.Sc.(Computer Science), B.Sc. (Entire Computer Science), B.Sc. (Computer Technology), B.Sc. (Mathematics), B.Sc.(Statistics), B.Sc. (Electronics) will be eligible for admission to M.Sc. Computer Science.

3. Admission / Selection Procedure: A student shall be held eligible for admission to the M. Sc. (Computer Science) course provided he / she has passed the B.Sc. examination in the subjects mentioned in Eligibility, and has passed the entrance examination conducted by the University. The students with B.Sc. from other universities shall be eligible if they qualify through entrance examination and they score minimum 55 percent B+ marks in the subject at the B.Sc. examination. While preparing the merit list for M. Sc. (Computer Science) admission, the performance at B.Sc. III and the performance at the entrance examination will be given equal weightage (50:50)

4. Duration of the Course: The M.Sc. is offered on full time basis, the course is of two years duration named as M.Sc. (Computer Science), each year is divided into two semesters for the convenience of teaching and examination. In each semester there will be teaching for 14 weeks followed by end of semester examination.

5. Passing Standard: Passing standard is same as that of other M.Sc. courses in the Solapur University. The candidate has to appear for internal evaluation of 30 marks and external evaluation (university exam) for 70 marks for each paper / practical / project. In case of theory papers internal examination/s will be conducted by the school / department. The nature of internal evaluation of practical and project will be decided by the respective schools / departments. The internal evaluation is a process of continuous assessment.

A student who failed in Term End examination (theory) & passed in internal assessment of a paper (subject) shall be given FC (Failed in Term End Exam) Grade. Such student will have to appear for Term End examination only. A student who fails in internal assessment and passed in Term End examination (Theory) shall be given FR (Failed in Internal Assessment) Grade. Such student will have to appear for Term End examination as well as internal assessment.

In case of year down candidates from the mark scheme the candidates shall appear for the same 80 marks paper of the external examination and his performance shall be scaled to 100 marks.

6. Structure of the Syllabus – M.Sc. (Computer Science):

Part – I Semester-I

Paper Code	Title of the Paper	Hrs / week	Distribution of Marks for Examination			Credits
			Internal	University	Total	
Hard Core - Theory						
HCT 1.1	Object Oriented Programming using C++	04	20	80	100	4
HCT 1.2	Advanced DBMS	04	20	80	100	4
HCT 1.3	Data Structures and Algorithms	04	20	80	100	4
Soft Core – Theory (Any One)						
SCT 1.1	Software Engineering	04	20	80	100	4
SCT 1.2	UML					
Hard core Lab / Project						
HCP 1.1	Practical based on HCT 1.1	04	10	40	50	2
HCP 1.2	Practical based on HCT 1.2	04	10	40	50	2
HCP 1.3	Practical based on HCT 1.3	04	10	40	50	2
HCP 1.4	Project – I	02	10	40	50	2
	Tutorial	02	25	-	25	1
Total		32	145	480	625	25

Part – I Semester-II

Paper Code	Title of the Paper	Hrs / week	Distribution of Marks for Examination			Credits
			Internal	University	Total	
Hard Core – Theory						
HCT 2.1	Java Programming	04	20	80	100	4
HCT 2.2	Python Programming	04	20	80	100	4
Soft Core – Theory (Any One)						
SCT 1.1	Computer Communication Network	04	20	80	100	4
SCT 1.2	Artificial Intelligence	04	20	80	100	4
Open Elective – Theory (Any One)						
OET 2.1	Office Automation	04	20	80	100	4
OET 2.2	SWAYAM Course*	--	--	--	--	4
Hard core Lab / Project						
HCP 2.1	Practical based on HCT 2.1	04	10	40	50	2
HCP 2.2	Practical based on HCT 2.2	04	10	40	50	2
HCP 2.3	Project – II	02	10	40	50	2
Open Elective (Any One)						
OEP 2.1	Practical Based on OET 2.1	04	10	40	50	2
OEP 2.2	Practical / Seminar / Viva based on SWAYAM course OET2.2					
Others	Tutorial	02	25	-	25	1
Total		32	145	480	625	25

* : The credits will be transferred as per university policy and UGC guidelines after submitting the completion certificate / mark list from the SWAYAM.

Course Code: HCT-1.1,

Course Title: Object Oriented Programming using C++

Total Lectures: 60 Hrs

University Evaluation: 80 Marks

Contact Hrs (L) 4

Internal Evaluation: 20 Marks

Unit – I

Overview Of C++: Object Oriented Programming, Introducing C++ Classes, Concepts of Object Oriented Programming, C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, function prototyping, default arguments and argument matching, User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names. [04]

Classes & Objects: Classes, Structure & Classes, Union & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes. [05]

Array, Pointers References & The Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference, C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects. [06]

Unit – II

Constructor & Destructor: Introduction, Constructor, access specifiers for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor. [07]

Overloading as polymorphism: Function & Operator Overloading: Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (I.E. +=, -= Etc), Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading New & Delete, Overloading Some Special Operators, Overloading [], (), -, Comma Operator, Overloading << And . [08]

Unit – III

Inheritance: Base Class Access Control, Inheritance & Protected Members, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When Constructor & Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes. [08]

Virtual Functions & Polymorphism: Virtual Function, Pure Virtual Functions, Early Vs. Late Binding. [03]

Exception handling in C++: try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler. [04]

Unit – IV

Templates: Reason for templates compactness and flexibility, function template examples explicit specialization, class templates, out of class definition of member functions. [07]

The C++ I/O System Basics: C++ Streams, The Basic Stream Classes C++ Predefined Streams, Formatted I/O: Formatting Using the IOS Members, Setting The Format Flags, Clearing Format Flags, An Overloaded Form Of Setf (), Using Width() Precision() and Fill(), Using Manipulators to Format I/O, Creating Your own Manipulators. [08]

Reference Books:

1. C++: The Complete Reference: Herbert Schildt, Tata McGraw Hill.
2. Object Oriented Programming with C++: E. Balguruswami, Tata McGraw Hill.
3. Programming with C++ made simple: M. Kumar, Tata McGraw Hill.

Course Code: HCT-1.2,
Course Title: Advanced DBMS

Total Lectures: 60 Hrs
University Evaluation: 80 Marks

Contact Hrs (L) 4
Internal Evaluation: 20 Marks

Unit – I

Introduction to Database Systems: Database – Definition, Limitations of traditional file processing systems, Advantages of DBMS, Users of DBMS. [02]

Database Architecture and Environment: Components of DBMS, Architecture, Physical, logical and view, DDL, DML, DCL, schemas, life cycle of Database System Development, Functions of DBMS. [05]

Conceptual Database Modelling: Data Model – Concept, types of data models, ER model, concepts of entity, entity set, attributes, domains, existence dependency, Keys: candidate, primary, composite, strong and weak entities, cardinality, specialization, generalization, aggregation, Relational Algebra, Relational Calculus. [08]

Unit – II

Relational Database Systems: Characteristics, relation, attribute, tuple, domain, null, Normalization, Functional Dependencies, Multivalued Dependencies, 1NF, 2NF, 3NF, 4NF, 5NF Boyce codd's normal form. [07]

SQL and PL/SQL: DDL, DML, DCL, Select: From, Where, Order by, Group by, Having, Intersect, Union, Distinct, Between, In, Between, Different types of functions, Delete, Update, Insert, Nested queries, joins, create, alter and drop, constrains, index, views, Triggers, Grant, Revoke, Commit, RollBack, Savepoint, PL/SQL: %Type, %Rowtype, Exception, Cursor etc. [08]

Unit – III

Transaction Management and Concurrency Control: Transaction – properties (ACID), states, Concurrency – control, locks, two phase locking serialization. [08]

Distributed Databases: Standalone v/s Distributed databases, Replication, Fragmentation, Client/Server architecture, types of distributed databases. [07]

Unit – IV

Database Recovery: Need for recovery, techniques – log based recovery, check point, differed and immediate updates, shadowing, Catastrophic and non- catastrophic failures, Recovery in multi-database environments, Two phase commit protocol.

T/O based techniques, Multiversion approaches, Comparison of CC methods, dynamic databases, Failure classification, recovery algorithm, XML and relational databases. [9]

Object – Relational Databases: Abstract Datatypes, Nested Tables, Varying Arrays, Large Objects, Naming Conventions for Objects. [06]

Reference Books:

1. Database System Concepts by Korth: Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill Higher Education, 2006.
2. Ramez Elmasri, Shamkant Navathe, Pearson Education India, 2011.
3. An Intro. to Database Systems: C. J. Date, Pearson Education India.
4. Oracle 8i – The Complete Reference: Kevin Loney, George Koch, Osborne / McGraw-Hill, 2000.

Course Code: HCT-1.3,

Course Title: Data Structures and Algorithms

Total Lectures: 60 Hrs

University Evaluation=80 Marks

Contact Hrs (L) 4

Internal Evaluation=20 Marks

Unit – I

Fundamental notions: Primitives and composite data types, choice of data structure and complexity of an algorithm. [04]

Arrays: Single and Multidimensional Arrays, sparse matrices. [04]

Stacks: Processing the stacks, Linked list implementation, Application of Stacks for expression solving, Non recursive implementation of recursive algorithms. [07]

Unit – II

Queues: Processing the queues, Linked list implementation, Dequeues, Priority queues and their applications. [06]

Linked List: Processing linked list, Circularly linked list, Doubly linked list, Multilinked lists, String and characters manipulation using arrays and linked list. [09]

Unit – III

Trees: Introduction to Tree, Introduction to Binary Trees, Types of Binary tree- Strictly Binary tree, Complete Binary tree, Extended (2-Tree) Binary tree, Binary expression tree, Binary Search tree, Heap Tree- Min heap tree, Max heap tree, Representation of Binary tree using- Array, Linked list Operations of Binary search tree-Creating and inserting node, Searching node, Counting total nodes, Counting and displaying leaf nodes, Tree Traversal methods- Preorder, Inorder, Postorder, Deletion of Nodes, Implementation of binary search tree, Height balanced tree/Balanced Binary Tree/AVL tree, Application of tree Graph: Concept & terminologies used in graph, Graph Representation using- Array and linked list, Graph traversals – BFS & DFS, Dijkstra's shortest path algorithm, and application of graph. [15]

Unit – IV

Sorting and searching: Various sorts viz. Insertion, Bubble sort, Selection sort, Quick sort, Merge sort, Radix / Bucket sort, Counting sort, searching algorithms and their complexities, . Binary tree indexing, B-tree indexing, Hash indexing. [15]

Reference Books:

1. Data structures and algorithms: Alfred Aho, John Hopcraft and Jeffrey Ullman, Addison – Wesley.
2. Introduction to data structures: Bhagat Singh and Thomas Nap, West Publishing Company.
3. The C Programming Language: Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, 1988.
4. Introduction to Data Structures with applications: J. P. Tremble, Tata McGraw Hill, 1984.
5. Data and file structures: Weiderberg.

Course Code: SCT-1.1,
Course Title: Software Engineering

Total Lectures: 60 Hrs

University Evaluation: 80 Marks

Contact Hrs (L) 4

Internal Evaluation: 20 Marks

Unit 1

15 Hrs

Introduction: Product and Process: Evolving role of software, software characteristic and components, crisis, myths, software engineering – a layered technology, software process, linear sequential model, prototyping model, RAD model, evolutionary software process model. [10]

Software Process And Project Metrics: Measures, metric indicators, metric in process and the project domains, software measurement, metrics for software quality, software quality assurance. [05]

Unit – II

Analysis Concepts And Principles: Requirement analysis, communication techniques, analysis principles, software prototyping & Specification. [07]

Analysis Modeling: Elements of the analysis model, data modeling, functional modeling, behavioral modeling, the mechanics of structured analysis, data dictionary, other classical analysis methods. [08]

Unit – III

Design Concepts & Principles: Software Design and software Engineering design process, Design principles, Design concepts, Design methods-Data design, Architectural design and process, Transform and Transaction mappings, Design post processing, Architectural design optimization, Interface design, Procedural design. [15]

Unit – IV

Software Testing Methods: Fundamentals, Test case design, White box testing, basis path testing, control structure testing, black box testing, Software testing strategies. [08]

Object Oriented Software Engineering: Object oriented concepts, identifying the elements of an object model, Management of object-oriented software projects, Object-oriented analysis, design and testing. [07]

Reference Books:

1. Software Engineering: Roger S. Pressman, McGraw Hill, 1997.
2. Software Engineering: Shooman, McGraw Hill, 1987.
3. Software Engineering: Ian Sommerville, Addison Wesley, 1985.
4. Object Oriented Analysis and Design: Grady Booch, Pearson.
5. Object Oriented Modeling and Design: James Rumbaugh, Michael Bluha, Prentice Hall India, 1991.

Course Code: SCT-1.2,
Course Title: UML

Total Lectures: 60 Hrs

University Evaluation: 80 Marks

Contact Hrs (L) 4

Internal Evaluation: 20 Marks

Unit – I

Object Oriented Design and Modeling: Object Oriented Fundamentals, Objects and object classes, object oriented design process, importance of modeling, principles of modeling, object oriented modeling. [07]

Introduction to UML: Conceptual model of UML, building blocks of UML, Mechanisms in UML, architecture, software development life cycle. [08]

Unit – II

Basic Structural Modeling: Classes, relationships, common mechanisms, class and object diagrams. [08]

Advanced structural Modeling: Advanced classes, advanced relationships, Interfaces types and roles, packages, instances and object diagrams. [07]

Unit – III

Collaboration Diagrams and Sequence Diagrams: Terms, concepts and depicting a message in collaboration diagrams. Terms and concepts in sequence diagrams, Difference between collaboration and sequence diagram Depicting synchronous messages with / without priority call back mechanism. [08]

Basic behavioral modeling: Interactions use cases, Use Case Diagrams, Interaction Diagrams and activity diagrams. [07]

Unit – IV

Advanced behavioral modeling: Events and signals, state machines, process and threads, time and space, state chart diagrams. [08]

Architectural Modeling: Terms, Concepts, examples, Modeling techniques for component diagrams and deployment diagrams. [07]

Reference Books:

1. The Unified Modelling Language User Guide: Grandy Booch, James Rumbough, Ivar Jacobson, Pearson Education 2002.
2. Software Engineering Sixth Edition: Ian Sommerville, Pearson Education, 2003.
3. Fundamentals of Object-oriented Design in UML: Meilir Page-Jones, Larry L. Constantine, Addison Wesley, 2000.

Course Code: HCP-1.1, Course Title: Practical Based on HCT-1.1

Minimum 15 Practical Assignments based on HCT1.1.

Course Code: HCP-1.2, Course Title: Practical based on HCT-1.2

Minimum 15 Practical Assignments based on HCT1.2.

Course Code: HCP-1.3, Course Title: Practical Based on HCT-1.3

Minimum 15 Practical Assignments based on HCT1.3.

Course Code: HCT-2.1, Course Title: Java Programming

Total Lectures: 60 Hrs

University Evaluation: 80 Marks

Contact Hrs (L) 4

Internal Evaluation: 20 Marks

Unit – I

Introduction to Java: Importance and features of java, keywords, constants, variables and data types, Operators and expressions, Decision making, branching and looping: if..else, switch, ?: operator, while, do, for statements, labeled loops, jump statements: break, continue, return. [06]

Classes and Objects: defining a class, adding variables and methods, creating objects, constructors, class inheritance. [04]

Arrays and strings: creating an array, one and two dimensional arrays, string array and methods, String and StringBuffer classes, Wrapper classes. [05]

Unit – II

Inheritance: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages. [03]

Exception Handling: Fundamentals, exception types, uncaught exceptions, throw, final, built in exception, creating your own exceptions. [04]

Java Networking: Introduction, InetAddress class, Two way communication, Socket Overview, Networking Classes and Interfaces. [04]

Multithreaded Programming: Fundamentals of Java thread model, priorities, synchronization, messaging, thread class, Runnable interface, interthread Communication, suspending, resuming and stopping threads. [04]

Unit – III

Event Handling: Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet. [15]

Unit – IV

Input/Output: Basics, Streams, Byte and Character stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (lang, util, io, net). [08]

JDBC: JDBC API, JDBC Drivers, Products, JDBC Design considerations, Basic steps to JDBC, setting up a connection to database, Creating & executing SQL statements. [07]

Reference Books:

1. Java 2: The Complete Reference: The Complete Reference, Patrick Naughton, Herbert Schildt, McGraw Hill Professional, 1999.
2. Programming with JAVA - A Primer: E. Balaguruswamy, 3rd Edition, McGraw Hill.
3. Computing Concepts with Java 2 Essentials: Cay Horstmann, John Wiley.

Course Code: HCT-2.2, Course Title: Python Programming

Total Lectures: 60 Hrs

University Evaluation: 80 Marks

Contact Hrs (L) 4

Internal Evaluation: 20 Marks

Unit -I

String, List, Tuple ,Dictionary ,Function, Module, Set, Package [15]

String -Declaring string ,String manipulation using string functions, formatting string literals

List-Introduction to list ,list functions

Tuple- Introduction to tuple ,manipulating tuple.

Dictionary- Introduction, Accessing values in dictionaries, create,delete and update dictionary

items.**Function**- Types of function, Defining function ,calling function, advantages of function function parameters, Anonymous function, Global and local variables, inbuilt functions-map,zip,reduce,filter ,any,chr ,ord etc. **Modules**-Importing module, creating and exploring modules ,math module, time module,random module, OS,calendar,sys etc. **Set**-Introduction to set, manipulate set. **Package**-Introduction, importing from package, json

File-File opening ,closing file, various types of file modes, reading and writing to file manipulating directories **Exception handling** - try,else, finally, raise keyword.

Regular Expression- various types of regular expression, using match and search function.

GUI -Introduction to GUI library, Advantages, Layout management, Events and binding Drawing on canvas(line, oval, rectangle etc) widget such as Frame, Label, Button, Checkbutton, Entry, Listbox, Radiobutton, Text, Spinbox etc.

Database-Introduction, Connections, Executing queries, Transactions, Error Handling

Unit -II [15]

OOPs Concept : Introduction to OOP, Classes and objects, Inheritance Method overloading and method overriding ,Abstract method and Abstract class, Interfaces in python ,Abstract class VS Interfaces,constructor,instance methods ,class methods, static methods.

Generators- Introduction, communicating with generators with send()

Decorators -Introduction, simple function decoratoes, classes as decorators, chained decorators decorator arguments .

Threads - Introduction, Uses of Threads, creating Thread without using a class, creating a Thread by creating a Sub Class to Thread Class, creating a Thread without creating a Sub Class to Thread Class, Communication between Threads, Thread communication using notif() and wait() methods

Unit -III [15]

Data science using python

Data Frame-Creating Data Frame from an Excel Spreadsheet, Creating Data Frame from .csv file, Creating Data Frame from python Dictionary, Creating Data Frame from python List of Tuples, Operations on Data Frames.

Data visualization-Bar Graph ,Histogram ,Creating a pie chart ,creating line graph

NumPY

Introduction, creating NumPYarrays, indexing and slicing in NumPy.

Pandas-Introduction, installation of panda, data frame, series, range data, slice data,drop a column,, concatenation.

Django-Introduction to django, ddjango templates, introduction to WSGI

References :

1. INTRODUCTION TO COMPUTATION AND PROGRAMMING USING PYTHON: WITH APPLICATION TO UNDERSTANDING DATA, John V. Guttag
2. THINK PYTHON, by Allen B. Downey, O'Reilly
3. INTRODUCING PYTHON: MODERN COMPUTING IN SIMPLE PACKAGES by Bill Lubanovic
4. PYTHON PROGRAMMING: AN INTRODUCTION TO COMPUTER SCIENCE by John Zelle
5. Core Python Programming, Dr. R. Nageshwara Rao, Dreamtech
6. Introduction to Computer Science using Python, Charles Dierbach, Wiley

E-Resources: -

1. Python Book
(http://upload.wikimedia.org/wikipedia/commons/9/91/Python_Programming.pdf)
<http://pythonbooks.revolunet.com/>
2. Python Threading:
http://www.tutorialspoint.com/python/python_multithreading.htm
3. GUI:
<https://wiki.python.org/moin/TkInter>
<https://wiki.python.org/jython/LearningJython>
http://www.tutorialspoint.com/python/python_gui_programming.htm
4. Database:
Python MySQL API <https://wiki.python.org/moin/DatabaseInterfaces>
http://www.tutorialspoint.com/python/python_database_access.htm
5. Web Framework: <http://webpy.org/docs/0.3/tutorial>

Course Code: SCT-2.1,

Course Title: Computer Communication Network

Total Lectures: 60 Hrs

University Evaluation: 80 Marks

Contact Hrs (L) 4

Internal Evaluation: 20 Marks

Unit – I

Introduction: Uses of Computer networks: Business Applications, Home Applications, Mobile Users, Social Issues; Network Hardware: Local Area Networks, Metropolitan Networks, Wide Area Networks, Wireless Networks, Home Networks, Internetworks; Network Software: Protocol Hierarchies, Design Issues for the Layers, Connection-Oriented and Connectionless Service Primitives, Relationship of Services to Protocols; Example of Networks: The Internet, The ARPANET, NSFNET, Internet usage, Architecture of the internet. [07]

Data Link Layer: Data Link Layer Design Issues: Services Provided to the Network Layer, Framing, Error Control, Flow Control; Error Detection and Correction: Error-Correcting Codes, Error-Detecting Codes; Elementary Data Link Protocols: An Unrestricted Simplex Protocol, A Simplex Stop-and-Wait Protocol, A Simplex Protocol for a Noisy Channel; Sliding Window Protocols: A One-Bit Sliding Window Protocol, A Protocol Using Go Back N, A Protocol Using Selective Repeat; Example Data Link Protocols: HDLC—High-Level Data Link Control, The Data Link Layer in the Internet. [08]

Unit – II

Network Layer: Network Layer Design issues: Store and Forward packet Switching, Services Provided to the Transport Layer, implementation of Connectionless Service, Implementation of Connection-oriented Services, Comparison of Virtual Circuit and Datagram subnets; Routing algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link state Routing, Hierarchical Routing, Broadcast Routing, Routing for Mobile Hosts; Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnet, Load Shedding, Jitter Control; Quality of Service: Requirements, Techniques for Achieving Good Quality of Service; Internetworking: Differences in Networks, Network Connection, Concatenated Virtual Circuits, Connectionless Internetworking; Tunneling; Internetwork Routing, Fragmentation; The Network Layer in the Internet: The IP Protocol, IP Addresses, Internet Control Protocols, Mobile IP; IPV6. [15]

Unit – III

The Transport Layer: The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley Sockets; Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release Flow Control and Buffering, Multiplexing, Crash Recovery; The Internet Transport Protocol – UDP: Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol; The Internet Transport Protocols – TCP: Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management TCP Transmission Policy, TCP Congestion Control, Wireless TCP and UDP. [15]

Unit – IV

The Application Layer: DNS – The Domain Name System: The DNS Name Space, Resource Records, Name Servers; Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery; The World Wide Web: Architectural Overview, Static Web Documents, Dynamic Web Documents, HTTP, Performance Enhancements, The Wireless Web. [15]

Reference Books:

1. Computer Networks: Andrew S. Tanenbaum, 4th Edition, Pearson Education, Asia, 2002.
2. Communication Networks: Fundamental Concepts and Key Architectures, Alberto Leon-Garcia, Indra Widjaja, Tata McGraw Hill, 2006.
3. Data Communications and Networking: Behrouz A. Forouzan, Tata McGraw Hill, Second Edition, 2001.

Course Code: SCT-2.2,
Course Title: Artificial Intelligence

Total Lectures: 60 Hrs

University Evaluation: 80 Marks

Contact Hrs (L) 4

Internal Evaluation: 20 Marks

Unit-I

15 Hrs

The AI Problems, the Underlying Assumption, AI Technique, Problems.

Problem Spaces and Search: Problem definition, state space search, production systems, problem characteristics, production system characteristics, Issues in the design of search programs.

Unit-II

15 Hrs

Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Search techniques, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

Representing Knowledge Using Rules: Procedural versus Declarative Knowledge, Forward Versus Backward Reasoning, Matching.

Unit -III

15 Hrs

Statistical Reasoning: Probability and Bayes' Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.

Slot-and Filler Structures: Semantic Nets, Frames, Strong Slot-and-Filler Structures: Conceptual Dependency, Scripts.

Unit - IV

15 Hrs

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing.

Expert Systems: Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition.

Reference Books:

1. Artificial Intelligence by Elaine Rich, Kevin Knight, S Nair TMH, 3rd Edition.
2. Artificial Intelligence: A Modern Approach, S. Russel and P. Norvig, 3rd edition, Pearson.
3. Introduction to Artificial Intelligence and Expert Systems by D W Patterson, PHI, 2nd Edition.

Course Code: OET-2.1,
Course Title: Office Automation

Total Lectures: 60 Hrs

University Evaluation: 80 Marks

Contact Hrs (L) 4

Internal Evaluation: 20 Marks

Unit 1

15 Hrs

Introduction to Computer: Applications of Computer – Advantages of Computer – Terms related to Computer - Characteristics of Computer: Speed, Storage, Versatility and Diligence – Hardware & Software. Windows: Desktop icons and their functions: My computer, My documents, Network neighborhood, Recycle Bin, Quick launch tool bar, System tray, Start menu, Task bar, Dialog Boxes: List Box, Spin Control Box, Slide, Drop-down list, Radio button, Check box, Text box, Task Bar - System Tray - Quick launch tool bar - Start button - Parts of Windows -Title bar-Menu bar - Scroll bar- Status bar, Maximize, Minimize, close and Resize & Moving a Window, Keyboard Accelerators: Key board short keys or hotkeys.

Unit 2

15 Hrs

Word: Working with Documents -Opening & Saving files, Editing text documents, Formatting page & setting Margins, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Tool bars, Ruler, Using Icons, using help. Formatting Documents: Setting Font styles, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering. Setting Page style: Formatting Page, Page tab, Margins, Layout settings, Inserting manual page break, Column break and line break, Creating sections & frames, Anchoring & Wrapping, Setting Document styles, Table of Contents, Index, Page Numbering, date & Time, Author etc., Creating Master Documents, Web page. Creating Tables: Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula. Drawing: - Inserting Clip Arts, Pictures/Files etc. Tools: Word Completion, Spell Checks, Mail merge, Templates, Creating contents for books, Creating Letter/Faxes, Creating Web pages, Using Wizards, Tracking Changes, Security, Digital Signature. Printing Documents – Shortcut keys.

Unit 3

15 Hrs

Excel: Spread Sheet & its Applications, Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets- opening, Saving files, setting Margins, Converting files to different formats (importing, exporting, sending files to others), Spread sheet addressing - Rows, Columns & Cells,

Referring Cells & Selecting Cells – Shortcut Keys. Entering & Deleting Data: Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, Highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc, Inserting Functions, Manual breaks. Setting Formula: finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), using other Formulae. Formatting Spreadsheets: Labelling columns & rows, Formatting- Hiding Locking Cells, Anchoring objects, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Colour etc, Borders & Shading – Shortcut keys. Working with sheets: Sorting, Filtering, Validation, Consolidation, and Subtotal. Creating Charts: Drawing. Printing. Using Tools – Error checking, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Customization.

Unit 4

15 Hrs

Power point: Presentation – Opening new presentation, Different presentation templates, setting backgrounds, selecting presentation layouts. Creating a presentation: Setting Presentation style, Adding text to the Presentation. Formatting a Presentation: Adding style, Colour, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation- Inserting pictures, movies, tables etc into presentation, Drawing Pictures using draw. Adding Effects to the Presentation: Setting Animation & transition effect. Printing Handouts, Generating Standalone Presentation viewer.

Access: Introduction, Planning a Database, Starting Access, Access Screen, Creating a New Database, Creating Tables, Working with Forms, Creating queries, Finding Information in Databases, Creating Reports, Types of Reports, Printing & Print Preview – Importing data from other databases viz. MS Excel etc.

Suggested Reading:

1. Information Technology in Business: Principles, Practices, and Opportunities by James A Senn, Prentice Hall.
2. Computer Fundamental MS Office – Including Internet & Web, Vitasta Publishing
3. Technology: Anupama Jain (Author), Avneet Mehra, Vitasta Publishing
4. MS Office 2007 in a Nutshell: S. Saxena, 1st edition, Vikas Publishing House
5. Learning Computer Fundamentals, MS Office and Internet & Web Technology: D. Maidasani, Laxmi Publications.

**Course Code: OET-2.2,
Course Title: SWAYAM MOOCs Course**

1. Student has to register one course of minimum 4 credits from SWAYAM
2. The selected course should not be from the syllabus.
3. After registration student has to report to the SWAYAM mentor of the dept.
4. Student should register for the online exam of the same course, pass the exam. and submit the marklist / certificate from SWAYAM to the mentor.

Course Code: HCP-2.1, Course Title: Practical based on HCT-2.1

Minimum 15 Practical Assignments based on HCT2.1.

Course Code: HCP-2.2, Course Title: Practical based on HCT-2.2

Minimum 15 Practical Assignments based on HCT2.2.

Course Code: OEP-2.1, Course Title: Practical Based on OET-2.1

Minimum 15 Practical Assignments based on OET2.1.