Syllabus for

Master of Computer Applications (MCA)

Semester: I - VI

Session: 2021-22

Directorate of Online Studies

Guru Nanak Dev University

(ESTABLISHED UNDER STATE LEGISLATURE ACT NO. 21 OF 1969)
Accredited by National Assessment and Accreditation Council (NAAC) At 'A++' Grade (Highest Level) As Per Modified Criteria Notified On 27/07/2017 And Conferred 'University with Potential for Excellence' Status and 'Category-I University' As Per University Grants Commission (F. No. 1-8-2017/(CPP-II) Dated 12/02/2018)

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Note:

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MASTER OF COMPUTER APPLICATIONS (SEMESTER SYSTEM) under Directorate of Online Studies, Guru Nanak Dev University, Amritsar

SEMESTER-I

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLMCA-101T	Computer Fundamentals	20	80	100	4
OLMCA-102T	Introduction to Programming	20	80	100	4
OLMCA-103T	Computer Oriented Numerical & Statistical Methods	20	80	100	4
OLMCA-104P	Programming Laboratory–I	20	80	100	4
OLMCA-105T	Communication Skills	20	80	100	4*
	Total Marks & Credits	**90**	**360**	**450**	**20**

Note: * Credits not to be counted towards SGPA.

SEMESTER-II

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLMCA-201T	Data & File Structures	20	80	100	4
OLMCA-202T	Computer Organization & Architecture	20	80	100	4
OLMCA-203T	Computer Based Optimization Techniques	20	80	100	4
OLMCA-204T	Computer Networks	20	80	100	4
OLMCA-205P	Programming Laboratory–II	20	80	100	4
	Total Marks & Credits	**100**	**400**	**500**	**20**

SEMESTER-III

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLMCA - 301T	Microprocessor & its Applications	20	80	100	4
OLMCA - 302T	Data Base Management System	20	80	100	4
OLMCA - 303T	Operating System	20	80	100	4
OLMCA - 304T	Object Oriented Programming using JAVA	20	80	100	4
OLMCA - 305P	Programming Laboratory - III	20	80	100	4
	Total Marks & Credits	**100**	**400**	**500**	**20**

SEMESTER-IV

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLMCA-401T	Information System	20	80	100	4
OLMCA-402T	Evolutionary & Intelligent Computing Theories & Applications	20	80	100	4
OLMCA-403T	Web Technologies	20	80	100	4
OLMCA-404T	Computer Graphics	20	80	100	4
OLMCA-405P	Programming Laboratory - IV	20	80	100	4
	Total Marks & Credits	**100**	**400**	**500**	**20**

SEMESTER - V

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLMCA - 501T	System Software	20	80	100	4
OLMCA - 502T	Software Engineering	20	80	100	4
OLMCA - 503T	Fundamentals of Cloud Computing	20	80	100	4
OLMCA - 504T	Introduction to Machine Learning	20	80	100	4
ODMCA - 505P	Programming Laboratory - V	20	80	100	4
	Total Marks & Credits	**100**	**400**	**500**	**20**

SEMESTER - VI

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLMCA-601T	Project	130	520	650	26
	Total Marks & Credits	**130**	**520**	**650**	**26**

OLMCA-101T: Computer Fundamentals

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

Introduction to Computer: Computer System Characteristics, Hardware–CPU, Memory, Input, Output & Storage devices, Organization of Secondary Storage Media**,** Software – System & Application, Types of processing Batch and On–line.

Programming Paradigms and Development Tools: –Problem Analysis, Program Constructs (Sequential, Decision, Loop), Algorithms, Flowcharts, Pseudocode. Decision table, Modular Programming, Top–down and Bottom–up Approaches, functional, Procedural object–oriented, and logic programming, Programming Languages – Syntax & Semantics.

Section-B

Operating System Concepts: Role of an Operating System, Types of operating systems, Batch processing, Multiprogramming, timesharing, real time, mobile, portable etc, Booting procedure and its types, Components and functions of operating system.

Data Communication: Introduction to Data Communication, Types of Networks, Transmission Media, Network level threats, Classification of threats

Section-C

Internet: Internet and its applications, working knowledge of Search engines and use of electronic mail, Virus, Information level threats, Hacking Prevention Mechanism: Anti – Viruses, Firewalls, Biometrics Controls for security, cryptography and encryption.

Introduction to Cloud Computing: Overview of distributed computing: Trends of computing, introduction to parallel/distributed computing, Introduction to Cloud Computing including benefits, challenges, and risks, Different types of clouds, Security and Privacy issues in the Cloud.

Section-D

Introduction to DBMS: Database models, fundamental of relational model, 3–Level architecture, query languages, query optimization, normalization, DBA: security, recovery, concurrency. Introduction to distributed and Object Oriented database.

Introduction to Big data: Introduction to database, introduction to data mining, structural/unstructural data, Define and describe Big Data and its characteristics, Critique, Applications in different areas, Tools & Techniques of implementation.

References:

1. Computers Today: Suresh K. Basandra, Galgotia, Updated Edition, 2012.
2. Gurvinder Singh & Rachhpal Singh: A Test Book on Windows Based Computer Courses, Kalyani Publishers, 10th Edition 2008.
3. Norton, Peter: Introduction to Computers, McGraw Hill
4. Martin, James: Telecommunications and the Computer, PHI
5. Distributed and Cloud Computing, 1st edition, Morgan Kaufmann, 2011 by Hwang & Dongarra & Fox
6. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl Published May 2013.
7. Rajaraman, A., Ullman, J.D., Mining of Massive Datasets, Cambridge University Press, United Kingdom, 2012.
8. http://swayam.gov.in/
9. http://edx.org formerly http://mooc.org/
10. http://epgp.inflibnet.ac.in/

OLMCA-102T: Introduction to Programming

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

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2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

Introduction to Program Development: Problem Analysis, Designing a solution.
Overview of C: Brief history of C, introduction to different versions of C. General Structure of a C program, stages in the development of a C program.
Data Types, Operators & Expressions: Constants and variables, data types, declaring variables, storage classes, different types of expressions and their evaluation, conditional expression, assignment statement, enumerated data type, redefining/creating data types, type casting.
Console Input/Output: Standard input/output devices, unformatted input/output functions (character I/O functions and string I/O functions), formatted input/output functions *(scanf( )* function and *printf ( )* function).
Control Statements: Decision making using *if, if–else, elseif* and *switch* statements, Looping using *for*, *while* and *do–while* statements, transferring program control using *break* and *continue* statements

Section-B

Arrays & Strings: Introduction to arrays, declaring arrays, initializing arrays, processing of arrays, introduction to strings.

Structures & Unions: Introduction to structures, declaring structures, initializing structures, accessing elements of structures, array of structures, nested structures, passing structures as arguments to a function, introduction to unions.
Functions: Defining a function, local variables, *return* statement, invoking a function, specifying and passing arguments (including arrays, strings) to a function, function prototyping and use of header files, building own library, recursion.

Pointers: Why pointers? Declaring pointers, accessing values via pointers, pointer arithmetic, pointers to arrays, Array of pointers, pointers to strings, pointers to structures, self–referential structures.

Section-C

Program Structure: Program structure revisited, managing multi–file programs using traditional approach of separate compilations and project facility of Turbo C compiler, storage classes revisited.
File I/O: Introduction to files, different ways of file processing (standard I/O & system I/O), description of various library functions for file handling, updating files, programming examples to illustrate the processing of files.

Introduction to Object Oriented Paradigm –Object Oriented programming and C++, Structured Programming methodology, its shortcomings, advantages of OOPS (Object Oriented Programming Style).
OOP concepts: Abstraction, Encapsulation, Data Hiding, Inheritance, Polymorphism.

Section-D

Overview of C++ –Data types, Input/output statements, Flow of control–looping statements, branching statements, Pointers & references, namespaces.
Class design: constructors, destructors, operator overloading, reuse through inheritance, virtual functions, exception handling.
I/O with stream classes, memory management
The Standard Template Library (STL): containers, algorithms, iterators, adaptors, function objects.

References:

1. Stephan G. Kochan, Programming in C, Addison–Wesley Professional, 2013.
2. Walter Savitch, Absolute C++, Fifth Edition, Addison Wesley, 2013
3. Ellis Horowitz, Satraj Sahni and Susan Anderson–Freed, Fundamentals of Data Structures in C, W. H. Freeman and Company.
4. R. G. Dromey, How to Solve it by Computer, Prentice–Hall of India.
5. Cohoon and Davidson, C++ Program Design: An introduction to Programming and Object–Oriented Design, 3rd Edition, Tata McGraw Hill.
6. Byron Gotterfied, Programming in C, Tata McGraw Hill Publishing Company Ltd., Delhi.
7. Yashvant Kanetkar, Let Us C, BPB Publications, Delhi.
8. R.S. Salaria, Applications Programming in C, Khanna Book Publishing Co. (P) Ltd., Delhi.
9. http://swayam.gov.in/
10. http://edx.org formerly http://mooc.org/
11. http://epgp.inflibnet.ac.in/

OLMCA-103T: Computer Oriented Numerical & Statistical Methods

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

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1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

Floating–Point Numbers: Floating–point representation, Rounding, Chopping, Error analysis.

Non–Linear Equations: Generalized Newton Raphson method, Secant method, Rate of convergence of secant method, Muller's method.

Linear Systems of equations: Gauss Elimination and LU–decomposition methods, solution of tridiagonal system, Jacobi and Gauss–Seidel methods.

Section-B

Central Difference Interpolation: Gauss forward, Gauss Backward, Stirling Interpolation methods.

Numerical Differentiation and Integration: Numerical differentiation using Interpolation method, Boole's Rule, Weddles's rule of numerical integration, Romberg Integration.

Numerical Solution of Ordinary Differential Equations: Euler's method, Runge–Kutta method, Predictor–Corrector method.

Section-C

Dispersion: Meaning, Characteristics for an ideal measure of dispersion. Measures of dispersion (Mean deviation, Standard Deviation and variance.)

Principle of least Square: correlation and regression coefficients (two variables only).

Analysis of Statistical Data: Frequency distribution; Frequency curve and histogram; Measure of central tendency and dispersion.

Section-D

Random Variables and probability distributions: Basic concepts of probability and its properties, Conditional probability and independent events; Random variable, Notion of sample space; distribution functions; Mathematical expectation, Poisson, Rectangular, Exponential and Normal distributions.
Sampling distributions: Notion of random sample and sampling distributions; Parameter and statistics; Standard error; Chi–square, t, F distributions; Basic ideas of testing of hypothesis; Testing of significance based on normal, Chi–square, t and F distributions.

Recommended Books:

1. Hogg, Robert V, Elliot A Tanis and Rao, Jagan M., Probability and Statistical Inference, Pearson Education (2009).
2. Meyer P. L., Introductory Probability and Statistical Applications, Oxford and IBH (2008).
3. Conte, S. D. and Boor, C. D., Elementary Numerical Analysis: An Algorithmic Approach, (Third Edition), Tata McGraw Hill, New York (2006).
4. Jain, M. K., Iyengar, S.R.K. and Jain, R.K., Numerical Methods for Scientific and Engineering Computation, New Age International Publishers (2008).
5. http://swayam.gov.in/
6. http://edx.org formerly http://mooc.org/
7. http://epgp.inflibnet.ac.in/

Master of Computer Applications (Semester – I)

OLMCA-104P: Programming Laboratory-I

Time: 03 Hours

Max. Marks: 100 Marks

Internal Assessment: 20 Marks

End Term: 80 Marks

- Practical Exercises on Programming in C/C++
- Implementation of numerical & statistical methods using C/C++ language
- File management using Linux/Unix/ Windows based operating system

OLMCA-105T: Communications Skills

Time: 03 Hours **Max. Marks: 80 Marks**

Internal Assessment: 20 Marks

End Term: 100 Marks

Instructions for the Paper-Setter/examiner:

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3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

Theories of communication, Goals- Organizational and Personal, Psychology of communication, Channels, Cost and Barriers to communication, Informal and Formal communication

Section-B

Listening and Speaking Skills, Familiarizing to different tones and accents, Oral communication practice, Public speaking, Grammar and Vocabulary, Speech, Extempore

Section-C

Basics of Telephone Etiquette in Business communication, Practice of Interview skills and Group Discussions

Section-D

Students must carry out Group discussions and Mock interviews during the lab session.

Books Recommended:

1. Simon Sweeney, "English for Communication", 2nd Edition, CUP, 2003.
2. Leo Jones and Richard Alexander, "New International Business English", CUP, 2000.
3. Essentials of Business Communication, Rajendra Pal. JS Korlahhi
4. http://swayam.gov.in/
5. http://edx.org formerly http://mooc.org/

OLMCA - 201T: Data & File Structures

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

Preliminaries: Various data structures, common operations on data structures, algorithm complexity, big O notation, time–space trade-off between algorithms.
Arrays: Arrays defined, representing arrays in memory, various operations on linear arrays, Multi–dimensional arrays, Records.
Linked Lists: Types of linked lists, representing linked lists in memory, advantage of using linked lists over arrays, various operation on linked lists

Section-B

Stacks: Description of stack structure, implementation of stack using arrays and linked lists. Applications of stacks – converting arithmetic expression from infix notation to polish and their subsequent evaluation, quicksort technique to sort an array, parenthesis checker.
Queues: Description of queue structure, implementation of queue using arrays and linked lists, description of priorities queues. Applications of queues – Operating system simulations
Trees: Description of tree structure and its terminology, binary search tree, implementing binary search tree using linked lists, various operations on binary search trees, AVL Trees, Threaded Binary Trees, B–Trees, B+ trees, Greedy Method: Knapsack Problem, Prim's and Kuruskal's Algorithm to find MSTs.

Section-C

Heaps: Description of heap structure, implementing heaps using arrays, various operations on heaps, Applications of heaps – heapsort technique to sort an array, implementation of priority queues. Graphs: Description of graph structure, implementing graphs in memory using adjacency matrix or adjacency lists, various graphs traversing algorithms, finding shortest path between two nodes, Dijkastra's shortest path algorithm., finding biconnected component, strongly connected component and finding cycles in the graphs.

Section-D

Searching and Sorting: Sorting Types, External and Internal sort Linear Search, Binary search, Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Shell Sort, Quick sort, Radix Sort. Hash Tables: Direct address tables, hash tables, collision resolution by chaining, hash functions, open addressing – linear probing, quadratic probing, double hashing.

References:

1. Seymour Lipschutz: Theory and Problems of Data Structures, Schaum Outline Series, McGraw–Hill Book Company. Third Edition
2. Jeffery Esakov: Data Structures – An Advanced Approach Using C, Tom Weiss, Prentice–Hall International, Inc. 2007
3. Trembley and Sorenson: An Introduction to Data Structures with Application, Tata–McGraw Hill Company, Delhi. 2003
4. Tanenbaum: Data Structures and C. Second Edition
5. http://swayam.gov.in/
6. http://edx.org/ formerly http://mooc.org/

OLMCA-202T: Computer Organization and Architecture

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

Basic computer Organisation and design: Register Transfer and Micro–operations: Register Transfer Language, various Arithmetic, Logic & Shift micro–operations, instruction codes, computer registers, timing & control, instruction cycle, design of a complete basic computer &it's working.

Section-B

Programming & controlling the basic computer: Machine & Assembly Language, hardwired& Micro–programmed control, Design of a control unit.

CPU Architecture: General register & stack organization, instruction formats and addressing modes, ALU & Control unit architecture.

Section-C

Memory Organisation: Memory hierarchy, main, auxiliary, cache memory, virtual memory, paging and segmentation.

I/O Organization: Peripheral Devices, input–output interface, Modes of data transfer, programmed & interrupt initiated I/O, DMA, I/O Processors.

Section-D

Parallel & Multiprocessing Environment: Introduction to parallel processing, pipelining, RISC Architecture, vector & array processing, Multiprocessing concepts, memory & resource sharing, interprocessor communication & synchronisation.

References:

1. Morris Mano: Computer System Architecture, Pearson, 3rd Edition, 2007.
2. Hayes J.P.: Computer Architecture & Organisation, McGraw Hill, 3rd Edition, 2012.
3. Tanenbaum: Structured Computer Organisation, Pearson, 5th Edition, 2012.
4. Morris Mano: Computer System Architecture, PHI, 3rd Edition, 1993.
5. Stone: Introduction to Computer Architecture: Galgotia, 2nd Edition, 1990.
6. http://swayam.gov.in/
7. http://edx.org/ formerly http://mooc.org/

OLMCA-203T: Computer Based Optimization Techniques

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

Linear Programming: Mathematical formulation of linear programming problems, Canonical and standard forms of linear programming problems, Solution by Graphical & Simplex method, Revised simplex method, Two phase & Big–M method, Duality, Primal–Dual Relationship, Dual Simplex method, Economic Interpretation of Optimal simplex Solution. Sensitivity Analysis: Changes in RHS values, Objective Function Coefficients, Constraint Coefficients, Addition of a new constraint/variable.

Section-B

Special Types of LPP: Transportation and Assignment Problems, Optimality, Special cases in Transportation and Assignment Problems, Game Theory: Two–person zero sum games, maximin–minimax principle, games without saddle points (Mixed strategies), graphical solution of $2 \times n$ and $m \times 2$ games, dominance property, arithmetic method of $n \times n$.

Section-C

Integer & Dynamic Programming: Integer programming problem, Branch and Bound Techniques. Characteristics, Deterministic DP Problems, Recursive Approach and Tabular method.

PERT / CPM: Project Planning, Scheduling, Activity cost

Section-D

Evolutionary Techniques: Introduction to Evolutionary Computing & Genetic Algorithms, GAas a search and optimization technique. Implementation of SGA using MATLAB/Scilab. **Advanced Computing Techniques:** Introduction to Neural Networks, Fuzzy Systems and otherSoft Computing techniques. Introduction to Swarm Intelligence and Optimization.

Recommended Books:

1. Gass, S. L.: Linear Programming
2. Rao S.S.: Optimization Theory and Applications, Wiley Eastern.
3. Manmohan, Gupta P.K.: Operation Research, Sultan Chand & Co., New Delhi.
4. Swrup, Kanti: Operation Research, Sultan Chand & Co., New Delhi.
5. Hadley, G.: Linear Programming, Narosa, 1994.

6. Genetic Algorithms in Search Optimization and Machine Learning by David E. Goldberg, Pearson Education, 2004.
7. Introduction to Neural Networks using MATLAB, S N Sivanandam S Sumathi S N Deepa Mc GrawHill, 2015.
8. http://swayam.gov.in
9. http://edx.org formerly http://mooc.org/

OLMCA-204T : Computer Networks

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
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3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
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Section-A

Introduction to networks and its Components: Transmission media–Guided media Twisted pair (Architecture of RJ–45 Connector), Co–axial cable (architecture of BNC), unguided media. **Analog and Digital Transmission and their conversions:** composite signals and Fourier analysis. Switching, ISDN services, Transmission in ATM networks. **Layered Architecture:** OSI and TCP/IP reference models.

Section-B

Data Link layer: Framing, Error detection and correction, Elementary data link and sliding window protocols, Channel allocation in LAN and WAN, Multiple access protocols. **Design issues of network layer:** Routing algorithms, Congestion control algorithms, internetworking, Repeaters, Routers.

Section-C

Services and elements of transport protocols
IEEE standards used in Computer networks. Introduction to wireless networks: IEEE 802.11, Wireless sensor networks, Ad–hoc networks.

Section-D

Wireless System Architecture: wireless system components, Network Architecture. **Types of wireless networks:** WPAN, WLAN, WWAN, Cellular telephony. **Network Security and Privacy:** Fundamentals of data Compression techniques and Cryptography.

Recommended Books:

1. Forouzon Behrouz: Data Communication & networking 5E, Tata McGraw Hill.
2. Jm Geier, Wireless Networks First Step, CISCO Press
3. William Satlllings, Wireless Communication & Networks, Pearson Education
4. http://swayam.gov.in/
5. http://edx.org formerly http://mooc.org

OLMCA-205P : Programming Laboratory-II

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Practical will be based on:

- Implementation of Data and File Structures using C/C++
- Implementation of Computer Oriented Optimization Techniques
- Network Administration – User management, File & Resource Sharing

OLMCA - 301T: Microprocessor & its Applications

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

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2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

Introduction: Introduction to Microprocessor, Microcontroller and Microcomputer, different types of microprocessors - Intel, AMD, Motorola, and their suitability to different types of applications. Evolution of the microprocessor product line.

Architecture of a Microcomputer: General Architecture of a microcomputer system. Microprocessor unit, input unit, output unit, memory unit and auxiliary storage unit.

Section-B

Architecture of 8086/ 8088 Microprocessor: Description of various pins, configuring the 8086/8088 microprocessor for minimum and maximum mode systems description of maximum system mode interfaces, internal architecture of the 8086 / 8088 microprocessor, system clock, Bus cycle, instruction execution sequence.

Memory Interface of the 8086 / 8088 microprocessor: Address space and Date organization, generating memory addresses, hardware organization of the memory address space, memory bus status codes, memory control signals, read/write bus cycles, the role of stack in interrupts and subroutine cells; de-multiplexing the address data bus, program and data storage memory, dynamic RAM system.

Section-C

Input /Output Interface of the 8086 / 8088 microprocessor: I/O Interface, I/O address space and data transfers, I/O instructions, I/O bus cycles, Output ports, 8255A Programmable Peripherals Interface (PPI), memory– mapped, I/O, serial communication interface (USART and UART) – the RS–232 C interface, 8251A programmable communication interface, special purpose interface controllers.

Interrupt Interface of 8086/8088 microprocessor: What is interrupt? Types of interrupt, Interrupt Vector Table (IVT)

Section-D

8086/8088 assembly language programming: General structure of an assembly language program, steps in the development of an assembly language program, Assembly language V/S machine language, addressing modes, Instruction set: data movement instructions, arithmetic instructions, logical instructions, shift and rotate instructions, jumping and looping instructions, string processing, interrupt instructions, stack operations, subroutines, handling instructions, defining and using macros.

Programming exercises must be designed to show how the input/output is performed. How decisions are made and how loops can be set in an assembly language program.

References:

1. Walter Triebel: The 8086 Microprocessor – Architecture, Software and Interfacing Techniques, PHI, Delhi.
2. Walter Triebel: The 8088 Microprocessor – Architecture, Software and Interfacing Techniques, PHI, Delhi
3. Douglas V. Hall: Microprocessors and Interfacing – Programming and Hardware, Tata McGraw Hill Publishing Company Ltd., New Delhi
4. Peter Abel: IBM PC Assembly Language and Programming, PHI, Delhi
5. http://swayam.gov.in
6. http://edx.org formerly http://mooc.org
7. http://epgp.inflibnet.ac.in/

OLMCA - 302T: Data Base Management System

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section - A

Basic Concepts: An overview of Database Management System, Architecture for a database system, Introduction to Relational, Network and Hierarchical database systems.

ER Model: Overview, ER diagrams, Database design using ER model.

Section - B

The Relational Model: Relational Data Objects: Domains and relations, Integrity Constraints, Relational Algebra, Relational Calculus and SQL Language. Working knowledge of DDL, DML and DCL based statements for generating queries is to be provided.

Relational Database Design: Concepts of functional dependencies, multivalued dependencies, 1NF, 2NF, 3NF, BCNF, Higher Normal Forms.

Section – C

Advanced Concepts in Relational Databases: Recovery, Concurrency, Security, Integrity, Query Optimization.

Introduction to Big Data: Structured and Unstructured data, Data Analytics, Big data management and Big data analytics.

Section – D

Techniques of Data Management: Storage and Analysis of data, Extraction of relevant Information Applications of Big Data: Distributed databases, Hadoop, NoSQL, NewSQL, Dimensionality reduction, processing unstructured data.

Reference:

1. C.J. Date, "An Introduction of Database System", The Systems Programming Series, 6/Ed, Addison–Wesley Publishing Company, Inc., 1995.
2. Silberscatz, Korth and Sudarshan, "Database System Concepts", Third Ed., McGraw Hill International Editions, Computer Science Series–1997.

3. Parteek Bhatia and Gurvinder Singh, "Simplified Approach to DBMS", Kalyani Publishers.
4. Desai, Bipin C, "An Introduction to Database Systems", West Publishing Company, St.Paul, Minnesota, USA–1993.
5. Michael Minelli, Michele Chambers, AmbigaDhiraj, "Big Data. Big Analytics", John Wiley, 2013.
6. Chris Eaton, Dirk Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", Tata McGraw Hill Education, 2012.
7. http://swayam.gov.in
8. http://edx.org formerly http://mooc.org
9. http://epgp.inflibnet.ac.in/

OLMCA - 303T: Operating System

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section - A

Basic Concepts: History & Evolution of Operating System, OS as resource manager, Various views of OS, System calls, interrupt Mechanism.

Process Management: States of Processes, process scheduling algorithms, race condition, Critical section Problem, Context Switching, Semaphores, Monitors. Deadlock conditions, deadlock prevention, avoidance, detection and recovery.

Section – B

Memory Management: Basic Memory Management Schemes, Partition memory management, demand paged memory management, segmented memory management, swapping, hierarchy of memory, Virtual Memory, Working Set Model.

Device Management: Dedicated devices, shared devices, virtual devices, channels, I/O traffic controller, I/O scheduler, I/O device handlers, Storage devices, buffering, disk scheduling algorithms.

Section – C

Information Management: File Attributes, File Organization in directories, Simple file system, Symbolic file system, logical file systems, physical file systems, security of file systems, Sequential, Indexed and indexed sequential allocations.

Distributed Systems: Definition, Characteristics, Goals and application of Distributed Systems, Basic Design issues and User Requirements.

Section – D

Distributed OS: Introduction, The Kernel, Process and Threads, Communication.

Case Studies: Windows NT, Unix / Linux.

References:

1. Madnick and Donovan: Operating System, McGraw Hill, 1973.
2. P.B. Henson: Operating System Principles, Prentice Hall, 1973.

3. J.L. Peterson, A. Silberchatz: Operating System Concepts, Addison Wesley, 1983.
4. George Coulouris, Jean Dollimore, Tim Kindberg : Distributed Systems : Concepts and Design 2nd edition, Addison-Wesley Publishing Company.
5. A.S. Tenenbaum: Operating System: Design and Implementation PHI, 1989.
6. http://swayam.gov.in
7. http://edx.org formerly http://mooc.org
8. http://epgp.inflibnet.ac.in/

OLMCA - 304T: Object Oriented Programming using JAVA

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Evolution of Java, Importance of JAVA to Internet, Features of JAVA, Bytecode, Object Oriented Approach. Various Data Types and Operators, Type Conversion and Casting, One Dimensional and Multidimensional arrays, Selection Statements, Iterative Statements, Jumping statements.

Section - B

Class Fundamentals, Declaring Objects, Introducing Methods, Constructors, this keyword, Overloading constructors and Methods, Recursion, Nested and Inner classes. Inheritance basics, Creating Multilevel hierarchy, Method Overriding and Abstract Classes.

Packages and Interfaces, Access Protection, Importing Packages, Interfaces, Defining, Implementing, Applying Interfaces, Extending Interfaces. Exception Handling Fundamentals, Exception Types, uncaught exceptions, try and catch, Creating own Exceptions.

Section – C

Programming The Java Thread Model, Thread Priorities, Synchronization, Interthread communication, Suspending, Resuming and Stopping Threads.

Java I/O Basics, Streams, reading Console input and writing console output, PrintWriter class, Reading & writing Files, Byte Streams, Character Streams & Serialization.

Section – D

Applet basics, Applet Architecture, Applet: Display, Repaint, Parameter Passing. Event Handling: The Delegation Event Model, Event Classes, Event Listener Interfaces, AWT Window Fundamentals, Working with Frame Windows, Graphics, Color and Fonts.

References:

1. Herbert Schildt: The Complete Reference Java 8, 9th edition, Oracle Press, 2014.
2. Balagurusamy: Programming in JAVA, Tata McGraw Hill, 2004.
3. Java2 Black Book Steven Holzner OT Dreamtech Press, www.idgbooksindia.com, 2007.
4. The Java Tutorial Continued by Compione, Walrath, Huml SUN JAVA Tutorial Team, Addison Wessley, 2007.

5. http://swayam.gov.in
6. http://edx.org formerly http://mooc.org
7. http://epgp.inflibnet.ac.in/

OLMCA - 305P: Programming Laboratory-III

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Practical will be based on

- Hands on practice of SQL statements with different clauses available using Oracle 8i or higher version
- Implementation of OO Concepts using JAVA

OLMCA - 401T: Information System

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

An Introduction to Information System: Information Concepts, System Concepts, Business Information Systems, Information Systems in society, business and Industry, Ethical and Social issues, Global Challenges in Information Systems

Information Systems in Organizations: organizations and Information systems, competitive Advantage, careers in Information System.

Section – B

Management Information System: Fundamental types of Management, Information Systems, Management Decision, Pitfalls in MIS Development Making Process Building and Maintaining Information Systems, Information System Security and Control.

Decision Support Systems (DSS): Conceptual Foundations of DSS, Concepts of DSS, DSS Software, Strategies for DSS, Group Support Systems, Executive Support System (ESS).

Section – C

Knowledge Management systems: Fundamentals of Knowledge Based Decision Support; Artificial Intelligence and Expert systems, Expert System & its integration with DSS. Other Information Systems like Supply chain management, Customer Relationship Management (CRM), Electronic Commerce and Mobile Commerce.

Section – D

Distributed Information System (DIS): Distributed processing systems, Advantages and disadvantages, Historical context of DIS. The Internet and Internet Applications as a Distributed Information System Security, data integrity and availability of DIS, Network management issues.

References:

1. Principles of Information Systems: A Managerial Approach, Ralph Stair and George Reynolds, Cenage Learning, 2008
2. Management Information Systems, Laudon C. Kenneth & Laudon P. Janes, Pearson Education, 2002.

3. Decision Support Systems & Intelligent Systems Turban Ejraini & Aronson E. Jay, Pearson Education, 2001.
4. Information Systems for Modern Management, Mudrick R.G., Ross, J.E. & Glegge, J.R.,3rd Edition, Prentice Hall of India, 1987.
5. Information Systems, Alter Steven, 3rd Edition, Pearson Education, 2000.
6. Distributed Systems: Concepts and Design. Jean Dollimore George Coulouris and Tim Kindberg. Addison Wesley, 5th edition, May 2011.
7. Distributed Systems: Principles and Paradigms. Andrew S. Tanenbaum and Maarten Van Steen. Prentice Hall, 2nd edition, October 2006.
8. http://swayam.gov.in
9. http://edx.org formerly http://mooc.org
10. http://epgp.inflibnet.ac.in/

OLMCA - 402T: Evolutionary & Intelligent Computing Theories & Applications

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Introduction to AI: AI concept, Importance of AI, Evolution of AI, Related Fields of AI.

Knowledge: Introduction and Importance of Knowledge, Knowledge based systems, Knowledge Representation, First Order Predicate Logic (FOPL), Syntax and Semantics of FOPL, Knowledge Organization and Manipulation.

Section – B

Un–supervised Learning: Kohonen Self Organization Feature maps and Adaptive Resonance Theory. Introduction to Fuzzy Logic and Fuzzy Sets, Fuzzy Relations, Fuzzyfication, Defuzzyfication. Introduction to Hybrid Soft Computing.

Section – C

Applications of Advance Computing in Pattern Recognition, Signal Processing & Image Retrieval. Introduction to Evolutionary Computing & Genetic Algorithms. Introduction to Genetic Algorithms, Goals of Optimization, How Genetic Algorithms work, A Simple Genetic Algorithm's Computer Implementation highlighting Reproduction by Selection, Crossover, Mutation.

Section – D

Advanced GA Techniques Mapping Objective Function to Fitness Form, Fitness scaling, discretization, Different types of Selection and Crossover techniques. A case study of Travelling Salesman Problem using GA Techniques. Introduction to other Evolutionary Techniques: PSO, Simulated Annealing and Ant Colony Optimization.

References:

1. David E. Goldberg, Genetic Algorithms in Search Optimization and Machine Learning, Pearson Education.
2. S. N. Sivanandam, S. N. Deepa, Principles of Soft Computing, Wiley Publications.
3. How to Solve It: Modern Heuristics, by Zbigniew Michalewicz, David B.Fogel, second Edition Springer Verilag-2004, ISBN- 3-540-22494-7.
4. Gallant Stephen I, Neural Network Learning & Extent Systems, MIT Press, 1993.
5. Aleksander & Morton, Neural Computing, Chapman & Hall, 1991.
6. Kosko, Neural Networks & Fuzzy Systems, PHI, 1991
7. Dan W. Patterson, '*Introduction to Artificial Intelligence and Expert Systems*', Prentice-Hall India Private Limited, 2006.
8. http://swayam.gov.in
9. http://edx.org formerly http://mooc.org
10. http://epgp.inflibnet.ac.in/

OLMCA - 403T: Web Technologies

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Web Essentials, Markup languages, CSS Basics of Client side programming, Java script language, java script objects, host objects, Browsers and DOM.

Section – B

Basics of Server side programming, Java servlets- Life cycle, Servlet API, Reading Servlet parameters, Handling HTTP requests and responses, Cookies and Session Tracking ASP/JSP, Basics of ASP/JSP objects, simple ASP and JSP pages.

Section – C

Representing Web data, Data base connectivity, JDBC, Dynamic web pages, XML, DTD, XML schema, DOM, SAX, XQuery, Building web applications, cookies, sessions, open source environment.

Introduction to PHP, basics, PHP File handling, file upload, cookies, error handling, PHP MySQL introduction.

Section – D

Middleware technologies, Ecommerce architecture and technologies, Ajax, Advanced web technologies and tools.

Case Studies: PHP and MySQL case studies.

References:

1. Jeffery C Jackson, "Web Technology-A Computer Science Perspective", Pearson Education, 2007.
2. Chris Bates, "Web Programming- Building Internet Applications", Wiley India, 2006.
3. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill.
4. http://swayam.gov.in
5. http://edx.org formerly http://mooc.org
6. http://epgp.inflibnet.ac.in/

OLMCA - 404T: Computer Graphics

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Elements of Computer Graphics: Introduction to computer graphics; graphics display devices; interactive control devices; output devices; display processors.

2D Graphics

Elementary Drawing Algorithms: Line drawing using direct method, simple DDA, integer DDA, incremental method, and Bresenham's algorithm; Circle drawing using incremental method and Bresenham's algorithm, drawing arcs, sectors, etc. Flood Fill Algorithms, Boundary Fill Algorithms

Section – B

Geometric Transformations: Translation, rotation, scaling, reflection and shear; concept of homogenous coordinates, Building composite transformations.

Viewing Transformations: Concept of windows & viewport, window–to–viewport mapping, clipping operations – point clipping, line clipping algorithms (Cohen – Sutherland, mid–point subdivision, Cyrus – Beck), Sutherland – Hodgman polygon clipping algorithm.

3D Graphics

Drawing 3D Shapes: Coordinate systems, representation of 3D shapes, designing curves and surfaces (Hermite, Bezier, and B–Spline).

Section - C

Geometric Transformations: Translation, rotation, scaling and reflection.

Projective Transformations: Parallel projections – orthographic, axonometric (isometric, diametric and trimetric), oblique projections; and perspective projections (one, two and three vanishing points).

Viewing Transformations: Viewing a 3D object, 3D clipping (extension of specified 2D algorithms to handle 3D objects).

Section – D

Hidden line/surface Removal: Back face removal, z–buffer algorithm, Painters (depth sort) algorithm, subdivision algorithms – Warnock's algorithm, scan line algorithms – scan line z– buffer algorithm.

Rendering: Introduction, a simple illumination model, shading – Gouraud shading & Phong shading, ray tracing, shadows, textures.

References:

1. David F. Rogers: Procedural Elements for Computer Graphics, McGraw Hill Book Company.
2. Adams & David F. Rogers: Mathematical Elements of Computer Graphics, McGraw Hill Book Company.
3. Roy A. Plastock, Gordon Kalley: Computer Graphics, McGraw Hill Book Company.
4. Donald Hearn & M. Pauline Baker: Computer Graphics, Prentice Hall of India Private Limited
5. http://swayam.gov.in
6. http://edx.org formerly http://mooc.org
7. http://epgp.inflibnet.ac.in/

OLMCA - 405P: Programming Laboratory-IV

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Practical will be based on

- Development of Websites, JAVA 2.0 / Front Page 2000 / HTML 4.0, ASP.
- Implementation of Computer Graphics using C/C++

OLMCA - 501T: System Software

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Introduction to System Software: Evolution of System software, Components of System software, Translators, Loaders, Interpreters, Assembler, and Compiler.

Section – B

Assemblers: Overview of Assembly Process, Design of One pass and Two pass Assembler

Macroprocessors: Macro definition and expansion, Concatenation of macro parameters, Generation of unique labels, Conditional macro expansion, Recursive macro expansion.

Section - C

Compliers: Phases of compilation process, Lexical analysis, parsing, Storage management optimisation. Incremental compilers, Cross compilers, P code compilers.

Loaders and Linkage Editors: Basic loader functions. Relocation, program linking, linkage, editors, dynamic linking bootstrap loaders

Section – D

Other System Software: Operating system, DBMS, text editors, Interactive debugging systems.

References:

1. Leland L. Beck: System Software, An introduction to system programming, Addison Wesley.
2. D.M. Dhamdhere: Introduction to System Software, Tata McGraw Hill.
3. D.M. Dhamdhere: System Software and Operating System, Tata McGraw Hill, 1992.
4. Madrich, Stuarte: Operating Systems, McGraw Hill, 1974.
5. Stern Nancy Assembler Language Programming for IBM and IBM compatible computers, John Wiley, 1991.
6. http://swayam.gov.in/
7. http://edx.org formerly http://mooc.org
8. http://epgp.inflibnet.ac.in/

OLMCA - 502T: Software Engineering

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Waterfall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models. Estimation of various parameters such Cost, Effort, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis, and Management.

Section – B

Software Requirement Specifications (SRS) Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI–CMM Model.

Section - C

Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top–Down and Bottom–Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs

Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top–Down and Bottom–Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

Section – D

Software Maintenance and Software Project Management: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective

Maintenance, Cost of Maintenance, Software Re– Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, Working knowledge of distributed version control system Git.

References:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
4. Pankaj Jalote, Software Engineering, Wiley
5. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
6. Ian Sommerville, Software Engineering, Addison Wesley.
7. KassemSaleh, "Software Engineering", Cengage Learning.
8. Pfleeger, Software Engineering, Macmillan Publication
9. http://swayam.gov.in/
10. http://edx.org formerly http://mooc.org
11. http://epgp.inflibnet.ac.in/

OLMCA - 503T: Fundamentals of Cloud Computing

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Introduction: Definition, Vision, Reference Model, Benefits, Limitations, Terminology, Open Challenges.

Virtualization: Definition, Type of Virtualization, Benefits, Limitations, Virtualization and Cloud, Virtual Appliance.

Section – B

Cloud Computing Architecture: Service Models, Deployment Models, Cloud Entities, Cloud Clients, Service Level Agreement (SLA) and Quality of Service (QoS) in Cloud Computing.

Section - C

Programming Models in Cloud: Thread Programming, Task Programming and Map–Reduce Programming.

Section – D

Cloud Security: Infrastructure Security, Data Security, Identity and Access Management, Privacy Management, Security as a Service on Cloud.

Advance Topic in Cloud: Energy Efficiency in cloud, Market Oriented Cloud Computing, Big– Data Analytics, Federated Cloud Computing.

References:

1. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., ISBN–13: 978–8–12–652980–3, New Delhi, India, 2011.
2. Dr. Saurabh Kumar, Cloud Computing: Insights Into New–Era Infrastructure, Wiley India Pvt. Ltd, ISBN–13: 978–8–12–652883–7, New Delhi, India, 2011.
3. Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Cloud Computing for Dummies, Wiley India Pvt. Ltd, ISBN–13: 978–0–47–059742–2, New Delhi, India, 2011.
4. http://swayam.gov.in/
5. http://edx.org formerly http://mooc.org
6. http://epgp.inflibnet.ac.in/

OLMCA - 504T: Introduction to Machine Learning

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Introduction, linear classification, Perceptron update rule Perceptron convergence, generalization, Maximum margin classification, Classification errors, regularization, logistic regression, Linear regression, estimator bias and variance, active learning, Active learning (cont.), non-linear predictions

Section – B

Kernels, Kernel regression, kernels, Support vector machine (SVM) and its implementation in PYTHON, kernels, kernel optimization, Model selection, Model selection criteria

Section - C

Description length, feature selection, combining classifiers, boosting, margin, and complexity, Margin and generalization.

Mixture models, Mixtures and the expectation maximization (EM) algorithm, EM, regularization, clustering, Spectral clustering

Section – D

Programming Assignment in PYTHON: Markov models, Hidden Markov models (HMMs), HMMs (cont.), Bayesian networks, Learning Bayesian networks, Probabilistic inference, collaborative filtering, Current problems in machine learning.

References:

1. Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995. ISBN: 9780198538646.
2. Duda, Richard, Peter Hart, and David Stork.Pattern Classification. 2nd ed. New York, NY: Wiley-Interscience, 2000. ISBN: 9780471056690.
3. Hastie, T., R. Tibshirani, and J. H. Friedman. The Elements of Statistical Learning: Data Mining, Inference and Prediction. New York, NY: Springer, 2001. ISBN:9780387952840.
4. MacKay, David. Information Theory, Inference, and Learning Algorithms. Cambridge, UK: Cambridge University Press, 2003. ISBN: 9780521642989. Available on-line here.
5. Mitchell, Tom. Machine Learning. New York, NY: McGraw-Hill, 1997. ISBN:9780070428072.
6. http://swayam.gov.in/
7. http://edx.org formerly http://mooc.org
8. http://epgp.inflibnet.ac.in/

OLMCA – 505P: Programming Laboratory - V

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 20 Marks

End Term: 80 Marks

Practical will be based on:

- Practical Exercises on System Programming concepts and Assembly Language.
- Working knowledge of distributed version control system Git.

OLMCA – 601P: Project

Max. Marks: 650 Marks

Internal Assessment: 130 Marks

End Term: 520 Marks

All the candidates of MCA final project are required to submit a project report based on the work done by him/her during the project period. A student will submit his/her project report in the prescribed format. A student has to submit: three hard copies of the project report, and a soft copy of project on CD/DVD in a thick envelope pasted inside of the back cover of the project report.

Prescribed outline for the project report

1. Title Page (*format as in Annexure -1*)
2. Declaration (*format as in Annexure -1*)
3. Certificate from the Project Guide on letter head of an organization (*format as in Annexure -1*)
4. Acknowledgement
5. Abstract
6. Index
7. List of Figures
8. List of Tables
9. List of acronyms and abbreviations
10. Introduction to the project
11. Statement of the Problem
12. Theoretical Background / Literature review
13. Research Work
14. Limitations of the project
15. Conclusions and Future Work
16. References
17. Annexures (optional)

Formatting Instructions:

Margins: Left margin -1.3-inch, Right margin-1-inch, Top margin: 1 inch, Bottom margin: 1-inch Page numbers – All pages should be numbered at the bottom center of the pages.

Normal Body Text: Font Size: 12, Times New Roman, 1.5 Spacing, Justified. 6 point above and below paragraph spacing.

Section Heading: Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.

Chapter Heading: Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing.

Figure and Table Captions: Font Size: 12, Times New Roman, centred.

Coding Font: size :10, Courier New, Normal

Good quality white paper A4 size should be used for typing and duplication.

Annexure – I

DECLARATION

The work embodied in this project entitled "Name of your project" submitted to the Directorate of Open & Distance Learning, Guru Nanak Dev University, Amritsar, for the award of degree of Master of Computer Application has been done by me. The project report is entirely based on my own work and not submitted elsewhere for the award of any other degree. All ideas and references have been duly acknowledged.

Name & Signature of the Candidate
Date

CERTIFICATE

This is to certify that this project entitled, "Name of the project", submitted to the Directorate of Open & Distance Learning, Guru Nanak Dev University, Amritsar, for the degree of Master of Computer Application was carried out by Mr./Ms._____ Roll No. _____ is an authentic work carried out by him/her at _____ under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Supervisor
Dated:

Title of the Project Report
(Times New Roman, Font size = 24)

Project Report
(Times New Roman, Font Size= 16)

Submitted to the Directorate of Open & Distance Learning
for the partial fulfilment of the requirements of
Master of Computer Applications
(Times New Roman, Font Size= 14)

Supervised by:
Name of Supervisor

Submitted by:
Name and Roll no. of Student

(Times New Roman, Font Size= 14)

University LOGO
Directorate of Open & Distance Learning
Guru Nanak Dev University
Amritsar- 143005
India
Month, Year
(Times New Roman, Font Size= 16)