(Annexure A-1)

FACULTY OF COMPUTER SCIENCE & IT

SYLLABUS

of

Master of Science (Computer Science)
(Semester I-II)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2023-24
Batch: 2023-25

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR (Autonomous)

Program Specific Outcomes

Master of Science (Computer Science)

(Session 2023-24)

After completing this programme, the students will be able to:

PSO1: Showcase their skillset to apply in the field of IT, academics and other competitive examinations.

PSO2: Comprehend the implementation logic behind the architecture of computers.

PSO3: Apply skills to provide IT based solutions for real world problems through development of software and websites.

PSO4: Contextualize and analyse the problems in hand to work for an IT based solution.

PSO4: Apply principles and techniques from the selective areas to develop special expertise.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

Master of Science (Computer Science)

Credit Based Continuous Evaluation Grading System (CBCEGS)

(Session 2023-24)

Master of Science (Computer Science) Semester - I										
Course Code	**Course Title**	**Course Type**	**Hours per week**	**Credit**		**Marks**				**Examination Time (in Hours)**
			L-T-P	**L-T-P**	**Total**	**Total**	**Ext.**		**CA**	
							L	**P**		
MCSL-1111	Advanced Data Structures	C	3-1-0	3-1-0	4	100	80	-	20	3
MCSL-1112	Advanced Computer Architecture	C	3-1-0	3-1-0	4	100	80	-	20	3
MCSL-1113	Network Security Practices	C	3-1-0	3-1-0	4	100	80	-	20	3
MCSL-1114	Discrete Structures	C	3-1-0	3-1-0	4	100	80	-	20	3
MCSL-1115	Artificial Intelligence	C	4-0-0	4-0-0	4	100	80	-	20	3
MCSP-1116	Lab on Advanced Data Structures	C	0-0-4	0-0-2	2	50	-	40	10	3
	****** Student can opt any one of the following Interdisciplinary courses	IDE			4	100	80		20	3
	Total				22	550				

**** List of Interdisciplinary Courses as per student's own choice and decision (Not compulsory):**

Option 1 - Effective Communication Skills (IDEC-1101)
Option 2 –Basics of Music (Vocal) (IDEM-1362)
Option 3 - Human Rights and Constitutional Duties (IDEH-1313)
Option 4 - Indian Heritage: Contribution to the world (IDEW-1275)

Note: C – Compulsory, IDE-Interdisciplinary Elective Courses

****Grade points of these courses will not be included in the SGPA/CGPA of Semester/ Programme.**

NOTE: The ID Course opted in Semester I, can't be opted in Semester III

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

Master of Science (Computer Science)

Credit Based Continuous Evaluation Grading System (CBCEGS)

(Session 2023-24)

Master of Science (Computer Science) Semester - II										
Course Code	**Course Title**	**Course Type**	**Hours per week**	**Credit**		**Marks**				**Examination Time (in Hours)**
			L-T-P	**L-T-P**	**Total**	**Total**	**Ext.**		**CA**	
							L	**P**		
MCSL-2111	Theory of Computation	C	3-1-0	3-1-0	4	100	80	-	20	3
MCSL-2112	Image Processing	C	3-1-0	3-1-0	4	100	80	-	20	3
MCSL-2113	Advanced Programming Concepts	C	4-0-0	4-0-0	4	100	80	-	20	3
MCSL-2114	Cloud Computing	C	4-0-0	4-0-0	4	100	80	-	20	3
MCSL-2115	Distributed Database Systems	C	3-1-0	3-1-0	4	100	80	-	20	3
MCSP-2116	Lab on Advanced Programming Concepts	C	0-0-4	0-0-2	2	50	-	40	10	3
	Total				22	550				

Note:

C - Compulsory

Master of Science (Computer Science) Semester – I

(Session 2023-24)
COURSE CODE: MCSL-1111
ADVANCED DATA STRUCTURES

Course Outcomes:

After passing this course the student will be able to:

CO1: Design, analyze and implement algorithms and check their performances against specified parameters.
CO2: Comprehend and implement operations on heaps and queue.
CO3: Understand the necessary mathematical abstraction to solve different data structure problems.
CO4: Implement various searching, sorting and hashing algorithms.

Master of Science (Computer Science) Semester – I

(Session 2023-24)
COURSE CODE: MCSL - 1111
ADVANCED DATA STRUCTURES

L-T-P: 3-1-0 **Max. Marks: 100**
Credits: 4
Examination Time: 3 Hours **Theory: 80**
CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Review of algorithm analysis, Binary search trees, balanced binary search trees (red-black trees), Btrees, AVL Trees, 2-3 trees, 2-3-4 trees.

UNIT-II

Binary heaps, heap operations, implementation and applications. Priority queue operations, and double-ended, priority queues.

UNIT-III

Binomial heaps, Fibonacci heaps. Data structures for disjoint sets.

Amortized analysis, string matching, and graph algorithms.

UNIT-IV

External data structures - external storage, external files, external sorting searching indexing files, external hashing.

References / Textbooks:

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Data Structures and Algorithms, Addision Wesley, 1985.

2. Dinesh P. Mehta, Sartaj Sahni, Handbook of Data Structures and Applications, Chapman & Hall/CRC, 2018.

3. Jean-Paul Tremblay, Paul Sorenson, An Introduction to Data Structures with Applications, McGraw Hill Education, 2017.

4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, MIT Press, 2009.
5. Peter Brass, Advanced Data Structure, Cambridge University Press, 2008.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – I

(Session 2023-24)

COURSE CODE: MCSL-1112
ADVANCED COMPUTER ARCHITECTURE

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend paradigms and various kind of classifications of computing.

CO2: Gain knowledge of parallel computing models.

CO3: comprehend various architectural classifications of computers on the basis of data processing schemes.

CO4: Analyse pipelined architecture against parameters like throughput, speedup, efficiency, etc.

Master of Science (Computer Science) Semester – I

(Session 2023-24)

COURSE CODE: MCSL-1112
ADVANCED COMPUTER ARCHITECTURE

L-T-P: 3-1-0 **Max. Marks: 100**
Credits: 4
Examination Time: 3 Hours **Theory: 80**
CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Paradigms of Computing: Synchronous – Vector/Array, SIMD, Systolic

Asynchronous – MIMD, reduction Paradigm, Hardware taxonomy: Flynn's classification, Software taxonomy: Kung's taxonomy, SPMD.

UNIT-II

Parallel Computing Models

Parallelism in Uniprocessor Systems: Trends in parallel processing, Basic Uniprocessor Architecture, Parallel Processing Mechanism.

UNIT-III

Parallel Computer Structures: Pipeline Computers, Array Computers, Multiprocessor Systems

Architectural Classification Schemes: Multiplicity of Instruction-Data Streams, Serial versus Parallel Processing, Parallelism versus Pipelining.

UNIT-IV

Pipelining: An overlapped Parallelism, Principles of Linear Pipelining, Classification of Pipeline Processors, General Pipelines and Reservation Tables.

Principles of Designing Pipelined Processors: Instruction Prefetch and Branch Handling, Data Buffering and Busing Structure, Internal Forwarding and Register tagging, Hazard Detection and Resolution.

References / Textbooks:

1. Kai Hwang, Faye A. Briggs, Computer Architecture and Parallel Processing, McGraw-Hill International Editions, 1985.
2. John D. Carpinelli, Computer Systems Organization & Architecture, Addison Wesley, 2001.
3. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability and Programmability, McGraw-Hill, International Edition, 1993.
4. T. J. Fountain, D Sima , Peter Kacsuk, Advanced Computer Architectures: A Design Space Approach, Addison-Wesley, 1997.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – I

(Session 2023-24)

COURSE CODE: MCSL-1113
NETWORK SECURITY PRACTICES

Course Outcomes:

After passing course the student will be able to:

CO1: Understand basics of cryptography, network security, services, mechanisms and defining various terms as vulnerability, threat and attack.

CO2: Comprehend the application of various private and public cryptography techniques.

CO3: Have understanding of data integrity, authentication, digital signatures and hash functions.

CO4: Understand various network security concepts as IPSec, Web security, PGP, Email security.

Master of Science (Computer Science) Semester – I

(Session 2023-24)

COURSE CODE: MCSL-1113
NETWORK SECURITY PRACTICES

L-T-P: 3-1-0 **Max. Marks: 100**

Credits: 4

Examination Time: 3 Hours **Theory: 80**

CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT -I

Introduction: Overview, Security attacks (Interruption, Interception, Modification and Fabrication) and services (confidentiality, authentication, integrity, non–repudiation, access control and availability), types of attacks, model for network security, CAINA Properties.

Classical and Modern Cryptography Techniques: Conventional encryption model, classical encryption techniques, Simplified DES, Principles of Block ciphers, DES and its strength.

UNIT -II

Classical and Modern Cryptography Techniques: Triple DES, Blowfish, CAST – 128, linear and differential cryptanalysis, steganography.

Confidentiality: Traffic confidentiality and random number generation.

Public Key Encryption Methods: Principles, RSA Algorithm, Diffie– Hellman key exchange, Elliptic curve cryptography.

UNIT -III

Hash functions: Applications of Hash Functions, Two Simple Hash Functions, Requirements and Security, SHA.

Message Authentication Codes: Requirements, Functions, Requirements of Message Authentication codes, Security of MACs, MACs based on HMAC, MACs based on Block Ciphers: DAA and CMAC.

Digital Signatures: Basics, Digital signature standard.

UNIT -IV

Key Management and Distribution: Symmetric Key Distribution using Symmetric Encryption, Symmetric Key Distribution using Asymmetric Encryption, X.509 Certificates, Distribution of Public Keys, PKI.

Other Securities:

Transport Level Security: Web Security Considerations.

Electronic Mail security: Pretty Good Privacy.

IP Security: IP Security Overview and Policy, ESP, Combining security Associations.

References / Textbooks:

1. William Stallings, Cryptography and Network Security: Principles and Practice, Pearson Education, 2017.
2. William Stallings, Network Security Essentials: Applications and Standards, Pearson Education, 2014.
3. Atul Kahate, Cryptography and Network Security, Tata McGraw-Hill Publishing Company Limited, 2013.
4. Bruce Schneier, Applied Cryptography: Protocols, Algorithms and Source Code in C, Wiley Publications, 2007.
5. V. K. Pachghare, Cryptography and Information Security Paperback, PHI Publications, 2015.
6. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2008.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – I

(Session 2023-24)

COURSE CODE: MCSL - 1114
DISCRETE STRUCTURES

Course Outcomes:

After passing course the student will be able to:

CO1: Understand and construct simple mathematical proofs of important principles like Pigeonhole principle, Inclusion-Exclusion Principle.
CO2: Comprehend advanced data structures like Graphs and Trees along with their associated operations.
CO3: Apply skills to solve problems on elementary counting techniques, factorials and recurrence relations.
CO4: Comprehend various combinatorial structures and Boolean Algebra.

Master of Science (Computer Science) Semester – I

(Session 2023-24)

COURSE CODE: MCSL-1114
DISCRETE STRUCTURES

L-T-P: 3-1-0 **Max. Marks: 100**

Credits: 4

Examination Time: 3 Hours **Theory: 80**

CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Sets and Functions:

Sets, Relations, Functions, Pigeonhole principle, Inclusion – Exclusion Principle, Equivalence and Partial orderings, Elementary counting techniques, relation of partial order partitions, binary relations.

UNIT-II

Graph Theory:

Definition, Walks, Paths, Directed and Undirected graphs, connected graphs, regular and bipartite graphs, Eulerian chains and cycles. Hamiltonian chains and cycles, planar graphs, Trees and rooted tree, Spanning trees, Chromatic number Connectivity and other graphical parameter application.

UNIT-III

Combinatorial Mathematics:

Basic counting principles Permutations and combinations, Recurrence relations, generating Function, Application.

UNIT-IV

Rings and Boolean algebra: Rings Subrings morphism of rings ideals and quotient rings. Euclidean domains Integral domains and fields Boolean Algebra direct product morphisms Application of Boolean algebra in logic circuits and switching functions.

References / Textbooks:

1. Ehrig, H., Mahr, B., Fundamentals of Algebraic Specification I, EATCS Monographs on Theory. Comp. Sc. Vol. 6 spinger, Berlin 1985.
2. Gersting J., Mathematical Structures for Computer Science, W.H. Freman, New York, 1987.

3. Gibons, A., Algorithmic Graph theory, Cambridge University Press, 1985.
4. Knuth, D.E., The art of Computer Programming Vol. I: Fundamental Algorithms, Reading, Mas, Adison Wesley 1973.
5. Kolman B., Busby R., Discrete Mathematical Structures for Computer Science, Prentice Hall Englewod Cliffs, 1984.
6. Sahni, S., Concepts in Discrete Mathematics Fridley MN., Camelot Publ. Comp., 1981.
7. Schmidt G.,Strohlein T., Relations Graphs Program, EATS Monograph on Theor.Comp.Sc.Vol.29, Berlin Spinger 1993.
8. Wheler W., Universal Algebra for Computer Scientist, EATCS Monographs on Theor.Comp.Sc.Vol.25 Spinger-Verlag, Berlin 1992.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – I

(Session 2023-24)

COURSE CODE: MCSL-1115
ARTIFICIAL INTELLIGENCE

Course Outcomes:

After passing course the student will be able to:

CO1: Understand various search strategies used in AI for finding solution to a problem.
CO2: Gain knowledge of propositional and predicate logic.
CO3: Represent planning in AI in different scenarios.
CO4: Understand basics of fuzzy logic, learning in AI and neural network.

Master of Science (Computer Science) Semester – I

(Session 2023-24)
COURSE CODE: MCSL-1115
ARTIFICIAL INTELLIGENCE

L-T-P: 4-0-0 **Max. Marks: 100**
Credits: 4
Examination Time: 3 Hours **Theory: 80**
CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction- What is intelligence, Foundations of Artificial Intelligence (AI), History of AI Problem Solving- Formulating problems, problem types, states and operators, state space, search strategies.

Uninformed Search Strategies – BFS, DFS, UCS, Depth Limited Search, Iterative Deepening Search, Bi-directional Search. Informed Search Strategies- Best first search, A* algorithm, heuristic functions, Iterative deepening A*(IDA), small memory A*(SMA*).

UNIT-II

Game playing - Perfect decision game, Imperfect decision game, Evaluation function, Alpha-Beta Pruning.
Reasoning- Representation, Inference, Propositional Logic, Predicate Logic (First Order Logic), logical reasoning, forward chaining, backward chaining.

UNIT-III

Planning- Basic representation of plans, partial order planning, planning in the blocks world, Hierarchical planning, Conditional planning, representation of resource constraints, measures, temporal constraints.

Uncertainty - Basic probability, Baye's rule, Belief networks, Default reasoning, Fuzzy sets and Fuzzy logic.

UNIT-IV

Inductive Learning - decision trees, rule based learning, current-best-hypothesis search, least commitment search, neural networks, reinforcement learning, genetic algorithms, Other learning methods - Neural Networks, Re-enforcement learning, Genetic algorithms, Communication among agents.

References / Textbooks:

1. Stuart J. Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson India Education Services Pvt. Ltd., 2015.
2. Kevin Knight, Elaine Rich, B. Nair, Artificial Intelligence, McGraw Hill, 2008.
3. George F. Luger, Artificial Intelligence, Pearson Education, 2001.
4. Nils J. Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kauffman, 2002.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – I

(Session 2023-24)

COURSE CODE: MCSP - 1116
LAB ON ADVANCED DATA STRUCTURES

L-T-P: 0-0-2 **Max. Marks: 50**

Credits: 2

Examination Time: 3 Hours **Practical: 40**

CA:10

Programs based on Advanced Data Structures.

Master of Science (Computer Science) Semester – II

(Session 2023-24)
COURSE CODE: MCSL-2111
THEORY OF COMPUTATION

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend various grammars in Chomsky hierarchy and their closure properties.
CO2: Define production rules for Context Free Grammar (CFG), Convert CFG into Chomsky and Greibach Normal Form.
CO3: Apply Pumping Lemma to find to identify membership of a language.
CO4: Construct computing machines like Finite Automata, Pushdown Automata, Turing machine, etc.

Master of Science (Computer Science) Semester – II

(Session 2023-24)

COURSE CODE: MCSL-2111

THEORY OF COMPUTATION

L-T-P: 3-1-0 **Max. Marks: 100**

Credits: 4

Examination Time: 3 Hours **Theory: 80**

CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Chomsky Hierarchy, regular expressions, Operations on Regular Sets, Regular grammars, Linear Grammar, equivalence of Regular Grammars, properties of regular languages, pumping lemma, Closure properties.

UNIT-II

Finite Automata – DFA, transition graphs, non-deterministic FA, equivalence of DFA and NDFA, Minimization of NFA, ε-NFA and its conversion into NFA, Mealy and Moore Machines.

Context Free Languages – Leftmost and rightmost derivation, parsing and ambiguity, Chomsky normal form, Greibach Normal form.

UNIT-III

Pushdown Automata – NDPDA, DPDA, context free languages and PDA, comparison of deterministic and non-deterministic versions, closure properties, pumping lemma for CFL

Context Sensitive Languages, Variations, Linear Bounded Automata, Closure Properties, The Kuroda Normal Form, One sided Context Sensitive Grammars.

UNIT-IV

Turing Machines, variations, halting problem, Post Correspondence Problem (PCP)

Properties of LL(k) and LR(k) grammars, Decidability, Recursive and Recursively Enumerable Languages, Closure properties.

References / Textbooks:

1. K.L.P. Mishra and N. Chandrasekaran, “Theory of Computer Science, Third Edition”, PHI Learning Private Limited, 2011.
2. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, “Introduction to Automata Theory”,Languages and Computation, Pearson Education.
3. M. Sipser, “Introduction to the Theory of Computation”, Second Edition, Cengage Learning.
4. K. V. N. Sunitha , N. Kalyani, “Formal Languages and Automata Theory”, McGraw-Hill, 2010.
5. Stephen Wolfram, “Theory and Applications of Cellular Automata”, World Scientific, 1986.
6. G.E. Revesz, “Introduction to Formal Languages”, Dover Publications, 1991.
7. M. A. Harrison, “Introduction to Formal Language Theory”, Addison-Wesley, 1978.
8. R.K. Shukla,” Theory of Computation”, Cengage Learning.
9. Peter Linz, An Introduction to Formal Languages and Automata, Third Edition, Narosa Publishers, 1998.

Master of Science (Computer Science) Semester – II

(Session 2023-24)

COURSE CODE: MCSL-2112

IMAGE PROCESSING

Course Outcomes:

After passing this course the student will be able to:

CO1: Identify current applications in the field of digital image processing along with its basics.
CO2: Comprehend fundamental concepts of Digital Image Processing like human visual system model, image signal representation, imaging system specification
CO3: Identify basic image processing operations.
CO4: Comprehend various colour models and colour image processing techniques.

Master of Science (Computer Science) Semester – II

(Session 2023-24)

COURSE CODE: MCSL-2112

IMAGE PROCESSING

L-T-P: 3-1-0 **Max. Marks: 100**

Credits: 4

Examination Time: 3 Hours **Theory: 80**

CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Background: Introduction to electronic systems for image transmission and storage, computer processing and recognition of pictorial data, overview of practical applications.

UNIT-II

Fundamentals: Mathematical and perceptual preliminaries, human visual system model, image signal representation, imaging system specification building image quality, role of computers, image data formats.

UNIT-III

Image Processing Techniques: Image enhancement, image restoration, image data compression and statistical pattern recognition.

Applications of Image Processing: Picture data archival, machine vision, medical image processing.

UNIT-IV

Techniques of Colour Image Processing: Colour image signal representation, colour system transformations, extension of processing techniques to colour domain.

References / Textbooks:

1. Pratt, W.K. Digital Image Processing, John Wiley, N.Y./1978.
2. Rosenfield, A and Kak, A.C., Picture processing, Academic Press N.Y., 1982.

3. Jain, A.K., Fundamentals of Digital Image Processing, Englewood Cliffs, Prentice Hall, 1989.
4. Chris Soloman, Stuart Gibson, Fundamentals of Digital Image Processing: A Practical Approach using MatLab, John Wiley and Sons, 2007.
5. Gonzalez and Woods, Digital Image Processing, Addison Wesley, 2000.
6. Jayaraman S, Veerakumar T, Esakkirajan S, Digital Image Processing, Tata McGraw Hill Education (2017), 1st Edition

Master of Science (Computer Science) Semester – II

(Session 2023-24)

COURSE CODE: MCSL-2113
ADVANED PROGRAMMING CONCEPTS

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend fundamentals of Java programming.
CO2: Apply OOPs concepts to model real world problems for its simplified implementation.
CO3: Identify the utilization of Applets and multithreading.
CO4: Work with Graphical User Interface through Swings and Event handling.

Master of Science (Computer Science) Semester – II

(Session 2023-24)

COURSE CODE: MCSL-2113
ADVANED PROGRAMMING CONCEPTS

L-T-P: 4-0-0 **Max. Marks: 100**

Credits: 4

Examination Time: 3 Hours **Theory: 80**

CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction to Advanced Programming using Java Fundamentals: Features, Objects Oriented Basis, Character Set, Operators, Data Types, Control Structures

UNIT-II

Classes, Inheritance, Polymorphism, Packages & Interfaces, Exception Handling

UNIT-III

Multithreading: Java Thread model, Thread Priorities, Synchronization, Interthread communication.

Applet: Applet basics, Applet architecture, Applet: Display, Repaint, Parameter Passing

UNIT-IV

Swings: Window Fundamentals, Working with JFrame Windows, Graphics, Controls, Color and Fonts.

Events Handling: The Delegation Event Model, Event Classes, Event Listener Interfaces.

References / Textbooks:

1. Herbet Schildt & Naughton, Complete Reference: Java, Tata Mc Graw Hill Education, 5th Edition, 2006.
2. Jane Jawoske, Java Unleashed, SAM5, Tech Me dia 2006.

3. Java 8 Programming Black Book, D.T. Editorial Services, 2015.
4. E Balagurusamy, Programming with Java – A Primer,McGraw Hill Education, 2017.
5. Kathy Sierra and Bert Bates, Head First Java, O'Reilly Publications, 2nd Edition.
6. Herbert Schildt, Java – A Beginner's Guide, Oracle Press, 7th Edition.

Master of Science (Computer Science) Semester – II

(Session 2023-24)

COURSE CODE: MCSL – 2114

CLOUD COMPUTING

Course Outcomes:

After passing this course the student will be able to:

CO1: Articulate the main concepts, key technologies, strengths and limitations of Cloud computing.
CO2: Identify the architecture and infrastructure of various Cloud services and deployment models.
CO3: Identify the application of programming and security model in cloud computing.
CO4: Comprehend various advance topics in the field of cloud computing.

Master of Science (Computer Science) Semester – II

(Session 2023-24)

COURSE CODE: MCSL – 2114

CLOUD COMPUTING

L-T-P: 4-0-0 **Max. Marks: 100**

Credits: 4

Examination Time: 3 Hours **Theory: 80**

CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

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

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

UNIT-II

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

UNIT-III

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

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

UNIT-IV

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

Reference / Textbooks:

1. Rajkumar Buyya, Christian Vecchiola and Thamarai Selvi, Mastering Cloud Computing: Foundation and Application Programming, Tata McGraw Hill, ISBN–13: 978–1–25–902995–0, New Delhi, India, Feb 2013.
2. Tim Mather, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy, O'Reilly, ISBN–13: 978–8–18–404815–5.
3. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., ISBN–13: 978–8–12–652980–3, New Delhi, India, 2011.
4. 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.
5. 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.

Master of Science (Computer Science) Semester – II

(Session 2023-24)
COURSE CODE: MCSL-2115
DISTRIBUTED DATABASE SYSTEMS

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend different kind of distributed databases, data fragmentation and involved transparencies.
CO2: Translate global queries into fragment queries by following different equivalence transformation rules for queries.
CO3: Comprehend query optimization along with management of distributed transaction and recovery mechanisms.
CO4: Identify deadlock situations along with application of concurrency control and reliability mechanisms to prevent deadlocks.

Master of Science (Computer Science) Semester – II

(Session 2023-24)

COURSE CODE: MCSL-2115

DISTRIBUTED DATABASE SYSTEMS

L-T-P: 3-1-0 **Max. Marks: 100**

Credits: 4

Examination Time: 3 Hours **Theory: 80**

CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction to distributed databases, comparison of distributed and centralized systems, DDBMS, global relations, fragment and physical image, types of schemas, methods of fragmentation of a relation, levels of transparency in a distributed system, integrity constraints.

UNIT-II

Representation of database operation in form of a query, operation in form of a query, operations on a query, unary and binary tree in a query, converting a global query into fragment query, join and union operations involving a query, aggregate functions, and parametric queries.

UNIT-III

Introduction to query optimization, estimation of profiles of algebraic operations, optimization graphs, reduction of relation using semi-join and join operation.

Properties and goals of transaction management, distributed transactions, recovery mechanism in case of transaction failures, log based recovery, check pointing, and communication and site failures in case of a transaction and methods to handle them, serializability and timestamp in distributed databases.

UNIT-IV

Introduction to distributed deadlocks, local and global wait for graphs, deadlock detection using centralized and hierarchical controllers, prevention of deadlocks, 2 and 3 phase locking and commitment protocols, reliability in commitment and locking protocols, reliability and concurrency control, reliability and removal of inconsistency.

Distributed database administration, authorization and protection in distributed databases, distributed database design, heterogeneous database system.

References / Textbooks:

1. Stefano Ceri and Guiseppe Pelagatti, Distributed Databases Principles and Systems, McGraw-Hill International Editions, 2004.
2. David Bell, Jame Grimson, Distributed Database Systems, Addison-Wesley, 1992.
3. M. Tamer Ozsu, Patrick Valdureiz, Principles of Distributed Database Systems, Prentice Hall, 2002, 2nd Edition.
4. Romez Elmasri, Shamkant B. Navathe, 'Fundamentals of Database Systems' Pearson Education, 2005.
5. Silberschatz, Korth, Sudershan, Database System Concept, 4th Ed. McGraw Hill, 2006.
6. Connolly &Begg "Database Systems – A practical approach to Design, Implementation and Management, 3rd Ed. Pearson Education, 2005.

Master of Science (Computer Science) Semester – II

(Session 2023-24)

COURSE CODE: MCSP-2116

LAB ON ADVANCED PROGRAMMING CONCEPTS

L-T-P: 0-0-2 **Max. Marks: 50**

Credits: 2

Examination Time: 3 Hours **Practical: 40**

CA:10

Implementations based on advanced programming concepts.