FACULTY OF COMPUTER SCIENCE & IT

SYLLABUS

of

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

(Under Continuous Evaluation System)

Session: 2021-22

The Heritage Institution

KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)

Program Specific Outcomes

Master of Science (Computer Science)

(Session 2021-22)

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 analyze 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)

Session 2021-22

Master of Science (Computer Science) Semester - I							
COURSE CODE	**COURSE NAME**	**COURSE TYPE**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
MCSL-1111	Advanced Data Structures	C	100	80	-	20	3
MCSL-1112	Advanced Computer Architecture	C	100	80	-	20	3
MCSL-1113	Network Security Practices	C	100	80	-	20	3
MCSL-1114	Discrete Structures	C	100	80	-	20	3
MCSL-1115	Artificial Intelligence	C	100	80	-	20	3
MCSP-1116	Lab on Advanced Data Structures	C	100	-	80	20	3
		Total	600				

Note:

C - Compulsory

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

Master of Science (Computer Science)

Session 2021-22

Master of Science (Computer Science) Semester – II							
COURSE CODE	**COURSE NAME**	**COURSE TYPE**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
MCSL-2111	Theory of Computation	C	100	80	-	20	3
MCSL-2112	Image Processing	C	100	80	-	20	3
MCSL-2113	Advanced Programming Concepts	C	100	80	-	20	3
MCSL-2114	Cloud Computing	C	100	80	-	20	3
MCSL-2115	Distributed Database Systems	C	100	80	-	20	3
MCSP-2116	Lab on Advanced Programming Concepts	C	100	-	80	20	3
		Total	600				

Note:

C - Compulsory

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

Master of Science (Computer Science)

Session 2021-22

Master of Science (Computer Science) Semester – III							
COURSE CODE	**COURSE NAME**	**COURSE TYPE**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
MCSL-3111	Data Mining and Data Warehousing	C	100	80	-	20	3
MCSL-3112	System Software	C	100	80	-	20	3
MCSL-3113	Advanced Web Technologies	C	100	80	-	20	3
MCSL-3114	Design and Analysis of Algorithms	C	100	80	-	20	3
MCSL-3115	Software Testing	C	100	80	-	20	3
MCSP-3116	Lab on Advanced Web Technologies	C	100	-	80	20	3
	Total		600				

Note:

C - Compulsory

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

Master of Science (Computer Science)

Session 2021-22

Master of Science (Computer Science) Semester – IV							
COURSE CODE	**COURSE NAME**	**COURSE TYPE**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
MCSL-4111	Advanced Software Engineering	C	100	80	-	20	3
MCSL-4112	Microprocessor and Its Applications	C	100	80	-	20	3
MCSL-4113	Foundation of Statistical Computing	C	100	80	-	20	3
MCSP-4114	Lab on Foundation of Statistical Computing	C	100	-	80	20	3
MCSD-4115	Project Work	C	200	-	160	40	6
	Total		600				

Note:

C - Compulsory

Master of Science (Computer Science) Semester – I

(Session 2021-22)
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: Understand the necessary mathematical abstraction to solve different data structure problems.

CO3: Devise various algorithms for real world problems involving data structures.

Master of Science (Computer Science) Semester – I

(Session 2021-22)
COURSE CODE: MCSL - 1111
ADVANCED DATA STRUCTURES

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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 2021-22)

COURSE CODE: MCSL-1112

ADVANCED COMPUTER ARCHITECTURE

Course Outcomes:

After passing this course the student will be able to:

CO1: Have broad knowledge of computer architecture and paradigms of computer system.

CO2: Gain knowledge of parallel computing models and parallel computer structures.

CO3: Understand the concepts of pipelining and multiprocessors.

Master of Science (Computer Science) Semester – I

(Session 2021-22)

COURSE CODE: MCSL-1112
ADVANCED COMPUTER ARCHITECTURE

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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 2021-22)

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: Identify and classify particular examples of attacks, differentiating between Symmetrical and Asymmetrical cryptography.

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 2021-22)

COURSE CODE: MCSL-1113

NETWORK SECURITY PRACTICES

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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.

1. 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 2021-22)

COURSE CODE: MCSL - 1114
DISCRETE STRUCTURES

Course Outcomes:

After passing course the student will be able to:

CO1: Develop the quantitative and mathematical skills required for continuous success in the field of Computer Science.

CO2: Understand and construct simple mathematical proofs of important principles like Pigeonhole principle, Inclusion-Exclusion Principle.

CO3: Get familiarize with data structures like Graphs and Trees.

CO4: Understand the basic and elementary counting techniques, factorials and recurrence relations.

Master of Science (Computer Science) Semester – I

(Session 2021-22)

COURSE CODE: MCSL-1114
DISCRETE STRUCTURES

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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 2021-22)

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 2021-22)
COURSE CODE: MCSL-1115
ARTIFICIAL INTELLIGENCE

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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 2021-22)

COURSE CODE: MCSP - 1116
LAB ON ADVANCED DATA STRUCTURES

Max. Marks: 100
Practical: 80
CA: 20

Examination Time: 3 Hrs

Programs based on Advanced Data Structures.

Master of Science (Computer Science) Semester – II

(Session 2021-22)
COURSE CODE: MCSL-2111
THEORY OF COMPUTATION

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend regular languages and its 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.

CO5: Comprehend closure properties associated with formal languages.

Master of Science (Computer Science) Semester – II

(Session 2021-22)

COURSE CODE: MCSL-2111

THEORY OF COMPUTATION

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs

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 2021-22)

COURSE CODE: MCSL-2112

IMAGE PROCESSING

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend fundamental concepts of Digital Image Processing like human visual system model, image signal representation, imaging system specification

CO2: Identify basic image processing operations.

CO3: identify current applications in the field of digital image processing.

CO4: Comprehend various color models and color image processing techniques.

Master of Science (Computer Science) Semester – II

(Session 2021-22)

COURSE CODE: MCSL-2112

IMAGE PROCESSING

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs

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 2021-22)

COURSE CODE: MCSL-2113
ADVANED PROGRAMMING CONCEPTS

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend Advanced Programming Concepts using Java programming.

CO2: Apply OOPs concepts to model real world problems for its simplified implementation.

CO3: Identify the utilization of packages, multithreading and Exception handling.

CO4: Demonstrate the concept of Applets, Swings and Events.

Master of Science (Computer Science) Semester – II

(Session 2021-22)

COURSE CODE: MCSL-2113
ADVANED PROGRAMMING CONCEPTS

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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, Java Virtual Machine, Character Set, Operators, Data Types, Control Structures

UNIT-II

Classes, Inheritance, Polymorphism, Packages & Interfaces, Stream IO Classes, Exception, Handling.

UNIT-III

Multithreading: Java Thread model, Thread Priorities, Synchronization, Interthread communication, Suspending, resuming & stopping thread.

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

UNIT-IV

Swings: Window Fundamentals, Working with JFrame Windows, Graphics, Controls, Colour 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 2021-22)

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 various issues related with Cloud computing and approaches corresponding to the solution of these issues.

CO4: Design prevalent solution corresponding to Cloud computing application.

CO5: Identify and apply new ideas and innovations in the field of Cloud computing.

Master of Science (Computer Science) Semester – II

(Session 2021-22)

COURSE CODE: MCSL – 2114

CLOUD COMPUTING

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs

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 ThamaraiSelvi, 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, ShahedLatif, 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 2021-22)
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 and involved transparencies.

CO2: Design distributed database by demonstrating the meaning of data fragmentation, various methods of data fragmentation and data allocation strategies.

CO3: Translate global queries into fragment queries by following different equivalence transformation rules for queries.

CO4: Solve query optimization problem.

CO5: Comprehend management of distributed transaction, concurrency control mechanisms and reliability protocols.

CO6: Identify the importance of security in distributed database management system.

Master of Science (Computer Science) Semester – II

(Session 2021-22)

COURSE CODE: MCSL-2115

DISTRIBUTED DATABASE SYSTEMS

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs

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 2021-22)

COURSE CODE: MCSP-2116

LAB ON ADVANCED PROGRAMMING CONCEPTS

Max. Marks: 100
Practical: 80
CA: 20

Examination Time: 3 Hrs

Implementations based on advanced programming concepts.

Master of Science (Computer Science) Semester – III

(Session 2021-22)

COURSE CODE: MCSL- 3111
DATA MINING AND DATA WAREHOUSING

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend the basic concepts of data mining and data warehousing, need of data mining and difference with ML.

CO2: Study and analyze architecture of data warehouse.

CO3: Identify various data mining techniques.

CO4: Have knowledge of various applications, trends and challenges of this field.

Master of Science (Computer Science) Semester – III

(Session 2021-22)

COURSE CODE: MCSL- 3111
DATA MINING AND DATA WAREHOUSING

Examination Time: 3 Hrs.

Max. Marks: 100
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

Data Mining: Introduction, Need of Data mining, Data mining Process, difference between DM & ML.

Data Pre-processing: Pre-processing the data, Data cleaning, data integration, data transformation, data reduction.

UNIT II

Data Warehousing: Concepts of Data Warehousing, difference between operational database systems and data warehousing, Need of a separate data warehouse.

From data Warehouse to Data Mining- OLAP and OLAM, Three Tier Data Warehouse Architecture.

UNIT III

Integration of Data Mining with DB/DW systems: DM Implementation Process, Knowledge discovery in database.

Data Mining Techniques: Classification, Clustering, Regression, Association Rules.

Clustering: Applications, Requirements, Clustering Methods.

UNIT IV

Applications, Trends and Challenges: Introduction to DMQL, Applications of Data Mining, Challenges in implementation of data mining, trends in Data Mining. Basic knowledge about useful data mining tools.

References / Textbooks:

1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, Morgan Kaufmann, 2012.
2. Alex Berson, Stephen J. Smith, Data Warehousing, Data Mining and OLAP, Tata McGraw 2008.
3. Silberschatz, Korth, Sudershan, Database System Concepts, McGraw Hill, 2002.
4. Thomas M. Connolly, Carolyn E. Begg, Database Systems: A Practical Approach to Design, Implementation and Management, Addison-Wesley, 2002.
5. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Addison Wesley, 2006.
6. Prateek Bhatia, Data Mining and Data Warehousing: Principles and Practical Techniques, Cambridge University Press,2019.

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

Master of Science (Computer Science) Semester – III

(Session 2021-22)

COURSE CODE: MCSL-3112

SYSTEM SOFTWARE

Course Outcomes:

After passing this course the student will be able to:

CO1: Study and analyze various components of system software like translators, loaders, interpreters, compilers, assemblers etc.

CO2: Understand different system software like OS, DBMS, text editors etc.

CO3: Target various applications areas of system software.

Master of Science (Computer Science) Semester – III

(Session 2021-22)
COURSE CODE: MCSL-3112
SYSTEM SOFTWARE

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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 System Software: Evolution of System Software, components of system software, Translators, loaders, interpreters, compiler, assemblers.

UNIT II

Assemblers: Overview of assembly process, design of one pass and two assemblers. **Macroprocessors:** Macro definition and expansion, concatenation of macro parameters, generations of unique labels, conditional macro expansion, Recursive macro expansion.

UNIT III

Compilers: Phases of compilation process, logical analysis, parsing, storage management optimisation. Incremental compilers, cross compilers, P code compilers.

UNIT IV

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

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

References / Textbooks:

1. Leland L. Beck, System Software: An introduction to System Programming, Addison Wesley, 1997.
2. D.M. Dhamdhere, Introduction to System Software, Tata McGraw Hill, 1986.

3. D.M. Dhamdhere, System Software and Operating Systems, Tata McGraw Hill Education, 1992.
4. Madrich, Stuart, Operating Systems, McGraw Hill, 1974.
5. Stern Nancy, Assembler Language Programming for IBM and IBM compatible computers, John Wiley, 1991.

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

Master of Science (Computer Science) Semester – III

(Session 2021-22)

COURSE CODE: MCSL-3113
ADVANCED WEB TECHNOLOGIES

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand fundamental concepts and theories of web designing using ASP.NET.

CO2: Study and analyze practical uses of different controls of ASP.NET.

CO3: Establish and study dynamic relationship of the language with standard databases.

CO4: Work on other core issues of website like cookies, caching and dependencies.

Master of Science (Computer Science) Semester – III

(Session 2021-22)

COURSE CODE: MCSL-3113

ADVANCED WEB TECHNOLOGIES

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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

Standard Controls: Display information, Accepting user input, Submitting form data, Displaying images, Using the panel control, Using the hyperlink control.

Validation Controls: Using the required field validator control, using the range validator control using the compare validator control, using the regular expression validator control, Using the custom validator control, Using the validation summary controls.

UNIT-II

Rich Controls: Accepting file uploads, Displaying a calendar, Displaying advertisement, Displaying different page views, Displaying a wizard.

Designing Website with Master Pages: Creating master pages, Modifying master page content, Loading master page dynamically.

SQL Data Source Control: Creating database connections, Executing database commands, Using ASP.NET parameters with the SQL data source controls, Programmatically executing SQL data source commands, Cashing database data with the SQL data Source controls.

UNIT-III

List Controls: Dropdown list control, Radio button list controls, list box controls, bulleted list controls, custom list controls.

Grid View Controls: Grid view control fundamentals, Using field with the grid view control, Working with grid view control events extending the grid view control.

UNIT-IV

Building Data Access Components with ADO.NET: Connected the data access, Disconnected data access, Executing a synchronous database commands, Building data base objects with the .NET framework.

Maintaining Application State: Using browser cookies, Using session state, Using profiles.

Caching Application Pages and Data: page output caching, partial page caching, data source caching, data caching, SQL cache dependences.

References / Textbooks:

1. Stephen Walther, ASP.NET 3.5, Pearson Education, 2005.
2. Matthew MacDonald, ASP.NET: The Complete Reference, McGraw-Hill/Osborne, 2002.
3. Imar Spaanjaars, Beginning ASP.NET 3.5, John Wiley & Sons, 2008.
4. Scott Millett, Professional ASP.NET Design Patterns, Wiley, 2010.
5. Glenn Johnson, Programming Microsoft® ADO.NET 2.0 Applications: Advanced Topics, WP Publishers & Distributors Pvt Limited, 2005.

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

Master of Science (Computer Science) Semester – III

(Session 2021-22)

COURSE CODE: MCSL-3114

DESIGN AND ANALYSIS OF ALGORITHMS

Course Outcomes:

After passing this course the student will be able to:

CO1: find an optimal solution to a practical problem.

CO2: understand various algorithm design techniques and their applications.

CO3: analyse and implement solutions to complex problems like placement of queens on chessboard, Knapsack, travelling salesman etc.

Master of Science (Computer Science) Semester – III

(Session 2021-22)

COURSE CODE: MCSL-3114

DESIGN AND ANALYSIS OF ALGORITHMS

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs

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: Concept of Algorithm, Algorithm Specification, Performance Analysis (Time and Space Complexities), Asymptotic Notations.
Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Quick Sort, Selection.

UNIT-II

Greedy Method: General Method, Knapsack Problem, Minimum Cost Spanning Trees (Prim's Algorithm, Kruskal's Algorithm) and Single-Source Shortest Path.

UNIT-III

Dynamic Programming: General Single Method, Multistage Graphs, All Pairs Shortest Paths, Single-Source Shortest Paths, Optimal Binary Search Tress, 0/1 Knapsack and Travelling Salesman Problem.

UNIT-IV

Backtracking: General Method, 4-Queens Problem, Graph Coloring and Hamiltonian Cycles.
Search and Traversal Technique: Techniques for Binary Trees, Techniques for Graphs.

References / Textbooks:

1. V. Aho, J.E. Hopcroft, J.D. Ullman, Design and Analysis of Algorithms, Addison Wesley, 1976.
2. Horowitz, S. Sahni, Fundamentals of Computer Algorithms, Galgotia Publishers, 1984.

3. K. Mehlhorn, Data Structures and Algorithms, Vols. 1 and 2, Springer Verlag, 1984.
4. Purdom, Jr. and C. A. Brown, The Analysis of Algorithms, Holt Rinechart and Winston, 1985.
5. D. E. Kunth, The Art of Computer Programming, Vols. I and 3, Addison Wesley, 1975.
6. Anany Levitin, Introduction to the Design & Analysis of Algorithms, Addison, Wesley, 2002.

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

Master of Science (Computer Science) Semester – III

(Session 2021-22)

COURSE CODE: MCSL-3115
SOFTWARE TESTING

Course Outcome:

After passing this course the student will be able to:

CO1: study fundamental concepts in software testing

CO2: discuss various software testing issues and solutions in software unit test, integration and system testing.

CO3: expose the advanced software testing topics, such as object-oriented software testing methods.

CO4: discuss about the functional and system testing methods.

Master of Science (Computer Science) Semester – III

(Session 2021-22)
COURSE CODE: MCSL-3115
SOFTWARE TESTING

Max. Marks:100
Examination Time: 3 Hrs. **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 Software Testing, The Tester's Role in a Software Development Organization, Origins of Defects, Cost of defects, Fundamentals of Test Process, General Principles of Testing, Test Metrics, Role of Testing in SDLC, Comparing Software and Hardware Testing, Verification and Validation.

UNIT - II

Introduction to Test cases, test case design, types of testing , Structural versus Functional Technique Categories, Static versus Dynamic Testing, Control flow & Data flow testing, Random Testing, Requirements based testing, Black Box Testing, White Box Testing.

UNIT - III

Modeling of Software, Object Oriented Modeling based on UML, Requirements and Specifications with Use Case Diagrams; Object Oriented Testing Issues, OO Testing Methodologies, Analysis and Design Testing, UML Based, Class Testing, Integration Testing.

UNIT - IV

GUI testing, Validation testing, Regression testing, Scenario testing, Advances in Software Testing Methods. Test Organization, Test Planning, Test Strategies, Test Prioritization, Debugging. Software test automation – skill needed for automation – scope of automation.

References / Textbooks:

1. Paul Jorgensen, Software Testing: A Craftsman's Approach, Auerbach Publications, 2013.
2. Rex Black, Erik van Veenendaal, Dorothy Graham, Foundations of Software Testing: ISTQB Certification, Cengage Publications, 2015.
3. Glenford J. Myers, The Art of Software Testing, Wiley, 2004.

4. Paul Ammann, Jeff Offutt, Introduction to Software Testing, Cambridge University Press, 2016.
5. Srinivasan Desikan, Ramesh Gopalaswamy, Software Testing: Principles and Practices, Pearson Publications, 2009.

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

Master of Science (Computer Science) Semester – III

(Session 2021-22)

COURSE CODE: MCSP- 3116
LAB ON ADVANCED WEB TECHNOLOGIES

Max. Marks: 100
Practical: 80
CA: 20

Examination Time: 3 Hrs.

Programming Laboratory on Advanced Web Technologies.

Master of Science (Computer Science) Semester – IV

(Session 2021-22)

COURSE CODE: MCSL-4111
ADVANCED SOFTWARE ENGINEERING

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend the process of software project planning and management.

CO2: Demonstrate software Re-use and Re-engineering.

CO3: Exemplify the process of Object Oriented Analysis and Design.

CO4: Comprehend classification and design of Object Oriented Metrics.

Master of Science (Computer Science) Semester – IV

(Session 2021-22)

COURSE CODE: MCSL-4111

ADVANCED SOFTWARE ENGINEERING

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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

Software Project Management: Fundamentals of Software project planning , Conventional Software Management, Evolution of Software Economics, Improvement of Software Economics, Comparison of old and modern ways of Software Management.

UNIT II

Software Re-engineering: Introduction Re-engineering, Restructuring and Reverse Engineering, Re-engineering existing systems, Data Re-engineering and migration, Software Reuse and Re-engineering.

UNIT III

Object-Oriented (OO) Measurements: Introduction, Why metrics ?, Classification of OO metrics, Study of Design Metrics- method size, method internals, class size, class inheritance, Method inheritance, class intervals and class externals.

UNIT IV

Object-Oriented Analysis and Design: What is Object-Oriented Design?, Object, Abstraction, Collaboration among Objects, Polymorphism, Classes, specifying State, Specifying Behaviour, Class Relationships, Grouping, Hiding.

Software Agents: Definition, Applications, Types and Classes, Multi-Agent systems, characteristics & Properties Agents.

References / Textbooks:

1. Hans-Bernd Kittlaus, Samuel A. Fricker, Software Product Management, Springer (2017), 1st Edition
2. Imran Ghani, Emerging Advancements and Technologies in Software Engineering, Idea Group (2014), 1st Edition
3. Ian Sommerville, Software Engineering, Pearson Education (2017), 10th Edition.
4. K.K. Aggarwal, Software Engineering, New Age (2008), 3rd Edition
5. Booch, Object Oriented Analysis and Design, Pearson Education India (2009), 3rd Edition.
6. John W. Satzinger, Object Oriented Analysis and Design, Cengage Learning (2007), 1st Edition.
7. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Mcgraw Hills 8th Edition.

Master of Science (Computer Science) Semester – IV

(Session 2021-22)

COURSE CODE: MCSL-4112
MICROPROCESSOR AND ITS APPLICATIONS

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend architecture of 8086 and 8088 microprocessors.

CO2: Demonstrate the working of 8086/8088 microprocessor for minimum and maximum mode.

CO3: Apply instruction set of 8086 microprocessor to perform basic operations.

CO4: Articulate Memory and I/O interfaces of 8086/8088 microprocessor.

CO5: Comprehend interrupts and its service.

Master of Science (Computer Science) Semester – IV

(Session 2021-22)

COURSE CODE: MCSL-4112
MICROPROCESSOR AND ITS APPLICATIONS

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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: Introduction to Microprocessor, General Architecture of Microcomputer System. Microprocessor Units, Input unit, Output unit, Memory unit and auxiliary storage unit.

UNIT-II

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

UNIT-III

Memory Interface of 8086/8088 Microprocessor: Address space and data organization, generating memory addresses hardware organization of memory address space, memory bus status code, memory control signals, read/write bus cycles, program and data storage memory, dynamic RAM system.

UNIT-IV

Input/Output Interface of the 8086/8088 Microprocessor: I/O interface, I/O address space and data transfer, I/O instructions, I/O bus cycles, Output ports, 8255A Programmable Peripheral Interface (PPI), Serial communication interface (USART and UART) – the RS- 232 C interface.

Interrupt Interface of 8086/8088 Microprocessor, Types of Interrupt, Interrupt Vector Table (IVT).

References / Textbooks:

1. Walter Triebel: The 8086 Microprocessor – Architecture, Software and Interfacing Techniques, PHI, Delhi.
2. Gangwar Tripathi, Microprocessor & its Applications, EXCEL Books (2010)
3. Douglas V. Hall: Microprocessors and Interfacing – Programming and Hardware, Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Ramesh Gaonkar, Microprocessor Architecture, Programming and Applications with 8085 6/e, Penram International Publishing (2013), 6th Edition
5. A Nagoorkani, 8086 Microprocessor & its Applications, McGraw Hill Education (2017), 2nd Edition
6. Singh Anokh and A.K. Chhabra, Fundamentals of Microprocessors and its Applications, S. Chand & Company (2010).
7. R. Theagarajan, Microprocessors and its applications, New Age Publishers (1997), 1st Edition

Master of Science (Computer Science) Semester – IV

(Session 2021-22)

COURSE CODE: MCSL-4113
FOUNDATION OF STASTISTICAL COMPUTING

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend basics of Statistical Computing and role of constructs like control statements, string functions, array, list, etc in R programming.

CO2: Create, operate and manage data frames.

CO3: Apply R programming from a statistical perspective.

CO4: Simulate various descriptive and analytical algorithms using R language.

Master of Science (Computer Science) Semester – IV

(Session 2021-22)

COURSE CODE: MCSL-4113
FOUNDATION OF STASTISTICAL COMPUTING

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

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

Statistical Computing: Introduction, Role of Programming and Statistical Software. Data Statistics: Sampling, Cumulative statistics, Statistics for Data frames, matrix objects and lists.

Introduction to R: Introduction to R, Help functions in R, Vectors, Common Vector Operations, Using all and any function, subletting of vector. Creating matrices, Matrix operations, Applying Functions to Matrix Rows and Columns, Adding and deleting rows and columns.

UNIT - II

Lists, Creating lists, general list operations, Accessing list components and values, applying functions to lists, recursive lists

Creating Data Frames: Matrix-like operations in frames , Merging Data Frames, Applying functions to Data frames, Factors and Tables , factors and levels , Common functions used with factors , string operations

UNIT - III

Input/ Ouput: scan() , readline() Function, Printing to the Screen Reading and writing CSV and text file. Control statements: Loops, Looping Over Nonvector, Sets, if-else , writing user defined function, scope of the variable, R script file.

UNIT - IV

Graphics in R: Graph Syntax ((title, xlabel, ylabel, pch, lty, col.), Simple graphics (Bar, Multiple Bar, Histogram, Pie, Box-Plot, Scatter plot, qqplot), Low-level and High-Level plot functions. Using Analytical Algorithms (KNN, K-means, Naive Bayes) for Predictive analysis and Modelling.

References / Textbooks:

1. Andrie de Vries and JorisMeys, R Programming for Dummies, Wiley (2016), 2nd Edition.
2. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (2017), 1st Edition.
3. Sandip Rakshit, Statistics with R Programming, McGraw Hill Education (2018), 1st Edition.
4. Garrett Grolemund, Hands on Programming with R, O'Reilly (2014), 1st Edition
5. Mark Gardener, Beginning R: The Statistical Programming Language, Wiley (2013)
6. Tilman M. Davies, The Book of R: A first Course in Programming and Statistics, No Strach Press (2016), 1st Edition

Master of Science (Computer Science) Semester – IV

(Session 2021-22)

COURSE CODE: MCSP-4114

LAB ON FOUNDATION OF STATISTICAL COMPUTING

Max. Marks: 100
Practical: 80
CA: 20

Examination Time: 3 Hrs.

Lab on Foundation of Statistical Computing.

Master of Science (Computer Science) Semester – IV

(Session 2021-22)

COURSE CODE: MCSD-4115

PROJECT WORK

Course Outcomes:

After passing course the student will be able to:

CO1: Apply the tools and techniques learnt to frame problems and their corresponding solutions.

CO2: Develop skills necessary to structure, manage and execute projects.

CO3: Demonstrate the skills to work as a member and as a leader of cohesive unit.

CO4: Develop presentation skills.

CO5: Perform documentation related to development of the project.

Master of Science (Computer Science) Semester – IV

(Session 2021-22)

COURSE CODE: MCSD-4115
PROJECT WORK

Max. Marks: 200
Practical: 160
CA: 40

Examination Time:6 Hrs.

1. Candidates have to submit only one hard copy and CD of documentation which shall be kept with the course supervisor/guide in the college only. Further, supervisor/guide OR principal of college shall forward two copies of DVD (Digital Versatile Disk) containing all the documentation files of the students (file name to be saved as Rollno_of_the_ student.pdf) to the concerned branch of the University. Covering letter (duly signed by the principal/Head of the college/institute) should contain the following information. Candidate name, Candidate Roll no, Project Title of the student and .pdf file name of his project documentation.

2. The assignment shall be evaluated by a board of three examiner (two (02) External examiners and one (01) internal examiner) as approved by the BOS.

3. The Project is to be submitted as per the common ordinances for P.G. courses under semester system.