Study & Evaluation Scheme

Of

Master of Technology
Computer Science & Engineering
[Applicable w.e.f. Academic Session 2011-12 till revised]

TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in

TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)

Delhi Road, Bagarpur, Moradabad (U.P)

Study & Evaluation Scheme
Master of Technology-Computer Science & Engineering
SUMMARY

Programme : M.Tech **(Computer Science & Engineering)**

Duration : Two years Regular (Four Semesters)

Medium : English

Minimum Required Attendance : 75 %

Credits :

Maximum Credits : **80**

Minimum credits required for Degree : **76**

Assessment (Theory Papers) :

Internal	External	Total
30	70	100

Internal Evaluation (Theory Papers) :

1st Class Test	2nd Class Test	3rd Class Test	Assignment (S)	Other Activity Including attendance	Total
Best two of the three class tests shall be considered					
10 Marks	10 Marks	10 Marks	5 Marks	5 Marks	30 Marks

Evaluation of Practicals/Seminars :

Internal	External	Total
50	50	100

Evaluation of Thesis :

Internal		External	Total
Guide	RC	50	100
25	25		

Duration of Examination :

External	Internal
3 hrs.	1 ½ hrs

To qualify the course a student is required to secure a minimum of 40 % marks in aggregate including the semester end examination and teachers continuous evaluation.(i.e. both internal and external).

A candidate who secures less than 40% marks in a course shall be deemed to have failed in that course. In case a student has secured more than 40% marks in each course, but less than 50% in aggregate in a semester, he/she shall re-appear in courses where the marks are less than 50% to achieve the required aggregate percentage of 50% in the semester. The student must secure the prescribed minimum credits to be eligible for the award of degree. However he/she must have appeared in all papers.

Question Paper Structure

1. The question paper shall consist of eight questions, out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weight age 4 marks each of them).
2. Out of the remaining seven questions, a student shall be required to attempt any five questions. There will be minimum one and maximum two questions from each unit of the syllabus. The weight age of Question No. 2 to 8 shall be 10 marks each.

Study and Evaluation Scheme
Course: M.Tech. (CSE)

SEMESTER I

S.N.	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCS101	Design and Analysis of Algorithms	3	2	-	4	30	70	100
2	MCS 102	Advanced Computer Architecture	3	2	-	4	30	70	100
3	MCS 104	Advanced Software Engineering	3	2	-	4	30	70	100
4	MCS 105	Advanced Database Management Systems	3	2	-	4	30	70	100
5	MCS 151	Design and Analysis of Algorithms Lab	-	-	4	2	50	50	100
		Total	**12**	**8**	**4**	**18**	**170**	**330**	**500**

SEMESTER II

S.N.	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCS 201	Data Warehousing and Mining	3	2	-	4	30	70	100
2	MCS 202	Advanced Computer Network	3	2	-	4	30	70	100
3	MCS 203	Network Security and Cryptography	3	2	0	4	30	70	100
Elective I (Select any one from MCS231, MCS 232 , MCS233)									
4	MCS 231	Pattern Recognition and Image Processing	3	2	-	4	30	70	100
	MCS 232	Neural Networks							
	MCS 233	Theory of Computation							
Elective II (Select any one from MCS234, MCS 235 , MCS236)									
5	MCS 234	Middleware Technologies	3	2	-	4	30	70	100
	MCS 235	Genetic Algorithms							
	MCS 236	Software Project Management							
6	MCS251	Data Warehousing and Mining Lab	-		4	2	50	50	100
7	MCS 291	Seminar	-	-	-	2	50	50	100
		Total	**15**	**10**	**4**	**24**	**250**	**450**	**700**

SEMESTER III

S.N.	Subject Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MHM 301	Industrial Management & Research Methodology	3	2	0	4	30	70	100
2	MCS 301	Artificial Intelligence	3	2	0	4	30	70	100
Elective I (Select any one from MCS331, MCS 332 , MCS333)									
3	MCS 331	Mobile Computing	3	2	0	4	30	70	100
	MCS 332	Distributed Computing							
	MCS 333	Robotic Engineering							
Elective II (Select any one from MCS334, MCS 335 , MCS336)									
4	MCS 334	Parallel Algorithm	3	2	0	4	30	70	100
	MCS 335	Randomized Algorithm							
	MCS 336	Approximation Algorithm							
5	MCS 351	Artificial Intelligence Lab	-	-	4	2	50	50	100
6	MCS391	Minor project	-	-	4	2	50	50	100
7	MCS 399	Project Work Phase-1 (Synopsis and Presentation)	-	-	12	6	50	50	100
		Total	**12**	**8**	**20**	**26**	**270**	**430**	**700**

SEMESTER IV

S.N.	Subject Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCS 499	Project Work Phase-2 (Dissertation and Presentation)	-	-	-	12	50	50	100
		Total	-	-	-	12	50	50	100

M.Tech Computer Science & Engineering
Semester - I

DESIGN AND ANALYSIS OF ALGORITHMS

Course Code: MCS 101 **L-3, T-2, P-0, C-4**

Objective: Upon completion of this course the student should be able to:
1. Apply the algorithms and design techniques to solve problems;
2. Have a sense of the complexities of various problems in different domains.

UNIT-I **(Lecture 09)**

Algorithm Analysis: Algorithms, Designing of Algorithms, Pseudo code for expressing algorithms, Performance Analysis-time complexity and space complexity, Growth of function, Probabilistic analysis, Amortized analysis,
Sorting and order Statistics: Heap sort, Quick sort, sorting in linear time.

UNIT-II **(Lecture 09)**

Review of Data Structures: Red Black Tree AVL Tree: Insertion, deletion and searching, B-Trees: B-Tree of order m, Operations- insertion, deletion and searching.
Hash Functions, Collision Resolution in hashing, Priority queues-Definition, Priority queues-ADT, Heaps-Definition, Insertion and Deletion, Applications-Heap sort, Disjoint sets-Disjoint set ADT, Union algorithms.

UNIT-III **(Lecture 09)**

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort,.
Greedy method: General method, applications-Job sequencing with dead lines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT-IV **(Lecture 09)**

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem.

UNIT-V **(Lecture 09)**

Backtracking, Branch and Bound: General method (Backtracking), **Applications**- n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.
NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook' s theorem.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Computer Algorithms/C++, E. Horowitz, S. Sahani and S. Rajasekharan , Galgotia Publishers pvt. Limited.
2. Data Structures and Algorithm Analysis in C++, 2nd Edition, Mark Allen Weiss, Pearson education.
3. Introduction to Algorithms, 2nd Edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI pvt.Ltd./ Pearson Education.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson Education.
2. Introduction to the Design and Analysis of Algorithms, A.Levitin, Pearson Education.

3. Data structures, Algorithms and Applications in C++, S.Sahni, University press (India) pvt ltd, 2nd edition, Orient Longman pvt. ltd.
4. Object Oriented Programming Using C++, 2 Editions, I.Pohl, and Pearson Education.
5. Fundamentals of Sequential and Parallel Algorithms, K.A.Berman, J. L.Paul, Thomson
6 Data Structures and Algorithms in C++**,** 3 Edition, Adam Drozdek, Thomson.

Semester - I

ADVANCED COMPUTER ARCHITECTURE

Course Code: MCS 102 **L-3, T-2, P-0, C-4**

Objective: Computer architecture deals with the physical configuration, logical structure, formats, protocols, and operational sequences for processing data, controlling the configuration, and controlling the operations over a computer.

UNIT-I **(Lecture 09)**

Fundamentals of Computer design- Technology trends- cost-measuring and reporting performance quantitative principles of computer design.

Instruction set principles and examples- classifying instruction set-memory addressing-type and size of operands- addressing modes for signal processing-operations in the instruction set- instructions for control flow- encoding an instruction set.-the role of compiler

UNIT-II **(Lecture 09)**

Instruction level parallelism (ILP) - over coming data hazards-reducing branch costs – high performance instruction delivery- hardware based speculation-limitation of ILP

UNIT-III **(Lecture 09)**

ILP software approach- compiler techniques- static branch protection-VLIW approach- H.W support for more ILP at compile time- H.W verses S.W solutions, Memory hierarchy design-cache performance- reducing cache misses penalty and Miss rate– virtual memory-protection and examples of VM.

UNIT-IV **(Lecture 09)**

Multiprocessors and thread level parallelism- symmetric shared memory architectures-distributed shared memory- Synchronization- multi threading.

Storage systems-Types – Buses - RAID- errors and failures- bench marking a storage device-designing a I/O system.

UNIT-V **(Lecture 09)**

Inter connection networks and clusters- interconnection network media – practical issues in interconnecting networks- examples – clusters- designing a cluster

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Computer Architecture A quantitative approach 3 edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier)

REFERENCE BOOKS:

1. “Computer Architecture and parallel Processing” Kai Hwang and A.Briggs International Edition McGraw-Hill.

2. Advanced Computer Architectures, Dezso Sima, Terence Fountain, Peter Kacsuk, Pearson.

Semester - I
ADVANCED SOFTWARE ENGINEERING

Course Code: MCS 104 **L-3, T-2, P-0, C-4**

Objective: The purpose of this course is to teach component-based systems, based on contemporary methods of development, which is component software, software architectures and middleware platforms.

UNIT-I **(Lecture 09)**

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

UNIT-II **(Lecture 09)**

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavior al models, Data models, Object models, structured methods.

UNIT-III **(Lecture 09)**

Design Engineering: Design process and Design quality, Design concepts, the design model.

Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design.

Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution.

UNIT-IV **(Lecture 09)**

Performing User interface design: Golden rules, User inter face analysis and design, interface analysis, interface design steps, Design evaluation.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

UNIT-V **(Lecture 09)**

Plans for testing: Snooping for information, Coping with complexity through teaming, Testing plan focus areas , Testing for recoverability , Planning for troubles.

Preparing for the tests: Software Reuse, Developing good test programs , Data corruption, Tools, Test Execution ,Testing with a virtual computer , Simulation and Prototypes, Managing the Test, Customer' s role in testing

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach-Roger S. Pressman, 6th editions. Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7 edition, Pearson education.
3. Software Testing Techniques – Loveland, Miller, Prewitt, Shannon, Shroff Publishers & Distribution Pvt. Ltd.,

REFERENCE BOOKS:

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age Inter national Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Systems Analysis and Design- Shelly Cashman Rosenblatt, Thomson Publications.

Semester - I
ADVANCED DATABASE MANAGEMENT SYSTEMS

Course Code: MCS 105 **L-3, T-2, P-0, C-4**

Objective: A DBMS is a set of software programs that controls the organization, storage, management, and retrieval of data in a database. DBMS are categorized according to their data structures or types. It is a set of prewritten programs that are used to store, update and retrieve a Database.

UNIT I **(Lecture 09)**

Database System Applications, database System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model– Other Models – Database Languages – DDL – DML – database Access for applications Programs – database Users and Administrator – Transaction Management – database System Structure – Storage Manager – the Query Processor – History of Database Systems. Database design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

UNIT – II **(Lecture 09)**

Relational Model: Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views. **Relational Algebra and Calculus:** Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT – III **(Lecture 09)**

For m of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operator s – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity' s – AND, OR and NOTR – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition
Schema refinement in Data base Design – Multi valued Dependencies – fourth Normal Form.

UNIT – IV **(Lecture 09)**

Overview of Transaction Management: ACID Properties – Transactions and Schedules- Concurrent Execution of transaction – Lock Based Concurrency Control – Performance Locking – Transaction Support in SQL – Introduction to Crash recovery. **Concurrency Control:** Serializability, and recover ability – Introduction to Lock Management – Lock Conversions – Dealing with Dead Locks – Specialized Locking Techniques – Concurrency without Locking. **Crash recovery:** Introduction to ARIES – the Log – Other Recovery related Structures – the Write-Ahead Log Protocol – Check pointing – recovering from a System Crash – Media recovery – Other approaches and Interaction with Concurrency control.

UNIT – V **(Lecture: 09)**

Overview of Storage and Indexing: Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning. **Storing data: Disks and Files:** - The Memory Hierarchy – Redundant Arrays of Independent – Disks – Disk Space Management – Buffer Manager – Files of records – Page Formats – record formats. **Tree Structured Indexing:** Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure. **Hash Based Indexing:** Static Hashing – Extendable hashing – Linear Hashing – Exendblevs, Liner hashing.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw-Hill 3 Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, IV edition.

REFERENCE BOOKS:

1. Introduction to Database Systems, C.J.Date Pearson Education
2. Data base Management System, Elmasri Navate Pearson Education
3. Data base Management System Mathew Leon, Leon Vikas Publication
4. Data base Systems, Connoley Pearson education

Semester - I
DESIGN AND ANALYSIS OF ALGORITHMS LAB

Course Code: MCS 151 **L-0, T-0, P-4, C-2**

1. Write a C++ program to perform the following operations:
a) Insert an element into a binary search tree.
b) Delete an element from a binary search tree.
c) Search for a key element in a binary search tree.
2. Write a C++ program to perform the following operations on B-Trees and AVL-trees:
a) Insertion.
b) Deletion.
3. Write C++ programs for the implementation of bfs and dfs for a given graph.
4. Write C++ programs to implement the following to generate a minimum cost spanning tree:
a) Prim's algorithm.
b) Kruskal's algorithm.
5. Write a C++ program to solve the single source shortest path problem.
(Note: Use Dijkstra's algorithm).
6. Write C++ program that uses non-recursive functions to traverse a binary tree in:
a) Pre-order.
b) In-order.
c) Post-order.
7. Write C++ programs for sorting a given list of elements in ascending order using the following sorting methods:
a) Quick sort.
b) Merge sort.
8. Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Write a C++ program that implements backtracking algorithm to solve the problem i.e. place eight non-attacking queens on the board.
9. Write a C++ program to solve 0/1 knapsack problem using the following:
a) Greedy algorithm.
b) Dynamic programming algorithm.
c) Backtracking algorithm.
d) Branch and bound algorithm.
10. Write a C++ program that uses dynamic programming algorithm to solve the optimal binary search tree problem.
11. Write a C++ program for solving traveling sales persons problem using the following:
a) Dynamic programming algorithm.
b) The back tracking algorithm.
c) Branch and Bound.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would be done by the external faculty based on the experiment conducted during the examination.

Semester - II
DATA WAREHOUSING AND MINING

Course Code: MCS 201 **L-3, T-2, P-0, C-4**

Objective: Enterprise data is the lifeblood of a corporation, but it's useless if it's left to languish in data silos.

UNIT-I **(Lecture 09)**

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining,

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Online Data Storage.

UNIT-II **(Lecture 09)**

Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems,

Concepts Description: Characterization and Comparison: Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

UNIT-III **(Lecture 09)**

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT-IV **(Lecture 09)**

Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

UNIT-V **(Lecture 09)**

Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE Harcourt India.
2. Data Mining Techniques – ARUN K PUJARI, University Press
3. Building the Data Warehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd.

REFERENCE BOOKS:

1. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn. Asia.
2. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.
3. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION.
4. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION.

Semester - II
ADVANCED COMPUTER NETWORK

Course Code: MCS 202 **L-3, T-2, P-0, C-4**

Objective: This course covers advanced fundamentals principles of computer networks and techniques for networking. Briefly, the topics include advanced network architecture and design principles, protocol mechanisms, implementation principles and s/w engineering practices, network algorithmic, network simulation techniques and tools.

UNIT-I **(Lecture: 09)**

Introduction:

Introduction to Network models-ISO-OSI, SNA, Apple talk and TCP/IP models. Review of Physical layer and Data link layers, Review of LAN (IEEE 802.3, 802.5, 802.11b/a/g, FDDI) and WAN (Frame Relay, ATM, ISDN) standards.

UNIT-II **(Lecture: 09)**

Network layer:

ARP, RARP, Internet architecture and addressing, internetworking, IPv4, overview of IPv6, ICMP, Routing Protocols- RIP, OSPF, BGP, IP over ATM.

UNIT-III **(Lecture: 09)**

Transport layer:

Design issues, Connection management, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Finite state machine model.

UNIT-IV **(Lecture: 09)**

Application layer: WWW, DNS, e-mail, SNMP, RMON

UNIT-V **(Lecture: 09)**

Network Security: Cryptography, Firewalls, Secure Socket Layer (SSL) and Virtual Private Networks (VPN).

Case study: Study of various network simulators, Network performance analysis using NS2

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Behrouz A. Forouzan, “TCP/IP Protocol Suit”, TMH, 2000.
2. Tananbaum A. S., “Computer Networks”, 3rd Ed., PHI, 1999.

REFERENCE BOOKSBOOKS:

1. Black U, “Computer Networks-Protocols, Standards and Interfaces”, PHI, 1996.
2. Stallings W., “Data and Computer Communications”, 6th Ed., PHI, 2002.
3. Stallings W., “SNMP, SNMPv2, SNMPv3, RMON 1 & 2”, 3rd Ed., Addison Wesley, 1999.
4. Laurra Chappell (Ed), “Introduction to Cisco Router Configuration”, Techmedia, 1999.

Semester - II
NETWORK SECURITY AND CRYPTOGRAPHY

Course Code: MCS 203 **L-3, T-2, P-0, C-4**

Objective: To understand the principles of encryption algorithms; conventional and public key cryptography. To have a detailed knowledge about authentication, hash functions and application level security mechanisms.

UNIT-I **(Lecture: 09)**

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations. Algorithms: Triple DES, Inter national Data Encryption algorithm, Blowfish, R C 5, C AST -128, R C 2, and Characteristics of Advanced Symmetric block ciphers.

UNIT-II **(Lecture: 09)**

Conventional Encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation. Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

UNIT-III **(Lecture: 09)**

Number theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat' s and Euler' s theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

Message authentication and Hash functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

UNIT-IV **(Lecture: 09)**

Hash and Mac Algorithms: MD File, Message digests Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards.

Authentication Applications:

Kerberos, X.509 directory Authentication service, Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT-V **(Lecture: 09)**

IP Security: Over view, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management, Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.

Intruders, Viruses and Worms:

Intruders, Viruses and Related threats, Fire Walls: Fire wall Design Principles, Trusted systems.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice, William Stallings, Pearson Education.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Char lie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Principles of Information Security, Whitman, Thomson.
4. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
5. Introduction to Cryptography, Buchmann, Springer.

Semester - II
PATTERN RECOGNITION AND IMAGE PROCESSING

Course Code: MCS 231 **L-3, T-2, P-0, C-4**

Objective: This paper provides a broad overview of the major elements of pattern recognition and image processing (PRIP).

UNIT-I **(Lecture: 09)**

Introduction: Machine perception, pattern recognition example, pattern Recognition systems, the design cycle, learning and adaptation.

Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification-zero–one loss function, classifier s, discriminant functions, and decision surfaces

UNIT-II **(Lecture:09)**

Normal density: Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context

Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case

UNIT-III **(Lecture:09)**

Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering

Pattern recognition using discrete hidden Markov models:

Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs

UNIT-IV **(Lecture: 09)**

Continuous hidden Markov models:

Continuous observation densities, multiple mixtures per state, speech recognition applications.

Digital image fundamentals:

Introduction, an image model, sampling and quantization, basic relationships between pixels, image geometry

UNIT V **(Lecture: 09)**

Image enhancement:

Back ground, enhancement by point processing histogram processing, spatial filtering, introduction to image transforms, image enhancement in frequency domain.

Image Segmentation and Edge Detection: Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and Laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
2. Fundamentals of speech Recognition, Lawerence Rabiner, Biing – Hwang Juang Pearson education.
3. R.C Gonzalez and R.E. Woods, "Digital Image Processing", Addison Wesley, 1992.

REFERENCE BOOKS:

1. A.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
2. Digital Image Processing – M.Anji Reddy, BS Publications.
3. Pattern Recognition and Image Analysis – Earl Gose, Richard John baugh, Steve Jost PHI 2004

Semester - II
NEURAL NETWORKS

Course Code: MCS 232 **L-3, T-2, P-0, C-4**

Objective: This paper contains biological neural network which is composed of a group or groups of chemically connected or functionally associated neurons. Apart from the electrical signaling, there are other forms of signaling that arise from neurotransmitter diffusion, which have an effect on electrical signaling.

UNIT I **(Lecture: 09)**

INTRODUCTION - what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

LEARNING PROCESS – Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT II **(Lecture: 09)**

SINGLE LAYER PERCEPTRONS – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perceptron –convergence theorem, Relation between perceptron and Bayes classifier for a Gaussian Environment

MULTILAYER PERCEPTRON – Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection.

UNIT III **(Lecture: 09)**

BACK PROPAGATION -back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated convergence, supervised learning.

UNIT IV **(Lecture: 09)**

SELF ORGANIZATION MAPS – Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification

UNIT V **(Lecture: 09)**

NEURO DYNAMICS – Dynamical systems, stability of equilibrium states, attractors, neurodynamical models, manipulation of attractors as a recurrent network paradigm

HOPFIELD MODELS – Hopfield models, computer experiment.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Neural networks A comprehensive foundations, Simon Hhaykin, Pear son Education edition 2004.

REFERENCE BOOKS:

1. Artificial neural networks - B.Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural networks in Computer intelligence, Li Min Fu TMH 2003
3. Neural networks James A Freeman David M S kapura pearson education 2004

Semester - II

THEORY OF COMPUTATION

Course Code: MCS 233 **L-3, T-2, P-0, C-4**

Objective: This paper includes a theoretical treatment of what can be computed and how fast it can be done. Applications to compilers, string searching, and control circuit design will be discussed. The hierarchy of finite state machines, pushdown machines, context free grammars and Turing machines will be analyzed, along with their variations.

UNIT I **(Lectures 09)**

Introduction: alphabets, Strings and Languages; automata and Grammars.

Finite automata (FA) -its behavior; DFA -Formal definition, simplified notations (state transition diagram, transition table), Language of a DFA, NFA -Formal definition, Language of an NFA, Removing, epsilon-transitions. Equivalence of DFAs and NFAs Regular expressions (RE) -Definition, FA and RE, RE to FA, FA to RE, algebraic laws for RE, applications of REs. Regular grammars and FA, FA for regular grammar , Regular grammar for FA.

UNIT II **(Lectures 09)**

Proving languages to be non-regular -Pumping Lemma, applications. Some closure properties of Regular languages -Closure under Boolean operations, reversal, homomorphism, inverse homomorphism, etc. M hill-Nerode theorem DFA Minimization Some decision properties of Regular languages -emptiness, finiteness, membership, equivalence of two DF As or REs, etc. Two-way finite automata, Finite automata with output.

UNIT III **(Lectures 09)**

Context-free Grammars (CFGs) -Formal definition, sentential forms, leftmost and rightmost derivations,, the language of a CFG, Derivation tree or Parse tree -Definition, Relationship between parse trees and derivations, Parsing and ambiguity, Ambiguity in grammars and Languages Pushdown Automata (PDA) -Formal definition, behavior and graphical notation, Instantaneous descriptions (Ids), the language of PDA (acceptance by final state and empty stack), Equivalence of acceptance by final state and empty stack, Equivalence of PDAs and CFGs, CFG to PDA, PDA to CFG.

UNIT IV **(Lectures 09)**

Languages of DPDAs, DPDAs, and ambiguous grammars. Simplification of CFGs - Removing useless symbols, epsilon- Productions, and unit productions, Normal forms -CNF and GNF Proving that some languages are not context free -Pumping lemma for CFLs, applications.

Some closure properties of CFLs -Closure under union, concatenation, Kleene closure, substitution, homomorphism, reversal, intersection with regular set, etc. Some more decision properties of CFLs, Review of some undecidable CFL problems.

UNIT V **(Lectures 09)**

Turing Machines TM –F

ormal definition and behavior, Transition diagrams, Language of a TM, TM as accepters and deciders. TM as a computer of integer functions Programming techniques for TMs -Storage in state, multiple tracks, subroutines, etc. Variants of TMs -Multitape TMs, Nondeterministic TMs. TMs with semi-infinite tapes, multistack machines. Post's Correspondence Problem (PCP) -Definition, Undecidability of PCP. Chomsky hierarchy.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Hopcroft, ullman," Introduction to Automata Theory, Language and Computation", Nerosa Publishing House

2. K.L.P.Mishra and N.Chandrasekaran," Theory of Computer Science (Automata Language and Computation)", PHI

3. Martin J.C. "Introduction to Language and Theory of computation". TMH

REFERENCE BOOKS:

1. Papadimitrou,C. and Lewis,C.L."Elements of theory of computation "PHI

2. Cohen DIA," Introduction to computer theory", John Wiley& Sons

3. Kumar Rajendra, "Theory of Automata(Language and Computation)"PPM

Semester - II
MIDDLEWARE TECHNOLOGIES

Course Code: MCS 234 **L-3, T-2, P-0, C-4**

Objective: This paper provide a more functional set of application programming interfaces to allow an application to Locate transparently across the network, thus providing interaction with another service or application, Be independent from network services, Be reliable and always available.

UNIT-I **(Lecture: 09)**

Introduction to client server computing: Evolution of corporate computing models from centralized to distribute computing, client server models. Benefits of client server computing, pitfalls of client server programming.

UNIT-II **(Lecture: 09)**

CORBA with Java: Review of Java concept like RMI, RMI API, J DBC, Client/Server CORBA-style, The object web: CORBA with Java.

Introducing C# and the .NET Platform; Under standing .NET Assemblies; Object – Oriented Programming with C#; Callback Inter faces, Delegates, and Events.

UNIT III **(Lecture: 09)**

Building c# applications: Type Reflection, Late Binding, and Attribute-Based Programming; Object Serialization and the .NET Remoting Layer; Data Access with ADO.NET; XML Web Ser vices.

Core CORBA / Java: Two types of Client/ Server invocations-static, dynamic. The static CORBA, first CORBA program, ORBlets with Applets, Dynamic CORBA-The portable count, the dynamic count multi count.

UNIT-IV **(Lecture: 09)**

Existential CORBA: CORBA initialization protocol, CORBA activation ser vices, CORBAIDL mapping CORBA java- to- IDL mapping, The introspective CORBA/Java object.

UNIT-V **(Lecture: 09)**

Java Bean Component Model: Events, proper ties, persistency, Intrespection of beans, CORBA Beans

EJBs and CORBA: Object transaction monitor s CORBA OTM' s, EJ B and CORBA OTM' s, EJB container framework, Session and Entity Beans, The EJ B client/server development Process The EJB container protocol, support for transaction EJ B packaging EJB design Guidelines.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Client/Server programming with Java and CORBA Robert Orfali and Dan Harkey, John Wiley & Sons ,SPD 2nd Edition.
2. Java programming with CORBA 3rd Edition, G. Brose, A Vogel and K.Duddy, Wiley- dreamtech, India John wiley and sons.
3. C# and the .NET Platform Andrew Troelsen, Apress Wiley-dreamtech, India Pvt Ltd.

REFERENCE BOOKS:

1. Distributed Computing, Principles and applications, M.L.Liu, Pearson Education
2. Client/Server Survival Guide 3edition Robert Orfali Dan Harkey and Jeri Edwards, John Wiley & Sons
3. Client/Server Computing D T Dewire, TMH.
4. IBM Webspere Starter Kit Ron Ben Natan Ori Sasson, TMh, New Delhi
5. Programming C#, Jesse Liberty, SPD-O' Reilly.
6. C# Preciesely Peter Sestoft and Henrik I. Hansen, Prentice Hall of India
7. Intoduction to C# Using .NET Pearson Education
8. C# How to program, Pearson Education

Semester - II
GENETIC ALGORITHMS

Course Code: MCS 235 **L-3, T-2, P-0, C-4**

Objective: This paper provide a search technique used in computing to find exact or approximate solutions to optimization and search problems.

UNIT-I **(Lecture: 09)**

Introduction

A brief history of evolutionary computation, Elements of Genetic Algorithms, A simple genetic algorithm, Applications of genetic algorithms

Genetic Algorithms in Scientific models

Evolving computer programs, data analysis & prediction, evolving neural networks, modeling interaction between learning & evolution, modeling sexual selection, measuring evolutionary activity.

UNIT-II **(Lecture: 09)**

Theoretical Foundation of genetic algorithm

Schemas & Two-Armed and k-armed problem, royal roads, exact mathematical models of simple genetic algorithms, Statistical- Mechanics Approaches.

UNIT-III **(Lecture: 09)**

Computer Implementation of Genetic Algorithm

Data structures, Reproduction, crossover & mutation, mapping objective functions to fitness form, fitness scaling, coding, a multiparameter, mapped, fixed point coding, discretization and constraints.

UNIT-IV **(Lecture: 09)**

Some applications of genetic algorithms

The risk of genetic algorithms, De Jong & function optimization, Improvement in basic techniques, current application of genetic algorithms

UNIT-V **(Lecture: 09)**

Advanced operators & techniques in genetic search

Dominance, duplicity, & abeyance, inversion & other reordering operators, other micro operators, Niche & speciation, multi objective optimization, knowledge based techniques, genetic algorithms & parallel processors.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. David E. Goldberg, "Genetic algorithms in search, optimization & Machine Learning" Pearson Education, 2006

REFERENCE BOOKS:

1. Melanle Mitchell, "An introduction to genetic algorithms", Prentice Hall India, 2002.
2. Michael D. Vose, "The simple genetic algorithm foundations and theory, Prentice Hall India, 1999.
3. Masatoshi Sakawa, "Genetic Algorithms & Fuzzy Multiobjective Optimization", Kluwer Academic Publisher, 2001

4. D. Quagliarella, J Periaux, C Poloni & G Winter, “Genetic Algorithms in Engineering & Computer science”, John Wiley & Sons, First edition, 1997

Semester - II

SOFTWARE PROJECT MANAGEMENT

Course Code: MCS 236 **L-3, T-2, P-0, C-4**

Objective: This paper is a sub-discipline of project management in which software projects are planned, monitored and controlled. These processes exist primarily for supporting the management of software development, and are generally skewed toward addressing business concerns.

UNIT – I **(Lecture: 09)**

Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Improving Software Economics: Reducing Software product size, improving software Processes, improving team effectiveness, improving automation, achieving required quality, peer inspections.

UNIT – II **(Lecture: 09)**

The old way and the new: The principles of conventional software engineering, Principles of modern software management, transitioning to an iterative process. Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

UNIT – III **(Lecture: 09)**

Flows of the process: Software process workflows, Intertrans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments.

Interactive Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.

UNIT – IV **(Lecture: 09)**

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

Process Automation: Automation Building Blocks, the Project Environment.

UNIT-V **(Lecture: 09)**

Project Control and Process instrumentation: The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process : Process discriminants, Example.

Future Software Project Management: Modern Project Profiles Next generation Software economics, modern Process transitions. Case Study: The Command Center Processing and Display System-Replacement(CCPDS-R)

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Walker Rayce: Software Project Management, Pearson Education, 2005.

REFERENCE BOOKS:

1. Richard H.Thayer: Software Engineering Project Management, IEEE Computer Society, 1997.
2. Shere K.D. : Software Engineering and Management, Prentice Hall, 1988.

Semester - II
DATA WAREHOUSING AND MINING LAB

Course Code: MCS 251 **L-0, T-0, P-4, C-2**

1. Implement Inferring rudimentary rules
2. Implement Statistical modeling
3. Implement Divide-and-conquer: constructing decision trees
4. Implement Covering algorithms: constructing rules
5. Implement Mining association rules
6. Implement linear models

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)</td><td rowspan="2">ATTENDANCE (5 MARKS)</td><td rowspan="2">QUIZ (5 MARKS)</td><td rowspan="2">VIVA (10 MARKS)</td><td rowspan="2">TOTAL INTERNAL (50 MARKS)</td></tr>
<tr><td>EXPERIMENT (10 MARKS)</td><td>FILE WORK (10 MARKS)</td><td>VIVA (10 MARKS)</td></tr>
</table>

External Evaluation (50 marks)
The external evaluation would be done by the external faculty based on the experiment conducted during the examination.

Semester - II
SEMINAR

Course Code: MCS 291 **L-0, T-0, P-0, C-2**

Selection of topic:

All students pursuing M.Tech shall submit the proposed topic of the seminar in the first week of the semester to the course coordinator. Care should be taken that the topic selected does not directly relate to the subject of the courses being pursued or thesis work, if any. The course coordinator shall then forward the list to the concerned department coordinators who will vet the list and add some more topics in consultation with the faculty of the department .The topics will then be allocated to the students along with the name of the faculty guide.

Preparation of the seminar

1. The student shall meet the guide for the necessary guidance for the seminar work.

2. During the next two to four weeks the student should read the primary literature germane to the seminar topic. Reading selection should continuously be informed to the guide.

3. After necessary collection of data and literature survey, the students must prepare a report. The report shall be arrange in the sequence consisting of the following:-

a. Top Sheet of transparent plastic.

b. Top cover.

c. Preliminary pages.

(i) Title page

(ii) Certification page.

(iii) Acknowledgment.

(iv) Abstract.

(v) Table of Content.

(vi) List of Figures and Tables.

(vii) Nomenclature.

d. Chapters (Main Material).

e. Appendices, If any.

f. Bibliography/ References.

g. Evaluation Form.

h. Back Cover (Blank sheet).

i. Back Sheet of Plastic (May be opaque or transparent).

4. ***<u>Top Cover-</u>*** ***The sampled top cover shall be as Under:***

TITLE OF THE SEMINAR
NAME OF THE STUDENT WITH COURSE, STREAM, SEMESTER & SECTION.
Department of Computer Science & Engineering
College of Engineering
Teerthankar Mahaveer University
Moradabad-244001

(TMU LOGO)

MONTH AND YEAR

5. Title Page:- The Title Page cover shall be as Under:

Title of the seminar
M.Tech. Seminar
(Submitted in Partial fulfillment of the requirement for the degree of
MASTER OF TECHNOLOGY
In
COMPUTER SCIENCE & ENGINEERING
by
Name of Student in capital Letters
(Roll No.)

(TMU LOGO)

COLLEGE OF ENGINEERING
TEERTHANKAR MAHAVEER UNIVERSITY
N.H. 24, BAGARPUR,
MORADABAD-244001

MONTH AND YEAR
Name of the college and University.
Month and Year

6. Certification page:- This shall be as under

Department of Computer Science & Engineering
College of Engineering
Teerthankar Mahaveer University
Moradabad-244001

The seminar Report and Title "Topic of the Seminar."
Submitted by Mr./Ms. (Name of the student) (Roll No.) may be accepted for being evaluated

Date ***Signature***
Place ***(Name of guide)***

For Guide *If you Choose not to sign the acceptance certificate above, please indicate reasons for the same from amongst those given below:*

i) The amount of time and effort put in by the student is not sufficient;

ii) The amount of work put in by the student is not adequate;

iii) The report does not represent the actual work that was done / expected to be done;

iv) Any other objection (Please elaborate)

7. **Abstract-** A portion of the seminar evaluation will be based on the abstract. The abstract will be evaluated according to the adherence to related technical field and according to the format described below.

The seminar abstract is an important record of the coverage of your topic and provides a valuable source of leading references for students. Accordingly, the abstract must serve as an introduction to your seminar topic. The abstract will be limited to 500 words, excluding figures and tables (if any). The abstract will include references to the research articles upon which the seminar is based as well as research articles that have served as key background material.

8. Evaluation Form:- Three sheets of evaluation form should be attached in the report as under.

a. Evaluation form for guide and other Internal Examiner.

b. Evaluation form for external examiners.

c. Summary Sheet

9. Evaluation form for Guide & Internal Examiners:-

EVALUATION SHEET

(To be filled by the GUIDE & Internal Examiners only)

Name of Candidate:
Roll No:

Class and Section:

Please evaluate out of Five marks each.

S. No.	Details	Marks (5) Guide	Marks (5) Int. Exam. 1	Marks (5) Int. Exam. 2
1	OBJECTIVE IDENTIFIED & UNDERSTOOD			
2	LITERATURE REVIEW / BACKGROUND WORK (Coverage, Organization, Critical review)			
3	DISCUSSION/CONCLUSIONS (Clarity, Exhaustive)			
4	SLIDES/PRESENTATION SUBMITTED (Readable, Adequate)			
5	FREQUENCY OF INTERACTION (Timely submission, Interest shown, Depth, Attitude)			
	Total (Out of 25)			
	Average out of 50			

Signature: **Signature:** **Signature:**

Date: **Date:** **Date:**

EVALUATION SHEET

(To be filled by the External Examiner only)

Name of Candidate:
Roll No :

Please evaluate out of Ten marks each.

S.No.	Details	Marks (10)
1	OBJECTIVE IDENTIFIED & UNDERSTOOD	
2	LITERATURE REVIEW / BACKGROUND WORK (Coverage, Organization, Critical review)	
3	DISCUSSION/CONCLUSIONS (Clarity, Exhaustive)	
4	POWER POINT PRESENTATION (Clear, Structured)	
5	SLIDES (Readable, Adequate)	
	Total (Out of 50)	

Signature:

Date:

EVALUATION SUMMARY SHEET

Name and Roll No.	Internal Examiners (50)	External Examiner (50)	Total (100)	Result (Pass/Fail)

Note:- The summary sheet is to be completed for all students and the same shall also be compiled for all students examined by External Examiner. The Format shall be provided by the course coordinator.

General points for the seminar

1. The report should be typed on A4 sheet. The Paper should be of 70-90 GSM.
2. Each page should have minimum margins as under

    a. Left 1.5 inches
    b. Right 0.5 Inches
    c. Top 1 Inch
    d. Bottom 1 Inch (Excluding Footer, If any)

3. The printing should be only on one side of the paper
4. The font for normal text should Times New Roman, 12 size for text and 14 size for heading and should be typed in double space. The references may be printed in Italics or in a different fonts.
5. The Total Report should not exceed 50 pages including top cover and blank pages.
6. A CD of the report should be pasted/attached on the bottom page of the report.
7. Similarly a hard copy of the presentation (Two slide per page) should be attached along with the report and a soft copy be included in the CD.
8. Three copies completed in all respect as given above is to be submitted to the guide. One copy will be kept in departmental/University Library, One will be return to the student and third copy will be for the guide.
9. The power point presentation should not exceed 30 minutes which include 10 minutes for discussion/Viva.

Semester - III
INDUSTRIAL MANAGEMENT AND RESEARCH METHODOLOGY

Course Code: MHM 301 **L-3, T-2, P-0, C-4**

OBJECTIVE:

1) To enhance the knowledge of students in the area of Industrial Management, General Management, Productivity, leadership and motivational skills.
2) To impart understanding of Research Methodology process, Hypothesis Testing and statistical analysis.

UNIT-I **(09 lectures)**

Industrial management:-Introduction, Concept, Application & Scope. Productivity: Definition, Measurement, Productivity Index, Types of production system

UNIT-II **(09 lectures)**

Management Function: Concept, Nature, Importance, Management: Art and Science, Management skills, Levels of Management Evolution of Management: Early contributions, Taylors and scientific management, Bureaucracy, Hawthorne Experiments and human Relations, Social System Approach, Decision Theory Approach

UNIT-III **(09 lectures)**

Organizational behaviour:- Concept, Nature, conceptual Foundations. Perception: Concept, Nature, Processes, Importance; Motivation: Concept, Process, Theories of Motivation Leadership: Style & Theories of Leadership- Trait, Behavioral and Situational Theories; Emotional Intelligence.

UNIT-IV

(09 lectures)

Research Methodology ; Concept of Research and its Application , Types of Research , Steps involved in Research Processes , Collection of data : Types of Data -Primary & Secondary data , Various Methods of Collection Of Data.; Concept of sample , Sample Size & Sampling Procedure, Various Techniques of Sampling .Analysis of data : Coding , Editing and Tabulation of data , Various kinds of Charts and Diagrams used in data Analysis .

UNIT-V

(09 lectures)

Estimation Theory and Hypothesis testing: Meaning & Characteristics of a good Hypothesis, Formulation of Hypothesis, ways of stating a Hypothesis, test of significance, Level of significance, Errors in Hypothesis- test I , test II Errors .Application of Z test , T test , F test and chi-square test.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1- Industrial Engineering and Production Management, M. MAHAJAN, Dhanpat Rai & Sons
2-Koontz Harold & W. Heinz- Essentials of Management (Tata Mc Graw Hill, Fifth Edition 2008)
3- Robbins Stephen p.Organizational behavior (Pearson Education 13th Edition)
4-Cooper and Schindler- Business Research Methods (Tata McGraw Hill, 9th Edition)

5-Kothari CR- Research Methodology Methods and techniques (New age International Publishers)

REFERENCE BOOKS:

1. Industrial Engineering and Management, O.P. KHANNA
2. Principles of Management. L.M.Prasad.
3. K.Aswathappa- Organizational behavior
4. Luthans Fred- Organizational behavior (Tata McGraw Hill, 10th Edition)
5. Saunders- Research Methods for Business Students(Pearson Education ,2nd Edition)
6. Byod and others- marketiry Research (All India traveler Bookseller)
7. Beri .G.C- Statistics for management Tata Mc. Graw Hill.

Semester - III
ARTIFICIAL INTELLIGENCE

Course Code: MCS 301 **L-3, T-2, P-0, C-4**

Objective: To study the development of intelligent machines which is capable of performing complex tasks that require thought and behavior normally associated with human intelligence. This subject adapts characteristics of human problem-solving skills and then applies them as algorithms easily comprehended by computer systems

UNIT - I **(Lecture: 09)**

Scope of AI:

Games, theorem proving, natural language processing, vision and speech processing, robotics, expert Systems, AI techniques- search knowledge, abstraction. **Problem solving :** State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound, Problem Reduction, Constraint Satisfaction End, Means-End Analysis

UNIT - II **(Lecture: 09)**

Knowledge Representation:

Predicate Logic: Unification, modus pones, resolution, dependency directed backtracking. Rule based

Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtracks. Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, Conceptual dependency, scripts.

UNIT - III **(Lecture: 09)**

Handling uncertainty on-Monotonic Reasoning, Probabilistic reasoning, use of certainty factors, fuzzy logic.

UNIT - IV **(Lecture: 09)**

Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

UNIT-V **(Lecture: 09)**

Expert Systems:

Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990

REFERENCE BOOKS:

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
3. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
4. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994

Semester - III
MOBILE COMPUTING

Course Code: MCS 331 **L-3, T-2, P-0, C-4**

Objective: This paper is a generic term describing one's ability to use technology while moving, as opposed to portable computers, which are only practical for use while deployed in a stationary configuration. Researchers have made numerous contributions ranging from technology for handheld and notebook computers to Mobile IP.

UNIT- I **(Lecture: 09)**

Introduction to Mobile Communications and Computing: Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture, GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

(Wireless) Medium Access Control: Motivation for a specialized, MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT- II **(Lecture: 09)**

Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT- III **(Lecture: 09)**

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

UNIT- IV **(Lecture: 09)**

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

UNIT- V **(Lecture: 09)**

Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1). Jochen Schiller, "Mobile Communications", Addison Wesley Wesley. second edition, 2004

2) Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002,

REFERENCE BOOKS:

1) Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004,

2) Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, " Fundamentals of Mobile and Pervasive Computing" , ISBN: 0071412379, McGraw-Hill Professional, 2005.

3) Hansmann, Merk, Nicklous, Stober , "Principles of Mobile Computing" , Springer, second edition, 2003.

4) Martyn Mallick, " Mobile and Wireless Design Essentials" , Wiley DreamTech, 2003

Semester - III
DISTRIBUTED COMPUTING

Course Code: MCS 332 **L-3, T-2, P-0, C-4**

Objective: To study distributed systems which consists of multiple autonomous computers that communicate through a computer network. The objective is to understand the interaction of distributed computers to achieve a common goal in distributed computing, a problem is divided into many tasks, each of which is solved by one computer

UNIT-I **(Lecture: 09)**

Fundamentals of Distributed Computing: Architectural models for distributed and mobile computing systems. Basic concepts in distributed computing such as clocks, message ordering, consistent global states, and consensus.

Basic Algorithms in Message: Passing Systems, Leader Election in Rings, and Mutual Exclusion in Shared Memory, Fault-Tolerant Consensus, Causality and Time. Message Passing: PVM and MPI.

UNIT-II **(Lecture: 09)**

Distributed Operating Systems: OS and network operating systems, Distributed File systems. Middleware, client/server model for computing, common layer application protocols (RPC, RMI, streams), distributed processes, network naming, distributed synchronization and distributed object-based systems.

UNIT-III **(Lecture: 09)**

Simulation:

A Formal Model for Simulations, Broadcast and Multicast, Distributed Shared Memory, Fault-Tolerant Simulations of Read/Write Objects Simulating Synchrony, Improving the Fault Tolerance of Algorithms, Fault-Tolerant Clock Synchronization.

UNIT-IV **(Lecture: 09)**

Distributed Environments: Current systems and developments (DCE, CORBA, JAVA). Randomization, Wait-Free Simulations of Arbitrary Objects, Problems Solvable in asynchronous Systems, Solving Consensus in Eventually Stable Systems, High Performance Computing-HPF, Distributed and mobile multimedia systems. Adaptability in Mobile Computing. Grid Computing and applications. Fault tolerant Computing Systems.

UNIT-V **(Lecture: 09)**

Parallel Processing:

Basic Concepts: Introduction to parallel processing, Parallel Processors: Taxonomy and topology - shared memory multiprocessors, distributed memory networks. Processor organization - Static and dynamic interconnections. Embeddings and simulations.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. Tannenbaum, A, Van Steen. Distributed Systems, Principles and Paradigm, Prentice Hall India, 2002
2. Tannenbaum, A. Distributed Operating Systems, Pearson Education. 2006
3. Attiya, Welch, “Distributed Computing”, Wiley India, 2006

REFERENCE BOOKS:

1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, "Introduction to parallel computing", 2nd Edition, Pearson Education, 2007
2. Cameron Hughes, Tracey Hughes, "Parallel and distributed programming using C++", Pearson Education, 2005
3. Tanenbaum, A, "Modern Operating Systems", 2nd Edition, Prentice Hall India, 2001.
4. Singhal and Shivaratri, "Advanced Concepts in Operating Systems", McGraw Hill, 1994

Semester - III
ROBOTIC ENGINEERING

Course Code: MCS 333 **L-3, T-2, P-0, C-4**

Objective : Robotics Engineering is a course that utilizes the development of knowledge in robotics to teach basic engineering concepts.

UNIT - I **(Lecture: 09)**

Overview: Historical perspective, classification, applications, components, industrial and technical development.

UNIT – II **(Lecture: 09)**

Mechanical systems:dynamics, modeling, end effectors.
Drive methods:principles and characteristics.

UNIT - III **(Lecture: 09)**

Sensors: Sensory requirements, available techniques, evaluation selection. Review of control methods.

UNIT-IV **(Lecture: 09)**

Computer hardware for robot systems, logic circuits and computer elements, peripheral system organization.

UNIT – V **(Lecture: 09)**

Input and output operations and control, Robot software requirement, functions performed by programming, present robot languages.
Robot vision: capturing the image, frame grabbers, interfacing and controls.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:

1. "Robotic Engineering: An integrated approach" by Richard D. Klafter, Thomas A. Chmielewski and Micheal Negin. Prentice Hall India publisher, 2002

REFERENCE BOOKS:

1. "Robot technology" by Lames G. Keramas. Thomson Publisher, 2003
2. "Fundamentals of robotics analysis and control" by Tsuneo Yoshikawa. Prentice Hall India
publishers, 20

Semester - III
PARALLEL ALGORITHM

Course Code: MCS 334 **L-3, T-2, P-0, C-4**

Objective: To understand the concept of parallel algorithms.

Unit I **(Lectures 09)**
Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

Unit II **(Lectures 09)**
Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Costoptimality, An example of illustrate Cost-optimal algorithms- such as summation, Min/Max on various models.

Unit III **(Lectures 09)**
Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC/, Parallel Sorting Networks on CREW/EREW/MCC/, linear array.

Unit IV **(Lectures 09)**
Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

Unit V **(Lectures 09)**
Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms- Permutation, Combinations, Derangements.

TOTAL (L – 45 + T – 15): 60 PERIODS

Text Books:
1. M.J. Quinn, "Designing Efficient Algorithms for Parallel Computer" by Mc Graw Hill.
2. S.G. Akl, "Design and Analysis of Parallel Algorithms".

Reference Books:
3. S.G. Akl, "Parallel Sorting Algorithm" by Academic Press

Semester - III
RANDOMIZED ALGORITHM

Course Code: MCS 335 **L-3, T-1, P-0, C-4**

Objective: To understand the concept of randomized algorithms.

Unit I **(Lectures 09)**

Introduction: Basic Probability Theory, Probability Spaces; Bayes' Rule; Independence; Expectation; Moments; Common Distributions , Randomized Algorithm: General concepts and definitions, Quicksort , Min-Cut, Random Partitions, Probabilistic recurrences , Randomized Complexity Classes: *RP*, *PP*, *BPP*.

Unit II **(Lectures 09)**

Moments and Deviations: Random sampling/bucketing, Tail bounds : Markov and Chebyshev inequalities, High confidence selection, Pairwise independence, Applications : The stable marriage problem, Tail Inequalities : Chernoff bounds; Applications: Network routing and gate-array wiring

Unit III **(Lectures 09)**

Markov Chains and Random Walks: A 2-SAT Example, Markov Chains, Random Walks on Graphs, Graph Connectivity, Expanders , Probability Amplification by Random Walks on Expanders, Algebraic methods: Fingerprinting and Freivald's technique, Verifying polynomial identities, Randomized pattern matching.

Unit IV **(Lectures 09)**

Data Structures: Random treaps; Skip lists, Randomized Graph Algorithm: Shortest paths; Minimum spanning tree .

Unit V **(Lectures 09)**

Parallel and Distributed Algorithms: The PRAM Model, Sorting on a PRAM, Maximal Independent Sets, Perfect Matchings,
Number Theory and Algebra: Elementary number theory, Quadratic residues, Primality testing, RSA cryptosystem.

Text Books:

1. R. Motwani and P. Raghavan, "Randomized Algorithms", Cambridge University Press.

Reference Books:

1. Michael Mitzenmacher, Eli Upfal , "Probability and Computing", Cambridge University Press

Semester - III
APPROXIMATION ALGORITHM

Course Code: MCS 336 **L-3, T-2, P-0, C-4**

Objective: This subject provides the methods for the solution of NP-Complete problems like LP duality, bin-packing.

UNIT-I **(Lecture: 09)**
Introduction and overview of complexity theory, class NP, NP-Completeness, reduction, randomized complexity classes, basics of probability theory, expectation and moments, basic distribution.

UNIT-II **(Lecture: 09)**
Vertex set cover greedy algorithm, hardness of approximating TSP, set cover, layering algorithm, shortest super string, steiner tree, metric steiner tree, metric TSP, minimum weight multi-way cut, minimum weight k-cut, k-center.

UNIT-III **(Lecture: 09)**
Knapsack problem, pseudo polynomial time algorithm, fully polynomial time approximation scheme, strong NP-hardness, bin-packing, asymptotic p-task, Euclidian TSP.

UNIT-IV **(Lecture: 09)**
LP-duality, LP-duality theorem, dual fitting based analysis for greedy set algorithm, rounding algorithm, set cover, randomized rounding.

UNIT-V **(Lecture: 09)**
Half integrity of vertex cover, primal dual schema, scheduling on unrelated parallel machine, primal dual algorithm, facility location, k-median problem, steiner network design.

TOTAL (L – 45 + T – 15): 60 PERIODS

TEXT BOOKS:
1. Approximation algorithm, Vijay B. Vazirani – springer publication.

REFERENCE BOOKS:
1. Approximation algorithm for NP-Hardness, pws publication.

Semester - III
ARTIFICIAL INTELLIGENCE LAB

Course Code: MCS 351 **L-0, T-0, P-4, C-2**

LIST OF EXPERIMENTS:

1. Write a LISP Program to solve the water-jug problem using heuristic function.
2. Create a compound object using Turbo Prolog.
3. Write a Prolog Program to show the advantage and disadvantage of green and red cuts.
4. Write a prolog program to use of BEST-FIRST SEARCH applied to the eight puzzle problem.
5. Implementation of the problem solving strategies: Forward Chaining, Backward Chaining, Problem Reduction.
6. Write a Lisp Program to implement the STEEPEST-ASCENT HILL CLIMBING.
7. Write a Prolog Program to implement COUNTE PROPAGATION NETWORK.

Semester III
MINOR PROJECT

Course Code: MCS391

L	T	P	C
0	0	4	2

Guidelines

Students will be required to undertake a project work of specialization in the Masters course. The topic of the project shall be finalized in consultation with the project guide allocated to the student by the Coordinator of the course and project guide would be the supervisor of the student.

Students will also be required to prepare an exhaustive report of the work carried out during the semester. The project work is to be done within the Institute.

The student at the end of the III semester will present his/her project report before a committee constituted by the course coordinator which would comprise of at least three members.

The marks by the external examiner would be based on the project report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned.

The marking shall be as per the evaluation details in the course outline.

Internal		External	Total
Guide Committee	Research	50	100
25	25		

Semester - III
PROJECT WORK PHASE-1

Course Code: MCS 399 **L-0, T-0, P-12, C-6**

Selection of Topic:

1. The student will submit a synopsis at the beginning of the semester for the approval of thesis topic to the Departmental Research Committee (DRC) (DRC shall be nominated by the Director), in a specified format. The format shall be as per the following guidelines-

Template for synopsis:

Topic:

(1)	Introduction	1 Page
(2)	Theory/Problem Statement	1-2 Pages
	(a) Background/Literature Review	
	(b) Hypothesis formulation	
(3)	Expected Contribution of the study	1-2 Pages
(4)	Research Methodology	1-2 Pages
(5)	References	1-2 Pages

2. Synopsis must be submitted within four weeks of the commencement of semester.
3. On acceptance of the synopsis/topic, a guide will be allotted to the student. The guide may be from within the faculty or from outside. In either of the cases the student is required to submit an acceptance certificate from the proposed guide. In case the propose guide is from outside his/her bio-data duly verified by the head of the organization where he/she is working must be submitted by the student. In this case it is the responsibility of the student to ensure that the guide is present in the college on the day of synopsis presentation and final presentation. It is to be noted that a person can not act as guide for more than five projects/thesis simultaneously. This condition is inclusive of non TMU students. This aspect will also be included in the certificate provided by the guide.

Dissertation work:

4. On confirmation of the topic and allocation of the guide, the student shall immediately start the thesis work.
5. He/she shall submit the progress of the work done by him/her in the form of a monthly report till the completion of the work and the submission of the thesis.
6. In phase-1 the student shall be evaluated based on the following-

(a)	Synopsis	(25%)
(b)	Frequency of interaction with the guide. (Progress report)	(25%)
(c)	Final Presentation of the work done during the semester.	(50%)

7. Serial 6-(a & c) shall be assessed by DRC and 6-(b) by the guide. The student is required to submit three hard copies of the proposed presentation duly countersigned by the guide to the departmental head. Student should generally restrict him/her self to the presentation slide submitted by him/her.

Internal		External	Total
Guide	Research Committee	50	100
25	25		

Semester - IV
PROJECT WORK PHASE-2
(CONTINUATION OF PHASE-1 (DISSERTATION AND PRESENTATION))

Course Code: MCS 499 **L-0, T-0, P-0, C-12**

Dissertation work

1. As brought out for MCS 399, the student shall meet the guide frequently for the necessary guidance for the Thesis work.
2. During the next six to eight weeks as well as the semester break, student should read the literature germane to the thesis topic. The progress of the Research / thesis work should continuously be informed to the guide.
3. In the end after necessary collection of data, literature survey and research work, the students must prepare a thesis report (Final Report). The report shall be arranged in the sequence consisting of the following:-
   (a) Top Sheet of transparent plastic.
   (b) Top cover.
   (c) Preliminary pages.
      (i) Title page
      (ii) Certification page.
      (iii) Sanctity Certificate by the Guide
      (iv) Acknowledgment.
      (v) Abstract.
      (vi) Table of Content.
      (vii) List of Figures/Photographs and Tables.
      (viii) Nomenclature.
   (d) Chapters (Main Material).
   (e) Appendices, if any.
   (f) Bibliography/ References.
   (g) Evaluation Form.
   (h) Back Cover (Blank sheet).
   (i) Back Sheet of Plastic (May be opaque or transparent).

(Note: Sample of above is given in succeeding paragraphs.)

4. Top Cover- **The sampled top cover shall be as Under:**

TITLE OF THE THESIS

NAME OF THE STUDENT WITH COURSE, STREAM, SEMESTER & SECTION.

Under The Guidance of

NAME OF THE GUIDE WITH DESIGNATION

(TMU LOGO)

Department of Computer Science & Engineering
College of Engineering
Teerthankar Mahaveer University
Moradabad-244001

MONTH AND YEAR

5. Title Page:- The Title Page cover shall be as under:

M.Tech. Thesis

(Submitted in Partial fulfillment of the requirement for the degree of

MASTER OF TECHNOLOGY
In
COMPUTER SCIENCE & ENGINEERING
by
Name of Student in capital Letters

(Roll No.)

Under the Guidance of

Name of the Guide with designation in capital letters

(TMU LOGO)

COLLEGE OF ENGINEERING
TEERTHANKAR MAHAVEER UNIVERSITY
N.H. 24, BAGARPUR, MORADABAD-244001

MONTH AND YEAR

6. Certification page:- This shall be as under:

Department of Computer Science & Engineering
College of Engineering
Teerthanker Mahaveer University
Moradabad-244001

The Thesis Report with Title "Topic of the Thesis." Submitted by Mr./Ms. (Name of the student) (Roll No.) may be accepted for being evaluated-

Date **Signature**
Place **(Name of guide)**

For Guide:- If you Choose not to sign the acceptance certificate above, please indicate reasons for the same from amongst those given below-

(a) The amount of time and effort put in by the student is not sufficient.

(b) The amount of work put in by the student is not adequate.

(c) The report does not represent the actual work that was done / expected to be done.

(d) The work is not original (in such case the guide should not sign the sanctity certificate).

(e) Any other objection (Please elaborate)

7. Sanctity certificate:- This shall be as under:

Department of Computer Science & Engineering
College of Engineering
Teerthanker Mahaveer University
Moradabad-244001

This Thesis Report with Title "Topic of the Thesis." Submitted by Mr./Ms. (Name of the student) (Roll No.) in partial fulfillment of the award of M.Tech degree is the original contribution by the student to the best of my knowledge.

Date **Signature**
Place **(Name of guide)**

8. **Abstract-** A portion of the dissertation evaluation will be based on the abstract. The abstract will be evaluated according to the adherence to related technical field and according to the format described below.

The dissertation abstract is an important record of the coverage of your topic and provides a valuable source of leading references for students. Accordingly, the abstract must serve as an introduction to your dissertation topic. The abstract will be limited to 500 words, excluding figures and tables (if any). The abstract will include references to the research articles upon which the dissertation is based as well as research articles that have served as key background material.

9. Table of Content:- This shall be as under

SAMPLE SHEET FOR TABLE OF CONTENTS

TABLE OF CONTENTS		
Chapter No	Title	Page No.
	Certificate	ii
	Sanctity Certificate	iii
	Acknowledgement	iv
	Abstract	v
	List of Figures/Photographs	vi
	List of Table	vii
	Nomenclature and symbols	viii
1	Introduction	1
	1.1	
	1.2	
	1.3	
2	……..	
3	…….....	
4	Appendices	
5	References/ Bibliography	
6	Evaluation sheet	……..

10. List of Figures and Tables:- This will be as under

List of Figures and Tables - sample entries are given below:

List of Figures

List of Tables - sample entries are given below:

List of Tables

Main Pages:-

The Main report should be divided in chapters (1, 2, 3 ….. etc.) and structured into sections (1.1, 1.2 ……..etc) and subsection (1.2.1, 1.2.2, ….. etc). Suitable title should be given for section and subsection where necessary.

Referencing style- wherever reference is given in the main pages it should have the following format.

The values of thermal conductivities for a variety of substances have been reported by Varma (1982). For polymers, however, the information is more limited and some recent reviews have attempted to fill the gaps (Batchelor and Shah, 1985).

For two authors -

(Batchelor and Kapur, 1985)

For more than two authors -

(Batchelor et al., 1986)

By same author/combination of authors in the same year -

(Batchelor, 1978a; Batchelor, 1978b; Batchelor et al., 1978)

12. Bibliography/References-

In the bibliography/ references list standard formats must be used. The typical formats are given blow-

Journal articles: -

David, A.B., Pandit, M.M. and Sinha, B.K., 1991, "Measurement of surface viscosity by tensiometric methods", Chem. Engng Sci.47, 931-945.

Books: -

Doraiswamy, L.K. and Sharma, M.M., 1984, "Heterogeneous Reactions- Vol 1", Wiley, New York, pp 89-90.

Edited books/Compilations/Handbooks: -

Patel, A.B., 1989, "Liquid -liquid dispersions", in Dispersed Systems Handbook, Hardy, L.C. and Jameson, P.B. (Eds.), McGraw Hill, Tokyo, pp 165-178.

Lynch, A.B. (Ed.), 1972, "Technical Writing", Prentice Hall, London.

Theses/Dissertations: -

Pradhan, S.S., 1992, "Hydrodynamic and mass transfer characteristics of packed extraction columns", Ph.D. Thesis, University of Manchester, Manchester, U.K..

Citations from abstracts: -

Lee, S. and Demlow, B.X., 1985, US Patent 5,657,543, Cf C.A. 56, 845674.

Personal Communications: -

Reddy, A.R., 1993, personal communication at private meeting on 22 October 1992 at Physics Department, Indian Institute of Technology, Delhi.

Electronic sources (web material and the like):

For citing web pages and electronic documents, use the APA style given at: http://www.apastyle.org/elecsource.html

13. Evaluation Form:- Three sheets of evaluation form should be attached in the report as under.

a. Evaluation form for guide and other Internal Examiner.

b. Evaluation form for external examiners.

c. Summary Sheet

14. **Evaluation form for Guide & Internal Examiners:-**

EVALUATION SHEET

(To be filled by the GUIDE & Internal Examiners only)

Name of Candidate:
Roll No:

Class and Section:

Please evaluate out of marks as indicated.

S. No.	Details	Marks (10) Guide	Marks (5) Int. Exam. 1	Marks (5) Int. Exam. 2
1	OBJECTIVE IDENTIFIED & UNDERSTOOD			
2	LITERATURE REVIEW / BACKGROUND WORK (Coverage, Organization, Critical review)			
3	DISCUSSION/CONCLUSIONS (Clarity, Exhaustive)			
4	SLIDES/PRESENTATION SUBMITTED (Readable, Adequate)			
5	FREQUENCY OF INTERACTION (Timely submission, Interest shown, Depth, Attitude)			
	Total			
	Average out of 100			

Signature: **Signature:** **Signature:**

Date: **Date:** **Date:**

EVALUATION SHEET

(To be filled by the External Examiner only)

Name of Candidate:
Roll No :

Please evaluate out of forty marks each.

S.No.	Details	Marks (20)
1	OBJECTIVE IDENTIFIED & UNDERSTOOD	
2	LITERATURE REVIEW / BACKGROUND WORK (Coverage, Organization, Critical review)	
3	DISCUSSION/CONCLUSIONS (Clarity, Exhaustive)	
4	POWER POINT PRESENTATION (Clear, Structured)	
5	SLIDES (Readable, Adequate)	
	Total (Out of 100)	

Signature:

Date:

EVALUATION SUMMARY SHEET

Name and Roll No.	Internal Examiners (100)	External Examiner (100)	Total (200)	Result (Pass/Fail)

Note:- The summary sheet is to be completed for all students and the same shall also be compiled for all students examined by External Examiner. The Format shall be provided by the course coordinator.

General points for the thesis

1. The report should be typed on A4 sheet. The Paper should be of 70-90 GSM.
2. Each page should have minimum margins as under

    a. Left 1.5 inches
    b. Right 0.5 Inches
    c. Top 1 Inch
    d. Bottom 1 Inch (Excluding Footer, If any)

3. The printing should be only on one side of the paper
4. The font for normal text should Times New Roman, 12 size for text and 14 size for heading and should be typed in double space. The references may be printed in Italics or in a different fonts.
5. The Total Report should not exceed 50 pages including top cover and blank pages.
6. A CD of the report should be pasted/attached on the bottom page of the report.
7. Similarly a hard copy of the presentation (Two slide per page) should be attached along with the report and a soft copy be included in the CD.
8. Three copies completed in all respect as given above is to be submitted to the guide. One copy will be kept in departmental/University Library, One will be returned to the student and third copy will be kept for the guide.
9. The power point presentation should not exceed 30 minutes which include 10 minutes for discussion/Viva.