GURUGRAM UNIVERSITY
SCHEME OF STUDIES & EXAMINATION FOR MASTER OF TECHNOLOGY COURSE IN
INFORMATION TECHNOLOGY
SEMESTER I

Sr. No.	Course No.	Course Title	Teaching Schedule			Marks			Duration of Exam
			L	T	P	Sessional	Exam	Total	
1	MTCE-601A	Computer System Software (Common with M. Tech (CSE) - I Semester)	4	-	-	50	100	150	3
2	MTIT-603A	Data Structures and Algorithm Design	4	-	-	50	100	150	3
3	MTCE-703A	Advance Database Management System (Common with M. Tech (CSE) - III Semester)	4	-	-	50	100	150	3
4	MTIT-607A / MTCE-607A	ELECTIVE I	4	-	-	50	100	150	3
5	MTCE-609A	OOPS Lab (Common with M. Tech (CSE) - I Semester)	-	-	4	50	50	100	3
6	MTIT-611A	Data Structures Lab	-	-	4	50	50	100	3
7	MTIT-613A	Seminar	-	-	2	50	-	50	-
		Total	16		10	350	500	850	-

ELECTIVE –I
MTIT-607A Software Engineering
MTCE- 607A Internet & Web Technology (Common with M. Tech (CSE) - I Semester)
Note:
1. The paper setter shall set each theory paper of 100 marks covering the entire syllabus and the same will beevaluated on marks.
2. The Sessional of Theory /Practical Courses shall also be evaluated on the basis of marks.
3. The choice of students for any elective shall not be binding on the Deptt. to offer it.

GURUGRAM UNIVERSITY
SCHEME OF STUDIES & EXAMINATION FOR MASTER OF TECHNOLOGY COURSE IN
INFORMATION TECHNOLOGY
SEMESTER II

Sr. No.	Course No.	Course Title	Teaching Schedule			Mark			Duration of Exam
			L	T	P	Sessional	Exam	Total	
1	MTIT-602A	Distributed Operating System	4	-	-	50	100	150	3
2	MTCE-602A	Soft Computing (Common with M. Tech (CSE)- II Semester)	4	-	-	50	100	150	3
3	MTCE-606A	Mobile & Wireless Communication (Common with M. Tech (CSE)- II Semester)	4	-	-	50	100	150	3
4	MTIT- 608A / MTCE -608A	Elective – II	4	-	-	50	100	150	3
5	MTCE-610A	Operating System Lab (Common with M. Tech (CSE)- II Semester)	-	-	4	50	50	100	3
6	MTCE-612A	Soft Computing lab (Common with M. Tech (CSE)- II Semester)	-	-	4	50	50	100	3
7	MTIT-614A	Seminar	-	-	2	50	-	50	-
		Total	16	-	10	350	500	850	-

ELECTIVE-II

MTCE – 608A Software Verification, Validation and Testing (Common with M. Tech (CSE) - II Semester)
MTIT – 608A Enterprise Resource Planning

Note:
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I Semester
MTCE-601A
C O M P U T E R S Y S T E M S O F T W A R E

Theory Marks	:	100	**L**	**T**	**P**
Sessional	:	50	4	0	0
Total	:	150			
Time	:	3 hrs			

1. **Introduction:** Introduction to Object Oriented Programming and Object Oriented Design.

2. **Concepts of classes**: Classes, objects, abstraction, encapsulation, inheritance, function overloading, virtual functions, function overriding, templates.

3. **Object modeling :** Class and object diagrams, association, aggregation, generalization, dynamic modeling and functional modeling.

4. **Introduction to UML :** Class diagrams, Use cases, interaction diagrams, collaboration diagrams, deployment diagrams.

5. **Principles of class design :** Open close principle, Liskov's substitution principle, dependency inversion principle, package cohesion principle etc.

6. **System Software design issue:** Design of assemblers, macro processors, linkers and loaders, dynamic linking.

Text Books:

1. Object Oriented Programming with C++ By Robert Lafore
2. Object Oriented Modeling and Design By James Rumbagh

Reference Books:

1. System Programming By Dhamdhere
2. System Programming By Donovan
3. Object Oriented Analysis & Design By Grady Booch

Note:

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MTIT- 603A
DATA STRUCTURES AND ALGORITHM DESIGN

			L	T	P
Theory Marks	:	100			
Sessional	:	50	4	0	0
Total	:	150			
Time	:	3 hrs			

1. **Introduction**: Overview of C++ classes, pointers, parameters passing, templates.

2. **Fundamentals of algorithm analysis:** Big „O‟ notations, Time and space complexity of algorithms, Elementary data structures and their applications.

3. **Arrays:** ordered lists, representation of arrays, sparse matrices, linked lists: singly and doubly linked lists, stacks, queues, multiples stacks and queues, Applications: polynomial arithmetic, infix, postfix and prefix arithmetic expression conversion and evaluations.

4. **Lists, Stacks & Queues:** Abstract Data Types, Representation & implementation of linked list, Doubly linked list, Circular linked lists, Stacks, array representation of stack. Applications of stacks. Queues, array representation of Queues, Circular queues, Deques, priority queues, Applications of Queues.

5. **Trees**: Introduction to trees, binary trees, representation and traversal of trees, operations on binary trees, types of binary trees, threaded binary trees, B Trees, AVL Trees, Application of trees.

6. **Graphs:** Representation, traversal, connected components, shortest path and transitive closure, topological sort, activity network, critical path, path enumeration. Dijkstra‟s Algorithm, Floyd Warshall‟s Algorithm, Minimum Spanning Tree Definitions.

7. **Searching & Sorting:** searching techniques, Hash function, Hash table, Internal sort: Radixsort, Insertion sort, Exchange sort, Selection sort, Quicksort, Mergesort, Heaport, External sort: K-way mergesort, balanced mergesort.

8. **Files:** Files, Queries and sequential organization; Cylinder surface indexing, Hashed Indexed, Tree Indexing, Sequential file organization, random file organization, Hashed file organization, Inverted files, cellular partitions.

Text Books:
1. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Booksource.
2. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss. Second edition, Pearson Edition. Asia.
3. Data Structures using C by A.M.Tenenbaum, Langsam, Moshe J. Augentem, PHI pub.

References Books:
1. Y. Langsam et. al., "Data Structures using C and C++", PHI.
2. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum"s outline, TMH

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<div align="center">**MTCE- 703A**</div>
<div align="center">**A D V A N C E   D A T A B A S E   M A N A G E M E N T   S Y S T E M**</div>

				L	T	P
Theory Marks	:	100		4	0	0
Sessional	:	50				
Total	:	150				
Time	:	3 hrs				

1. **Introduction :** Architecture. Advantages, Disadvantages, Data models, relational algebra, SQL, Normal forms.

2. **Query Processing :** General strategies for query processing, transformations, expected size, statistics in estimation, query improvement, query 'evaluation, view processing, query processor.

3. **Recovery :** Reliability, transactions, recovery in centralized DBMS, reflecting updates, Buffer management, logging schemes, disaster recovery.

4. **Concurrency :** Introduction, serializability, concurrency control, locking schemes, timestamp based ordering, optimistic scheduling, multiversion techniques, deadlocks.

5. **Object Oriented Data base Development :** Introduction, Object definition language, creating object instances, Object query language.

6. **Distributed Databases :** Basic concepts, options for distributing a database, distributed DBMS.

7. **Data warehousing :** Introduction, basic concepts, data warehousearchitecture, data characteristics, reconciled data lyer, data transformation, derived data layer, user interface.

8. **Object Relational Databases :** Basic concepts, enhanced SQL, advantages of object relational approach.

Text Books :
1. An Introduction to database systems by Bipin C. Desai, Galgotia Publications.
2. Modern Database Management by Feffray A. Lioffer, Mary B. Prescotl, Fred R Mcfadden, Pearson Education.
3. Principles of distributed database systems, by M.Tamer & Valduriez, Pearson education.
4. Database system concepts by Korth, TMH.

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ELECTIVE-I

MTIT- 607A
SOFTWARE ENGINEERING

			L	T	P
Theory Marks	:	100			
Sessional	:	50	4	0	0
Total	:	150			
Time	:	3 hrs			

1. **Introduction:** Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models, Overview of Quality Standards like ISO 9001, SEI – CMM.

2. **Software Requirements analysis & specifications:** Requirement engineering, requirement elicitation techniques like FAST, QFD & Use case approach, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.

3. **Software Project Planning:** Size Estimation like lines of Code & Function Count, Cost Estimation Models, Static single & Multivariable Models, COCOMO, COCOMO-II, Putnam resource allocation model, Risk Management.

4. **Software Design:** Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.

5. **Software Metrics:** Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics, Information Flow Metrics

6. **Software Testing:** Testing process, Design of test cases, functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing, Path Testing, Data flow and mutation testing, Unit Testing, Integration and System Testing, Debugging, Alpha & Beta Testing, Regression Testing, Testing Tools & Standards.

7. **Software Reliability:** Importance, Hardware Reliability & Software Reliability, Failure and Faults, Reliability Models, Basic Model, Logarithmic Poisson Model, Calender time Component.

8. **Software Maintenance:** Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.

Text Books:

1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International.
2. R. S. Pressman, "Software Engineering – A practitioner"s approach", McGraw Hill Int. Ed.,

Reference Books:
1. R. Fairley, "Software Engineering Concepts", Tata McGraw Hill.
2. P. Jalote, "An Integrated approach to Software Engineering", Narosa.
3. Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN.
4. James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons.
5. I. Sommerville, "Software Engineering", Addison. Wesley

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MTCE- 607A
INTERNET & WEB TECHNOLOGY

			L	T	P
Theory Marks	:	100			
Sessional	:	50	4	0	0
Total	:	150			
Time	:	3 hrs			

1. **Introduction:** Internet Protocol model, Internet Addresses, IP routing concepts, Table Driven and next hop routing, other routing related protocols, Internet Access through PPP, SLIP, WWW, Web servers, Browsers.

2. **Router Technology:** Hubs, Bridges, Routers, Routing Protocols, Routing Security, switch based routing, routing in unicast environment, multicasting, mobile routing.

3. **Web Server Technology:** Web's Robot global access to information, HTML, HTTP, Accessing a web server, publishing on web server, secure HTTP, Secure Sockets Layer, WWW Proxies, IIS, Case study of apache web server.

4. **Browsing Systems:** Searching and web casting Technique, popular web servers, basic features bookmarks, cookies, progress indicators, customization of browsers, browsing tricks, next generation web browsing, search engines, architecture of search engines, search tools, web crawlers, types of crawlers, scalable web crawler, incremental crawler, parallel crawler, focused crawler, agent based crawler, case study of IE.

5. **Web site Development:** HTML, XHTML, DHTML, XML, Structuring data, namespaces, XML schema Documents, Document Object Model, DOM methods, Simple API for XML, XSL, SOAP, ASP. Net. Security and management issues for creating a web site.

Text Books :
1. Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp, TMH.
2. Internet & World Wide Programming, Deitel, Deitel & Nieto, Pearson Education.
3. Beginning XHTML by Frank Boumpery, Cassandra Greer, Dave Ragett, Jenny Raggett, Subastian Schnitenbaumer & ted Wugofski, WROX press (Indian shroff Publ. SPD).
4. Complete reference guide to java script, Aron Weiss, QUIE
5. Intranet & Internet Engg. By Minoli
6. Internet & Web Technology By Rajkamal.

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MTCE- 609A

OOPS LAB

L	T	P
0	0	4

Practical based on theory paper Computer System Software

MTIT- 611A   **DATA STRUCTURES LAB**

L	T	P
0	0	4

Practical based on theory paper Data Structure & Algorithm Design

MTIT- 613A   **SEMINAR**

L	T	P
0	0	2

On the latest topic

II Semester

MTIT- 602A

DISTRIBUTEDOPERATING SYSTEM

			L	T	P
Theory Marks	:	100	4	0	0
Sessional	:	50			
Total	:	150			
Time	:	3 hrs			

1. **Distributed computing systems fundamentals:** Introduction to Distributed computing systems, Models, Popularity. Distributed computing system, Design issues of Distributed operating system. Distributed computing environment, security.

2. **Message Passing:** Features of a good Message Passing System. Issues in IPC by Message Passing Synchronization, Bullring, Multidatagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure handling, Group Communication.

3. **Remote Procedure Calls:** RPC Model, Implementing RPC Mechanism. Stub Generation. RPC Messages, Marshaling Arguments and Results. Server Management, Parameter, Passing semantics, call semantics, Communication protocols for RPCs, Client, Server Building, Exception handling, Security RPC in Heterogeneous Environments, Lightweight RPC.

4. **Distributed Shared Memory**: General Architecture of DSM systems. Design and implementation Issues of DSM, Granularity, Structure of Shared Memory Space. Consistency models, Replacement strategy, Thrashing, Synchronization: Clock Synchronization. Event Ordering, Mutual Exclusion, Deadlock, Election Algorithms.

5. **Resource Management:** Features of global scheduling algorithm. Task assignment approach, Load, Balancing and Load approach.

6. **Process Management:** Introduction, Process Migration, Threads.

7. **Distributed File Systems:** Features of good DFS, File models, File Accessing models. File Sharing Semantics, File, Caching schemes, File Replication, Fault Tolerance, Automatic Transactions, Design Principles, Case study: DCE Distributed File Service.

Text Books:
1. Distributed Operating Systems concepts and design, .K. Sinha (PHI).
2. Modern Operating System, Singhal

Reference Books:
1. Distributed Systems concepts and design, G.Coulouris, J.Dollimore & T. Kindberg
2. Modern Operating System, A.S. Tanenbaum(PHI).

Note:
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MTCE- 602 A

SOFT COMPUTING

			L	T	P
Theory Marks	:	100			
Sessional	:	50	4	0	0
Total	:	150			
Time	:	3 hrs			

1. **Neural Networks**: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning ANN training algorithms-perceptrons, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

2. **Fuzzy Logic :** Introduction to fuzzy Logic, Classical and Fuzzy Sets, Overview of Classical Sets, Membership Function, Fuzzy rule generation.

3. **Operations on Fuzzy Sets**: Compliment, Intersection, Union, Combination of Operations, Aggregation Operation.

4. **Fuzzy Arithmetic**: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.
   Classical Logic, Multi-valued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

5. **Uncertainty based information:** Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

Text Books:

1. Neural Networks by Simon Haykin
2. Neural Networks by Kosko
3. Fuzzy Logic & Fuzzy Sets by Klir & Yuan
4. Neutral networks by Satish Kumar

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MTCE- 606A
MOBILE AND WIRELESS COMMUNICATION

			L	T	P
Theory Marks	:	100			
Sessional	:	50	4	0	0
Total	:	150			
Time	:	3 hrs			

1. **Introduction:** Application, history, market, reference model and overview. Wireless Transmission-Frequencies, signals, antennae, signal propagation, multiplexing, modulation, spread spectrum, cellular system.
2. **MAC and Telecommunication System:** Specialized MAC, SDMA, FDMA, TDMA-fixed TDM, classical ALOHA, Slotted, ALOHA, CSMA, DAMA, PKMA, reservation TDMA. Collision avoidance, polling inhibit sense multiple access. CDMA, comparison, CSM-mobile services, architecture radio interface, protocol, localization, calling handover, security, new data services, Introduction to W'LL.
3. **Satellite and Broadcast Systems:** History, Applications, GEO, LEO, MEO, routing, localization, handover in satellite system. Digital audio and video broadcasting.
4. **Wireless LAN :** IEEE 802 11-System and protocol architecture, physical lyer.MAC layered management. Bluetooth-User scenarios, physical layer, MAC layer, networking, security and link management.
5. **Mobile network Layer :** Mobile IP-goals, assumption, requirement, entities, terminology, IP packet delivery.
   Agent advertisement and discovery, registration, tunneling, encapsulation, optimization, reverse tunneling, IPv6.
   DHCP. Adhoc Networks-routing, destination sequence distance vector, dynamic source routing, hierarchical algorithm, algorithm, alternative metric.
6. **Mobile Transport Layer:** Traditional TCP, Indirect 'TCP, Snooping; TCP, Mobile TCP fast retransmission, Transaction oriented TCP.
7. **Support for Mobility:** File, System, WWW-HIT,HTML, system architecture. WAP architecture, wireless datagram, protocol, wireless transport layer security, wireless transaction protocol, application environment, telephony application.

Text Books:
1. Jochen Schiller,"Mobile Communication", Pearson Education.
2. Lee,"Mobile Cellular Telecommunications" McGRAW-Hill.
3. Wireless Communications : Theodore S Rappaport; Pearsons

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Elective II

<div align="center">

MTCE- 608A
SOFTWARE VERIFICATION, VALIDATION AND TESTING
</div>

			L	T	P
Theory Marks	:	100			
Sessional	:	50	4	0	0
Total	:	150			
Time	:	3 hrs			

1. **Introduction:** Definition of testing, goals, psychology, model for testing, effective testing, limitations of testing.
2. **Testing terminology and Methodology:** Definitions of Failure, faults or bug, error, incident, test case, test ware, life cycle of bug, bug effects, bug classification, test case design, testing methodology, development of test strategy, verification, validation, testing life cycle model, testing techniques, testing principles.
3. **Verification and validation:** Verification activities, verification of requirements, verification of HL design, verification of data design, verification of architectural design, verification of UI design, verification of LL design, intro to validation activities.
4. **Black Box testing:** Boundary value analysis, equivalence class partitioning, state table based testing, decision table based, graph based testing, error guessing.
5. **White Box testing:** Logic coverage criteria, basic path testing, graph matrices, loop testing, data flow testing, mutation testing.
6. **Static testing:** Types of static testing, technical reviews, inspections, inspection process, structured walk through, walk through process, adv. of static testing.
7. **Validation Testing:** Unit testing, drivers stubs, integration testing, methods, effect of module coupling and cohesion, functional testing, system testing, recovery testing, security testing, stress testing, performance testing, usability testing.
8. **Test Automation and debugging:** S/w measurement and testing, testing metrics, tools, debugging design of practical test cases, reducing no of test cases, regression testing and test case mgmt.

Text Books:
1. Software Engg. By Pressman
2. Software Engg. By Dr. K.K. Aggarwal & Yogesh Singh
3. Software Engg. By Jawadekar
4. Software Testing By Aditya Mathur, Pearson Edu

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MTIT- 608A
ENTERPRISE RESOURCE PLANNING

			L	T	P
Theory Marks :		100	4	0	0
Sessional	:	50			
Total	:	150			
Time	:	3 hrs			

1. **ERP: Enterprise Perspective**: An Overview, Features of ERP, MIS Integration, ERP drivers, Trends in ERP, ERP in India.

2. **ERP: System Perspective:** Management Information System, Operations Support System, DSS, Transaction Processing System, Network Structure of ERP System, ERP
Work flow, Process modeling for ERP Systems, Communication in ERP Systems, OLTP, (On Line Transaction Processing), OLAP (On Line Analytical Processing), Enterprise Integration Application Tools for ERP.

3. **ERP: Resource Management Perspective** : Business Modules in ERP Packages, Finance, Production, Human Resource, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution, Resource Management, Business Process Reengineering, Relationship between ERP & BPR, ERP Implementation Life Cycle, Implementation methodology, ERP Project Management & Monitoring.

4. **ERP: Key Issues:** ERP and E,Commerce, ERP Culture, ERP and CRM, ERP and SCM, ERP Selection Issues, ERP in Public Sector Enterprises, Pre and Post Implementation Issues, ERP Vendors, Key ERP Consultants in India, Future Directions in ERP.

Text Books:
1. Alexis, Leon, ERP Demystified. Tata McGraw Hill.
2. Garg, V.K. and Venket, Krishna, N.K., ERP Concepts and Practices, PHI Publications.
3. Sadagopan, S. ERP: A Managerial perspective. Tata McGraw Hill.
4. Langenalter, A. Gary, Enterprise Resources Planning and Beyond. St. Lucie Press, USA.
5. Imhoff, C. Loftis Lisa & Geiger, G. Jonathan, Building the Customer Centric Enterprise. John Wiley & Sons.
6. Shankar, Ravi & Jaiswal, S., Enterprise Resource Planning. Galgotia Publications.
7. Diwan, Parag & Sharma, Sunil, Enterprise Resource Planning: Manager''s Guide. Excel Books.

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MTCE-610A
OPERATING SYSTEM LAB

L	T	P
0	0	4

Practical based on theory paper Distributed Operating System

MTCE-612A
SOFT COMPUTING LAB

L	T	P
0	0	4

Practical based on theory paper Soft Computing

MTIT-612A
SEMINAR

L	T	P
0	0	2

On the latest topic