JK Lakshmipat University

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

2 – Years M. Tech Programme

(BATCH: 2015-2017)

Syllabus & Scheme of Examination

JK Lakshmipat University, Jaipur

Institute of Engineering and Technology

Department of Computer Science and Engineering

Course Structure for the M.Tech Computer Science Engineering Batch 2015- 17

Semester	Courses							(L T P) Credits Hrs/Week
I	Analysis and Design of Algorithms	Advanced Computer Networks	Advanced DBMS	Software Systems Lab I	Elective I	Seminar & Presentation		(12212) 20
	MTCS101 (3 10) 4	MTCS102 (3 0 2) 4	MTCS103 (3 12) 5	MTCS152 (0 0 4) 2	(3 0 0) 3	MTSEM 101 (0 0 4) 2		26
II	Advanced Compilers	Computers and Network Security	Distributed Computing	Advanced Professional Communication	Software Systems Lab II	Elective-II	Seminar & Presentation	(13 212) 21
	MTCS201 (3 0 2) 4	MTCS202 (3 1 0) 4	MTCS203 (3 0 0) 3	MTLA201 (1 1 2) 3	MTCS251 (0 0 4) 2	(3 0 0) 3	MTSEM 201 (0 0 4) 2	27
III	Professional Practice	Dissertation Stage-I	Elective- III	Elective - IV				(9 0 4) 19
	MTPP301 (3 0 4) 5	MTDS301 ( ) 8	(3 0 0) 3	(3 0 0) 3				
IV	Dissertation Stage- II							( ) 20
	MTDS401 ( ) 20							

List of Elective Courses

Elective I	ICT for Socio Economic Development (MTCS121)	Internet Technologies (MTCS122)	Digital System Design (MTCS123)					
Elective II	Advanced Computer Architecture (MTCS221)	Information Security & Cyber Laws (MTCS222)	Graph Theory (MTCS223)	Object Oriented Analysis & Design (MTCS224)				
Elective III	Speech & Language Processing (MTCS321)	Genetic Algorithms (MTCS322)	New Trends in IT (MTCS323)	Computational Complexity (MTCS324)	Software Engineering (MTCS325)	Artificial Intelligence Techniques (MTCS326)		
ElectiveIV	Mobile Computing (MTCS421)	Pattern Recognition (MTCS422)	Parallel Processing (MTCS423)	Distributed Systems (MTCS424)	Real Time Systems (MTCS425)	Quantum Computing (MTCS426)	Dataware housing & Mining (MTCS427)	Embedded Systems (MTCS428)
	Spatial Databases (MTCS429)	Human Computer Interaction (MTCS430)	Organization of Web Information (MTCS431)	Computer Vision (MTCS432)	Advanced Computer Graphics (MTCS433)	Ubiquitous Computing (MTCS434)	Database Administration (MTCS435)	

Total Credits: 80

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS101	Analysis & Design of Algorithm	3	1	0	4

Evaluation Scheme (Theory)								
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Introduction to Algorithm, The role of algorithms in computing, Asymptotic notation, asymptotic analysis of recurrence relations, probabilistic analysis and randomized algorithm, the hiring problem, indicator random variables
- Divide and conquer paradigm – Merge sort, Inversion counting
- Dynamic Programming – Matrix Chain multiplication, Longest Common subsequence, optimal binary search trees
- Greedy Algorithm –Activity Selection problem, Theoretical foundation of greedy algorithm, Task Scheduling problem, Comparison of dynamic programming and Greedy algorithm with Knapsack as case study
- Graphs: Review of Graphs (Representation, Depth First Search, Breath First search, Kruskal and Prim Algorithm, Dijkstra's Algorithm
- Flow networks: Ford-Fulkerson method, comparison Networks, Zero-one Principle, Bitonic Sorting Network, Merging Network, Sorting Network
- Matrix Operation (Properties, Strassen's Algorithm, Solution of linear equation, Matrix inversion)
- Polynomial and FFT, Representation of polynomials, The DFT and FFT, efficient FFT implementation
- Number–Theoretic Algorithm, Elementary number-theoretic notion, Greatest common divisor, modular arithmetic, solving modular linear equation, the Chinese remainder theorem
- NP-Completeness, Polynomial time, Polynomial time verification, NP-completeness and reducibility, NP-Completeness proofs
- Approximation Algorithms- the vertex-cover problem, The Traveling-Salesman Problem, The set covering problem

Text Books:

T1. T. H. Cormen, C. E. Leiserson, R.L. Rivest, C. Stein, Introduction to Algorithms, 2nd Edition, PHI.
T2. A.V. Aho, J. E. Hopcroft, J.D. Ulman, The Design & Analysis of Computer Algorithms, Addison Wesley.

Reference Books:

R1. V. Manber, "Introduction to Algorithms – A Creative Approach", Addison Wesley.

R2. Ellis Harwitz and SartazSahani, “Fundamentals of Computer Algorithms”, Galgotia.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 102	Advanced Computer Networks	3	0	2	4

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	20	50	30	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Introduction, overview of network building blocks, Network architecture with layers and protocols, Overview of data link concepts, IP addressing, forwarding, and routing, BGP and adaptive routing, Multi-Protocol Label Switching (MPLS), MPLS Architecture and related protocols, Traffic Engineering (TE) and TE with MPLS

- Transport protocols and congestion control, Quality of Service (QoS) with MPLS technology, Network recovery and restoration with MPLS technology

- Virtual Private Networks (L2, L3, and Hybrid), Metro Networks, Metro technologies, Ethernet over SONET, Resilient Packet Rings, Ethernet transport, Metro Ethernet services, L2 switching, L3/L2VPNs for Metro, Pseudowire (PW) concept (multisegment/redundant PW's), Ethernet over MPLS, VPLS

- Optical Networks, WDM, Wavelength routing, LightPaths/Lighttrails, Wavelength conversion and rerouting, Network Survivability and Provisioning, IP over DWDM, Next generation Optical Networks, Optical Circuit Switching, Optical Burst Switching, Optical Packet Switching

- GMPLS (Generalized MPLS), MPL (lambda) S, GMPLS architecture

- Other Topics : Sensor Networks, Mobile Internet, Home networking, TriplePlay/IPTV

Syllabus (Practical)

- **Kernel** configuration, compilation and installation : Download / access the latest kernel source code from kernel.org,compile the kernel and install it in the local system.Try to view the source code of the kernel
- **Virtualisation** environment (e.g., xen, kqemu or lguest) to test an applications, new kernels and isolate applications. It could also be used to expose students to other alternate OSs like *BSD
- **Compiling from source:** learn about the various build systems used like the auto* family, cmake, ant etc. instead of just running the commands. This could involve the full process like fetching from a cvs and also include autoconf, automake etc.,

- Introduction to **packet management system**: Given a set of RPM or DEB, how to build and maintain, serve packages over http or ftp and also how do you configure client systems to access the package repository.
- **Installing various software packages** either the package is yet to be installed or an older version is existing. The student can practice installing the latest version. Of course, this might need internet access. Install samba and share files to windows Install Common Unix Printing System(CUPS)
- **Write userspace drivers using fuse** — easier to debug and less dangerous to the system (Writing full-fledged drivers is difficult at student level)
- **GUI programming**: a sample programme – using Gambas since the student
- have VB knowledge. However, one should try using GTK or QT
- **Version Control System** setup and usage using RCS, CVS, SVN
- **Text processing with Perl**: simple programs, connecting with database e.g., MYSQL
- **Running PHP** : simple applications like login forms after setting up a LAMP stack
- **Running Python** : some simple exercise – e.g. Connecting with MySql database
- **Set up the complete network** interface using ifconfig command like setting gateway, DNS, IP tables, etc.

Textbook:

T1. Forouzan, *Data Communications and Networking*, 4e, Mc Graw Hill.

Reference Books:

R1. Youlu Zheng, Shakil Akhtar, *Networks for Computer Scientists and Engineers*, Oxford University Press.

R2. Andrew S. Tanenbaum, *Computer Networks*, Fourth Edition", Prentice Hall.

R3. William Stallings, *Computer Networking with Internet Protocols and Technology*, Pearson Education, 2004.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS103	Advanced DBMS	3	1	2	5

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	20	50	30	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- OODBMBS & ORDBMS: Overview of Object-Oriented concepts & characteristics, Objects, OIDs and reference types, Database design for ORDBMS, Comparing RDBMS, OODBMS & ORDBMS
- Advance Database Management System –Concepts & Architecture, Spatial data management
- Web based systems: Overview of client server architecture,Databases and web architecture, N-tier, Architecture, Business logic – SOAP, Multimedia databases, Mobile database
- Parallel databases: Introduction, Parallel database architecture, I/O parallelism, Inter-query and Intra-query parallelism, Interoperational and Intra-operational parallelism, Design of parallel systems
- Distributed Databases:Introduction, DDBMS architectures,Homogeneous and Heterogeneous Databases,Distributed data storage,Distributed transactions, Commit protocols, Availability, Concurrency control & recovery in distributed databases, Directory systems
- Knowledge base Systems: Integration of expert in database, application & object database overview
- Data Warehousing: Introduction to Data warehousing, Architecture, Dimensional data modeling - star, snowflake schemas, fact constellation, OLAP and data cubes Operations on cubes
- Data preprocessing -need for preprocessing,data cleaning, data integration and transformation, data reduction
- Data Mining: Introduction to data mining, Introduction to machine learning, Descriptive and predictive data mining, outlier analysis, clustering, k means algorithm, Classification - decision tree, association rules - apriori algorithm,
- Information Retrieval & XML data: Introduction to information retrival, Indexing for Text search, Web search engines, Managing text in DBMS, Data model for XML, XML DTD's,Domain specific DTD's, Querying XML data

Syllabus (Practical)

PL/SQL:

Introduction , Declaring Variables , Writing Executable Statements , Interacting with Oracle Server , Writing Control Structures , Working with Composite Data Types , Writing Explicit Cursors , Writing Implicit Cursors , Handling Exceptions , Creating Procedures , Creating Functions , Managing Subprograms , Creating Packages , More Package concepts , Oracle supplied Packages , Manipulating Large Objects , Creating Database Triggers , More Trigger concepts

Text Books:

R1. RamezElmsari, ShamkantNavathe , *Fundamentals of Database Systems*, , Fifth edition, Pearson Education

R2. Ivan Bayross , *SQL, PL/SQL the Programming Language of Oracle*, 3rd edition

Reference Books:

T1. Date C. J., *An Introduction to Database Systems*, Addison-Wesley Longman (8th Ed)

T2. Database system concepts, 5th Edition –by Abraham Silberschatz, Henry Korth, S,Sudarshan, (McGraw Hill International)

T3. Data Mining: Concepts and systems, by Jiaweinan, MichelineKamber, (Morgan Kaufmann publishers)

T4. Database systems: Design implementation and management, by Rob Coronel, 4th Edition, (Thomson Learning Press)

T5. Database Management Systems by Raghu Ramkrishnan, Johannes Gehrke Second Edition, (McGraw Hill International)

T6. Database Management System by Alexis Leaon, Mathews Leon, (leon press)

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS152	Software Systems Lab-I	0	0	4	2

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
-	-	-	-	-	20	50	30	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others
**The ratio of weightage between Theory and Practical content will be 60%: 40%.

Syllabus (Practical)

- Linux introduction and file system - Basic Features, Advantages, Installing requirement, Basic Architecture of Unix/Linux system, Kernel, Shell. Linux File system-Boot block, super block, Inode table, data blocks, How Linux access files, storage files, Linux standard directories. Commands for files and directories cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less, creating and viewing files using cat, file comparisons – cmp&comm, View files, disk related commands, checking disk free spaces. Partitioning the Hard drive for Linux, Installing the Linux system, System startup and shut-down process, init and run levels.
- Shell programming- Basic of shell programming, Various types of shell available in Linux, comparisons between various shells, shell programming in bash, read command, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automate system tasks.
- Simple filter commands – pr, head, tail, cut, paste, sort, tr. Flter using regular expressions – grep, egrep, and sed. awk programming – report printing with awk
- LATEX course outline:-Introductory notions. Handling errors, Formatting text and mathematics, Formatting text and mathematics, Mathematical formulae, Producing and including graphics in a LATEX file.

Text Books:

T1. SumitabhaDas ,*UNIX – Concepts & Applications* (Third Ed.), Tata McGraw Hill Publications.

T2. Graham Glass & King Ables, *Unix for programmers and users* (Third Ed.), Pearson Education India. (Low Prices Edition)

Reference Books:

R1. Cristopher Negus, *Red Hat Linux 9 Bible*, IDG Books India Ltd.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS123(Elective-I)	Digital System Design	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others
**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- BOOLEAN ALGEBRA AND LOGIC GATES: Review of binary number systems - Binary arithmetic - Binary codes - Boolean algebra and theorems - Boolean functions - Simplifications of Boolean functions using Karnaugh map and tabulation methods - Logic gates
- COMBINATIONAL LOGIC: Combinational circuits - Analysis and design procedures - Circuits for arithmetic operations - Code conversion - Introduction to Hardware Description Language (HDL)
- DESIGN WITH MSI DEVICES: Decoders and encoders - Multiplexers and demultiplexers - Memory and programmable logic - HDL for combinational circuits
- SYNCHRONOUS SEQUENTIAL LOGIC: Sequential circuits - Flip flops - Analysis and design procedures - State reduction and state assignment - Shift registers - Counters - HDL for sequential logic circuits, Shift registers and counters.
- ASYNCHRONOUS SEQUENTIAL LOGIC: Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables - Race-free state assignment - Hazards.

Text Books:

T1. M.Morris Mano, "Digital Design", 3rd edition, Pearson Education, 2002.

Reference Books:

R1. Charles H.Roth, Jr. "Fundamentals of Logic Design", 4th Edition, Jaico Publishing House, 2000.
R2. Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2003.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS121(Elective-I)	ICT for Socio-Economic Development	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus

- Development and Knowledge-Based Societies
- Infrastructure and Policy
- Poverty and ICTs
- Growth and ICTs
- Education and ICTs
- Health and ICTs
- Gender Equality and ICTs
- Trade/Market Access and ICTs

Recommended Readings

- Avgerou, C. & Walsham, G. (eds) (2000) *Information Technology In Context: Studies From The Perspective Of Developing Countries,* Ashgate, Aldershot, UK
- Castells, M. (2006*) Mobile Communications and Society: A global Perspective*, Cambridge, Mass.: MIT Press.
- Heeks, R. (2002) 'i-Development not e-development', *Journal of International Development*, 14(1), 1-12
- Heeks, R. (2008) ICT4D2.0: the next phase of applying ICT for international development, *IEEE Computer*, 41(6), 26-33
- Heeks, R. (2010) Do information and communication technologies (ICTs) contribute to development?, *Journal of International Development*, 22(5), 625-640
- Krishna, S. &Madon, S. (eds) (2003) *The Digital Challenge: Information Technology in the Development Context,* Ashgate, Aldershot, UK
- Prahalad, C. (2004) *Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits*, Pearson Education.
- Unwin, T. (ed.) (2009) *ICT4D*, Cambridge University Press, Cambridge, UK
- World Bank (1998) *World Development Report: Knowledge for Development*, World Bank, Washington, DC
- Warschauer, M. (2003) *Technology and Social Inclusion: Re-thinking the Digital Divide*, Cambridge, Mass.: MIT Press.

Online:

- Electronic Journal of IS in Developing Countries, journal www.ejisdc.org

- ICT for Development www.ict4d.org
- Information Technology for Development, journal
- Information Technologies and International Development, journal www.itidjournal.org/
- Development Informatics Working Paper Series, IDPM, University of Manchester, UK http://bit.ly/DevInWP
- Zunia/Development Gateway: ICTs for Development, World Bank, Washington, DC http://zunia.org/cat/ict/
- Various (2002) Information Society, 18(2), special issue on ICTs in Developing Countries

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS122(Elective-I)	Internet Technologies	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus

Web 2.0:

search, content networks, user-generated content, blogging, social networking, social media, tagging, social bookmarking, rich Internet applications, web services, location-based services, Web 2.0 monetization and business models, future of the Web.

Extensible Hypertext Markup Language (XHTML):

XHTML syntax, headings, linking, images, special characters and horizontal rules, lists, tables, forms, internal linking, meta elements.

Cascading Style Sheets (CSS):

separation of content and presentation, inline styles, embedded style sheets, conflicting styles, kinking external style sheets, positioning elements, backgrounds, element dimensions, box model and text flow, media types, building a CSS drop-down menu, user style sheets.

JavaScript:

Client side scripting, control statements, functions, arrays, objects, events.

Document object model:

Objects and collectionsExtensible Markup Language (XML)

RSS:

Advantages and applications, structuring data, XML namespaces, Document Type Definitions (DTDs), XML vocabularies, RSS.

Text book:

Deitel H.M. and P. J. Deitel, Internet & World Wide Web. How to Program, 4/e, Prentice Hall, ISBN 0131752421, 2008

References

1. Web Design The complete Reference, Thomas Powell, Tata McGrawHill

2. HTML and XHTML The complete Reference, Thomas Powell, Tata McGrawHill

3. JavaScript 2.0 : The Complete Reference, Second Edition by Thomas Powell and Fritz Schneider 4. PHP : The Complete Reference By Steven Holzner, Tata McGrawHill

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTSEM101	Seminar & Presentation	0	0	4	2

S. No.	Evaluation Component	Duration (Hours)	Marks (100)	Nature of Component
1.	Presentation	Weekly	20	Open Book
2.	Report(Soft Copy)	Weekly	20	Open Book
3.	Assignment	Continuous	10	Open Book
4.	Final Presentation		25	Open Book
5.	Final Report(Hard Copy)		25	Open Book

Syllabus (Practical)

Operation Procedure

1. Student has to devote full semester for **MTSEM101** course.
2. Student has to report to the Supervisor regularly.
3. Seminars' evaluation has to be carried out in the presence of a two member Committee comprising.
4. Experts in the relevant area constituted by the Supervisor.

Final Thesis to be submitted has to be in formal hard bound cover bearing of the Institute emblem.

Reference Books:

Based on literature survey to be done with peer reviewed journals.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

2 – Years M. Tech Programme

(BATCH: 2015-2017)

Syllabus
Semester Second

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 201	Advanced Compilers	3	0	2	4

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	20	50	30	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- **Basics of Compiler Design**
  Planning a compiler, approaches to compiler design, compiler development tools – Lex and Yaac.

- **Code Generation**

  Efficient code generation for expressions, code generator generators, code generation for pipelined machines, register allocation techniques.

- **Code Optimization**

  Classical theory of data flow analysis, bi-directional data flows, unified algorithm for data flow analysis, theory of data flow analysis, program representation for optimization – SSA form.

- **Parallel Compilers**

  Motivation and overview, Structure of a Parallelizing compiler. Parallelism detection: data dependence, direction vectors, loop carried and loop independent dependences.

- **Compilation for Distributed Machines**

  Data partitioning, instruction scheduling, register allocation, machine optimization. Dynamic compilation.

- **Advanced Topics**
  Just in time (JIT) compilers, Auto scheduling compilers.

Syllabus (Practical)

Practice of Lex/Yacc of Compiler Writing, program to check whether a string belongs to grammar or not, program to parse a tree,program to find leading terminals, program to find trailing terminals, program to check whether a grammar is left recursive and remove left recursion, program to remove left factoring, program to show all operations of a stack

Text Books:

T1. Aho, Ulman, Sethi, “Compiler Principles and Techniques”, Addison Wesley

T2. Muchnik, “Advanced Compiler Design and Implementation”, Kauffman(1998)

Reference Books:

R1. Wolf M., “Optimizing Super Compiler for Super Computers”, Pitman(1989)
R2. Banerjee U., kluwer, “Loop Optimization”, PHI (1997)

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 202	Computer and Network Security	3	1	0	4

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others
**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.
- Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffle-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption.
- Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.
- Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

- IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET). System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

Reference Books:

R1. William Stallings, “Cryptography and Network Security: Principals and Practice”, Prentice Hall, New Jersy.

R2. Johannes A. Buchmann, “Introduction to Cryptography”, Springer-Verlag.

R3. Bruce Schiener, “Applied Cryptography”.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 203	Distributed Computing	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others
**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's& vectors logical clocks, Causal ordering of messages, global state, termination detection. Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms,performance metric for distributed mutual exclusion algorithms.
- Distributed Deadlock Detection: system model, resource vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.
- Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent. Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.
- Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions: Flat

and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

- Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm. CORBA Case Study: CORBA RMI, CORBA services.

Reference Books:

R1. Singhal& Shivaratri, “Advanced Concept in Operating Systems”, McGraw Hill

R2. Coulouris, Dollimore, Kindberg, “Distributed System: Concepts and Design”, Pearson Ed.

R3. Gerald Tel, "Distributed Algorithms", Cambridge University Press

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTLA 201	Advanced Professional Communication	1	1	2	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	20	50	30	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Introduction to the course.
- Characteristic Features of Effective Communication and Ways to Overcome Barriers to Communication
- Importance of Non-Verbal Communication
- Importance of Paralinguistic Features and Vocal Cues
- Group Discussion, Job Interviews
- Public Speaking
- Business Letters and Resume
- Business Reports, Technical Proposals
- E-mail Writing, Other Business Writings

Syllabus (Practical)

- Decided by teacher in to the lab according to topics in theory.

Text Book:

T1. Sanjay Kumar and PushpLata, *Communication Skills,* New Delhi: OUP, 2011.

Reference Books:

R1. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, Second Edition, New Delhi: OUP, 2011.

R2. Krishna Mohan and Meenakshi Raman, *Effective English Communication,* New Delhi: Tata-McGraw Hill, 2000.

R3. Krishna Mohan and N.P.Singh, *Speaking English Effectively*, New Delhi: Macmillan,1994.

R4. V. Sasikumar and P.V. Dhamija, *Spoken English: A Self-Learning Guide to ConversationPractic*e, Tata-McGraw Hill, 2007.

R5. Norman Lewis, *Word Power Made Easy*, Delhi: GoyalSaab Publishers and Distributors, 1994.

R6. A.J.Thomson and A.V.Martinet, *A Practical English Grammar,* 4th Edition, New Delhi: OUP, 1999.

R7. Asha Kaul, *Business Communication*, Second Edition, New Delhi: PHI, 2010.

R8. Edgar Thorpe and Showick Thorpe, *Objective English*, 2nd Edition, New Delhi: Pearson Education, 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 251	Software Systems lab II	0	0	4	2

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
-	-	-	-	-	20	50	30	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Practical)

- Development of programs using Software Architectural Styles
- Development of library information system by adopting RM-ODP standard
- Development of programs using Design Patterns
- Development of internet based online shopping system
- Two way communication using TCP and UDP
- Development of Simple Web Server
- File Transfer using TCP
- Implementation of page replacement algorithm
- Implementation of Scheduling algorithms
- Development of simple Web Services
- Implementation of Chat Server Application
- Implementation of SDES and RSA algorithm
- Implementation of Query Optimization techniques

LATEX course outline:-Introductory notions. Handling errors, Formatting text and mathematics, Formatting text and mathematics, Mathematical formulae, Producing and including graphics in a LATEX file

Text Books-

T1. UNIX – Concepts & Applications (Third Ed.) – Sumitabha Das, Tata McGraw Hill Publications.
T2. Unix for programmers and users (Third Ed.) – Graham Glass & King Ables, Pearson Education India. (Low Prices Edition)

Reference Books:-

R1. Red Hat Linux 9 Bible – Cristopher Negus, IDG Books India Ltd.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 221 (Elective II)	Advance Computer Architecture	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- 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
- Instruction level parallelism (ILP)- over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP
- 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.
- 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.
- Inter connection networks and clusters- interconnection network media – practical issues in interconnecting networks- examples – clusters- designing a cluster

Text Books:

T1. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier)

Reference Books:

R1. Computer Architecture and parallel Processing, Kai Hwang and A., Briggs International Edition, McGraw-Hill.

R2. Advanced Computer Architectures, DezsoSima, Terence Fountain, Peter Kacsuk, Pearson.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 222 (Elective II)	Information Security and Cyber Laws	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

Fundamentals of Cyber Law

- Jurisprudence of Cyber Law
- Overview of Computer and Web Technology
- Introduction to Indian Cyber Law
- Overview of General Laws and Procedures in India

E-commerce- Legal issues

- Electronic Commerce
- Digital Signatures - technical issues
- Digital Signatures - legal issues
- Electronic Contracts

Intellectual Property Issues and Cyberspace - The Indian Perspective

- Overview of Intellectual Property related Legislation
- Copyright law & Cyberspace
- Trademark law & Cyberspace
- Law relating to Semiconductor Layout & Design

Cybercrime and Digital Evidence - Indian Perspective

- Penalties & Offences under the IT Act, 2000
- Offences under the Indian Penal Code, 1860
- Investigation and adjudication of cyber crimes
- Digital evidence

Intellectual Property Rights

- Nature and Enforcement, International Character of IPRs, Role of IPRs in Economic Development.
- Patents: Introduction To Patents, Object of Patent Law, Inventions not Patentable, Obtaining Patents, Rights and Obligations of a Patentee.
- Copyrights: Introduction to Copyrights, Subject-Matters of Copyright, Rights Conferred by Copyright, Infringement, Assignment and Licensing Of Copyrights, Copyright Societies, International Copyright, Performers' Rights.
- Trademarks: Functions, Significance and Types of Trademarks, Distinctiveness and Deceptive Similarity, Registration Procedure, Trademark Registry, Grounds for Refusal of Registration of Trademarks, Concurrent Use, Character Merchandising.

Text Book:

T1. PavanDuggal ,Cyberlaw - The Indian Perspective,2009 Edition, Saakshar Law Publications, Delhi.

Reference Book:

R1. Narayanan,P.,IntellectualPropertyLaw,EasternLawHouse(2007)3rd ed

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 223 (Elective II)	Graph Theory	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Graph, Sub Graph, Connected component , spanning trees , Shortest path algorithm, Cut- sets and Cut Vertices: Cut Sets, Properties of Cut-sets, All Cut-Sets in a Graph, Fundamental Circuits and Cut-Sets, Connectivity and Separability, Network flows, 1 isomorphism, 2 isomorphism. Combinatorial Vs. Geometric Graphs, Planar Graphs, Kuratowski's Two Graphs, Different Representations of a Planar Graph, Detection of planarity, Geometric Dual, Combinatorial Dual, Matrix Representation of Graphs.

- Chromatic Number, Chromatic Partitioning, Chromatic, Polynomial, Vertex Cover, Matching's, Path cover, Connectivity, Hamilton city, Vertex Coloring, Edge Coloring, Four Color Problem and Other Coloring Problems.

- Basic combinatorial numbers, recurrences, generating functions,Latin squares, partitions, partially orders sets,

- Types of Enumeration, Counting Labeled Trees, Counting Unlabeled Trees, Polya's Counting Theorem, Graph Enumeration with Polya's Theorem

Textbook:

T1. Graph Theory with Applications to Engineering and Computer Science, NarasinghDeo, PHI.

ReferenceBooks:

R1.Graph Theory and Combinatorics, Dr. D.S. Chandrasekharaiah, Prism.

R2. Introduction to Graph Theory, Chartrand Zhang, TMH.

R3.Graph Theory Modeling, Applications, and Algorithms, GeirAgnarsson& Raymond Geenlaw,Pearson Prentice Hall.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 224 (Elective II)	Object Oriented Analysis and Design	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- FUNDAMENTAL: -An overview of object oriented systems development Object basics Object oriented systems development life cycle.
- OBJECT ORIENTED METHODOLOGIES: -Rumbaugh methodology, Booch methodology – Jacobson methodology, Patterns, Frameworks, Unified approach, Unified modeling language, Use case diagram, Class diagram, Interaction diagram, Package diagram, State diagram, Activity diagram and Implementation diagram.
- OBJECT ORIENTED ANALYSIS: -Identifying use cases Object analysis Classification, Identifying object relationships, Attributes and methods.
- OBJECT ORIENTED DESIGN: -Design axioms, Designing classes, Access layer, Object storage, Object interoperability.
- SOFTWARE QUALITY AND USABILITY: - Designing interface objects, Software quality assurance, System usability, Measuring user satisfaction.
- SYSTEM DESIGN: - Estimating Performance, Making a reuse plan, breaking system into subsystems ,identifying concurrency, allocation of subsystems, management of data storage, Handling Global resources, choosing a software control strategy, Handling boundary condition, common Architectural style.

Textbook:

T1. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education.

Reference Books:

R1.Oriented Modeling and Design with UML michaelBlaha and James Rambaugh - second edition

R2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,"Design patterns:Elements of Reusable object-oriented software", Addison-Wesley.

R3. Object-Oriented Methods: A Foundation, James Martin, et. al, Prentice-Hall.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTSEM201	Seminar & Presentation	0	0	4	2

EvaluationComponent	Duration (Hours)	Marks (100)	
Presentation	Mid Sem 1	20	
Report(Soft Copy)	Mid Sem 1	20	
Assignment	Continuous	10	
Final Presentation	End Sem	25	
Final Report(Hard Copy)	End Sem	25	

Syllabus (Practical)

Operation Procedure

5. Student has to devote full semester for **MTSEM201** course.
6. Student has to report to the Supervisor regularly.
7. Seminars' evaluation has to be carried out in the presence of a two member Committee comprising.
8. Experts in the relevant area constituted by the Supervisor.

Final Thesis to be submitted has to be in formal hard bound cover bearing of the Institute emblem.

Reference Books:

Based on literature survey to be done with peer reviewed journals.

JK Lakshmipat University

LaliyaKa Vas, P.O. Mahapura, Ajmer Road, Jaipur 302 026

Ph.: +91-141-7107500

INSTITUTE OF ENGINEERING AND TECHNOLOGY

2 Year M.TechProgramme

(Branch: Computer Science & Engineering)

Batch 2015-17

SEMESTER-THIRD

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTPP 301	Professional Practice	3	0	4	5

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	20	50	30	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Each Student will be assigned by Director, IET to a faculty member who will act as the instructor. Students and faculty members covering a broad area will be grouped in a panel. Panel will normally consists of 4 to 8 students and 2 to 4 faculty members.
- Within one week of registration, the student should plan the details of topics of lectures, laboratory experiments and developmental activities and broad topic of research etc. in consultation with his assigned instructor. Two copies of written outline of the total work should be submitted to the instructor within a week.
- In a particular discipline group, instructors belonging to broad areas will from the panel and will nominate one of them as the panel coordinator. The coordinator together with other instructors will draw a complete plan of lectures to be delivered by all the students in the semester. Each student will present 3 to 4 lectures, which will be attended by all students and instructors. There lectures will be evenly distributed over the entire semester the coordinator will announce the schedule for the entire semester and will fix suitable meeting time in the week.
- Each student will also make one presentation about his finding on the broad topic of research. The final report has to be submitted on the form of a complete research proposal. The reference and bibliography should be cited in a standard format. The research proposal should contain (i) topic of research (II) background and current status of research work in the area as evidence from the literature review (III) scope of the proposed work (IV) Methodology (V) Reference and bibliography.
- A report covering laboratory experiments, developmental activities and code for professional conduct and ethics in the discipline.
- The panel will jointly evaluate all components of the course throughout the semester and the mid semester grade will be announced by the respective instructor to his student.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTDS301	Dissertation Stage - I				8

OPERATION DETAILS:

- Each Student will be assigned by Director, IET to a faculty member who will act as the instructor. Students and faculty members covering a broad area will be grouped in a panel.
- Within 2 weeks of registration, the student should submit the work plan with time line and developmental activities in consultation with his assigned supervisor. Two copies of written outline of the total work should be submitted to the supervisor within 2 weeks.
- Mid semester grading will be done by the supervisor based on the performance of the student in research and development activities. The student should submit the Mid semester report to the supervisor in the 9^{th} week of the semester, which shows the progress of the student till the mid semester.
- The student is also required to submit End-semester report which provides the details of work done by the student in research and development area. End semester report should be submitted to the supervisor in the 15^{th} week of the semester. The end semester report should also contain a research proposal.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 321(Elective III)	Speech & Language Processing	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Introduction to Language and Speech
- Estimation Techniques, and Language Modeling
- Parsing and Syntax
- The EM Algorithm in NLP
- Stochastic Tagging, and Log-Linear Models
- Probabilistic Similarity Measures and Clustering
- Machine Translation
- Discourse Processing: Segmentation, Anaphora Resolution
- Dialogue Systems
- Natural Language Generation/Summarization
- Unsupervised Methods in NLP

Text Book:

1. Jurafsky, David, and James H. Martin. *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition*. Upper Saddle River, NJ: Prentice-Hall, 2000. ISBN: 0130950696.
2. Manning, Christopher D., and HinrichSchütze. *Foundations of Statistical Natural Language Processing*. Cambridge, MA: 1999. ISBN: 0262133601.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 322(Elective III)	Genetic Algorithms	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Evolutionary Computation as a Process Modeling tool and its historical perspective,
- Simple Genetic Algorithm and its major operators: Reproduction, Crossover, Mutation etc.
- Mathematical Construction of Genetic Operators.
- Schema Theorem of John Holland. Variants of Binary Encoded Genetic Algorithms: Micro Genetic Algorithm, Messy
- Genetic Algorithm, Greedy Genetic Algorithm etc. and their usage in Engineering Problems.
- Hamming Cliffs. Real Coded Genetic Algorithms, Differential Evolution and their recent usage in Engineering Process
- Modeling. Uni-modal vs. Multi-modal problems in Genetic Algorithms and their significance in the context of Process Simulation.
- Handling of Constraints. The role Pareto-optimal problems in engineering design and their solution strategies based upon Genetic Algorithms. Genetic Algorithms as classifier. Usage in process control. Examples of applications in major engineering and scientific disciplines.

Text Book:

Evolutionary Computation: A Unified Approach by Kenneth A. DeJong, MIT Press, 2006, ISBN: 0262041944

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 323(Elective III)	New Trends in IT	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Scope&Objective:

The basic aim of this course is to prepare the students for the M.Tech. Thesis / Dissertation by making them aware of the new and latest ongoing research in the field of CSE / IT.

Methodology:

Eachstudenthastogothrough different resources available with LRC likeIEEExploreandhastostudy3-4papersperweekanddiscusswiththecourseinstructor.Attheendofeachweekstudenthastogivethepresentationononeofthechosenpaperinconsentwiththecourseinstructor.

EvaluationScheme:

Acontinuousevaluationbasedonstudent'spresentationwilltakeplace.

Each presentation is for 10 marks evaluation and a minimum of 10 presentations are to be given by each student in whole semester. In case of more than 10 presentations, best of 10 presentations in terms of marks obtained by that student will be taken into consideration.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 324(Elective III)	Computational complexity	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Serial and Parallel Models of Computatio, Languages, Grammars, Machines , Time, Space and Other Resource Limitations , Properties of Models , Complexity Classifications , Reductions and their Applications , Languages Complete for a Class , Approximation Algorithms , Interactive Proofs
- Problem Definitions ,Models of Computation ,FSM Language Recognition ,TM Language Recognition , The Classes P and NP, NP-complete Languages, The classes **P** and **NP**, **NP**-complete languages, Proof that CIRCUIT SAT is **NP**-complete, Complexity Classes, Proper Resource Bounds, Hierarchy Theorems, Savitch's Theorem, Review of Space Complexity, Complements of Complexity Classes, co**NP** ,Polynomial Time Hierarchy

Reference Books:

1. M.R. Garey and D.S. Johnson, Computers and Intractability, A Guide to the Theory of NP-Completeness, Freeman 1986.
2. V.J. Rayward-Smith: A first Course in Computability, Blackwell Scientific Publications, 1986.
3. H. Lewis and C. Papadimitriou: Elements of the Theory of Computation, Prentice Hall, 1998.
4. J Hopcroft and J Ullman: Introduction to automata theory, languages, and computation, Addison-Wesley, 1979.
5. Michael Sipser: Introduction to the Theory of Computation

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 325(Elective III)	Software Engineering	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory):

- Introduction to Software Engineering; Prescriptive Process Models; Agile Process; Extreme Programming (XP); Brief Overview of Other Agile Process Models: Adaptive Software Development, Scrum

- Introduction; Core Principles of Process and Practice; Principles Guiding Each Framework Activity; Requirements Engineering; Groundwork for Understanding of Software Requirements; Overview of Eliciting Requirements, Developing Use Cases, Building the Requirements Model; Negotiating Requirements; Validating Requirements; Requirement Modeling Strategies; Overview of Flow-Oriented Modeling, Behavioral Modeling; Requirements Modeling for WebApps

- Design Concepts; Design Model; Architectural Styles, Architectural Design; Assessing lternative Architectural Designs; Architectural mapping Using Data Flow, Three Views of Component; Designing Class-Based Components; Conducting Component-Level Design; Component-Level Design for WebApps; Designing Traditional Components, Component-Based Development;

- Overview of Review Techniques, A Strategic Approach to Software Testing; Strategic Issues; Test Strategies for Conventional Software; Test Strategies for Object Oriented Software; Test Strategies for WebApps; System Testing; Debugging; Software Testing Fundamentals; White-Box Testing; Basis Path Testing; Control Structure Testing; Black-Box Testing; Testing for Specialized Environments; Patterns and Software Testing; Overview of Testing O-O Applications; Testing OOA and OOD Models; O-O Testing Strategies; O-O Testing Methods; Testing Methods Applicable at Class Levels; Inter-Class Test Case Design; Testing Concepts for WebApps; An Overview of Testing Process for WebApps; Content Testing; User Interface Testing; Component-Level Testing; Navigation Testing; Configuration Testing; Security Testing; Performance Testing

- Framework for Product Metrics; Metrics for Requirements Model; Metrics for Design Model; Design Metrics for WebApps; Metrics for Source Code; Metrics for Testing; Metrics for Maintenance; Software Project Estimation; Decomposition Techniques; Empirical Estimation Models; Estimation for Object Oriented Projects Overview of Project Scheduling

Text Books:

T1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", 7th Edition, McGraw Hill Publications

Reference Books:

R1. Sommerville, "Software Engineering", 8th Edition, Pearson Education
R2. Waman S. Jawadekar, "Software Engineering – Principles and Practices", TMGH Publication
R3. Pankaj Jalote, "Software Engineering – A Precise Approach", Wiley India

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 326(Elective III)	Artificial Intelligence Techniques	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- **Intelligent Agents** : Agents and environments - Good behavior – The nature of environments –structure of agents - Problem Solving - problem solving agents – example problems – searching for solutions – uniformed search strategies - avoiding repeated states – searching with partial nformation.
- **Searching Techniques:** Informed search and exploration – Informed search strategies – heuristic function – local search, algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments - Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems - Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an element of chance.
- **Knowledge Representation:** First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation - Ontological Engineering - Categories and objects – Actions - Simulation and events - Mental events and mental objects.
- **Learning:** Learning from observations - forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming - Statistical learning methods - Learning with complete data - Learning with hidden variable - EM algorithm - Instance based learning - Neural networks - Reinforcement learning – Passive reinforcement learning - Active reinforcement learning - Generalization in reinforcement learning.
- **Applications** Communication – Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation – Discourse understanding – Grammar induction - Probabilistic language processing - Probabilistic language models – Information retrieval – Information Extraction – Machine translation.

Text Book:

T1. Elaine Rich and Kevin Knight, *Artificial Intelligence*, 2nd Edition, Tata McGraw-Hill, 2009.

Reference Book:

R1. George Lugar, *Artificial Intelligence,* Pearson Publication, Fifth edition.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 421(Elective IV)	Mobile Computing	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

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

- 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.

Text Books:

T1. Jochen Schiller, "Mobile Communications", Addison-Wesley.(Chapters 4, 7, 9, 10, 11), second edition, 2004.

T2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)

Reference Books:

R1. . Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October2004,

R2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.

R3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, secondedition, 2003.

R4. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 422(Elective IV)	Pattern Recognition	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Basics of pattern recognition
- Bayesian decision theory : Classifiers, Discriminant functions, Decision surfaces, Normal density and discriminant functions
- Discrete features
- Parameter estimation methods: Maximum-Likelihood estimation, Gaussian mixture models, Expectation-maximization method,
- Bayesian estimation
- Hidden Markov models for sequential pattern classification: Discrete hidden Markov models, Continous density hidden Markov models
- Dimension reduction methods: Fisher discriminant analysis, Principal component analysis
- Non-parametric techniques for density estimation : Parzen-window method, K-Nearest Neighbour method
- Linear discriminant function based classifiers: Perceptron, Support vector machines
- Non-metric methods for pattern classification: Non-numeric data or nominal data, Decision trees
- Unsupervised learning and clustering : Criterion functions for clustering, Algorithms for clustering: K-means, Hierarchical and other methods Cluster validation

Text Books:

T1. R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2001

T2. S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009

T3. C.M.Bishop, Pattern Recognition and Machine Learning, Springer, 2006

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 423(Elective IV)	Parallel Processing	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Introduction to Parallel Processing: Flynn's classification, SIMD and MIMD operations, Shared Memory vs. message passing multiprocessors, Distributed shared memory, Hybrid multiprocessors
- Shared Memory Multiprocessors: SMP and CC-NUMA architectures, Cache coherence protocols, Consistency protocols, Data pre-fetching, CC-NUMA memory management, SGI 4700 multiprocessor, Network Processors
- Interconnection Networks: Static and Dynamic networks, switching techniques, Routers, Internet techniques
- Message Passing Architectures: Message passing paradigms, Grid architecture, Workstation clusters, User level software
- Scheduling: Multiprocessor Programming Technique, Scheduling and mapping, Internet web servers, P2P, Content aware load balancing

Text Books:

T1: Introduction to Parallel Computing 2nd Edition, AnanthGrama, Anshul Gupta, George Karypis, Vipin Kumar, The Addison Wesley Publishing Company, ISBN 0-201-64865

Reference Books:

R1: D.L. Eager, J. Zahorjan, and E.D. Lazowski. Speedup Versus Efficiency in Parallel Systems, IEEE Transactions on Computers, Vol 38 No 3, March 1989.

R2: Joseph JaJa, An Introduction to Parallel Algorithms, Addison-Wesley, 1992.

R3: S. G. Akl, Design and Analysis of Parallel Algorithms, Prentice-Hall, 1989.

R4: T. Leighton, Introduction to Parallel Algorithms and Architectures, Morgan Kaufmann, 1992.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 424(Elective IV)	Distributed Systems	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory):

- Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges.
- System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system,
- absence of global clock, shared memory, Logical clocks, Lamport's& vectors logical clocks, Causal ordering of messages, global state, termination detection.
- Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.
- Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection,
- Distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement
- Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.
- Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.
- Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL& Millicent.
- Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.
- Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

- Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks,
- Transaction recovery. Replication: System model and group communication, Fault -tolerant services, highly available services, Transactions with replicated data.
- Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem,
- Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm.CORBA Case Study: CORBA RMI, CORBA services.

Text/Reference Books:

1. Singhal& Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill

2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design",

Pearson Ed.

3. Gerald Tel, "Distributed Algorithms", Cambridge University Press

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 425(Elective IV)	Real Time System	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Introduction: Real-time systems, Properties, Misconceptions, Real-Time tasks, Scheduling results.
- Uniprocessor Real-Time System: Task Scheduling, Resource access control protocols, Overload handling, Energy-aware scheduling, Feedback control scheduling.
- Multiprocessor Real-Time System: Task Scheduling, Fault-tolerance, Resource reclaiming.
- Distributed Real-Time System: Global scheduling - transfer, information, and location policies..
- Real-time Networks: Real-time channel, Packet scheduling, Real-Time MAC protocols.
- Real-time OS: RT-Linux, Case studies of RTOS, Real-time middleware.
- Other Issues: Architecture and software engineering issues, Case studies

Textbook:

T1. Jane W. S. Liu, *Real-time Systems,* Prentice Hall, 2000, An in-depth introduction to real-time systems

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 426(Elective IV)	Quantum Computing	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory):

- FOUNDATION :
    - Overview of traditional computing – Church-Turing thesis – circuit model of computation – reversible computation – quantum physics – quantum physics and computation – Diracnotation and Hilbert Spaces – dual vectors – operators – the spectral theorem –functions of operators – tensor products – Schmidt decomposition theorem
- QUBITS AND QUANTUM MODEL OF COMPUTATION
    - State of a quantum system – time evolution of a closed system – composite systems –measurement – mixed states and general quantum operations – quantum circuit model –quantum gates – universal sets of quantum gates – unitary transformations – quantumcircuits
- QUANTUM ALGORITHMS
    - Superdense coding – quantum teleportation – applications of teleportation – probabilisticversus quantum algorithms – phase kick-back – the Deutsch algorithm – the Deutsch-Jozsa algorithm – Simon's algorithm – Quantum phase estimation and quantum FourierTransform – eigenvalue estimation
- QUANTUM ALGORITHMS – II
    - Order-finding problem – eigenvalue estimation approach to order finding – Shor'salgorithm for order finding – finding discrete logarithms – hidden subgroups – Grover'squantum search algorithm –

amplitude amplification – quantum amplitude estimation –quantum counting – searching without knowing the success probability

- QUANTUM COMPUTATIONAL COMPLEXITY AND ERROR CORRECTION
    - Computational complexity – black-box model – lower bounds for searching – generalblack-box lower bounds – polynomial method – block sensitivity – adversary methods –classical error correction – classical three-bit code – fault tolerance – quantum errorcorrection – three- and nine-qubit quantum codes – fault-tolerant quantum computation

Text Book:

T1. P. Kaye, R. Laflamme, and M. Mosca, “An introduction to Quantum Computing”,

Oxford University Press, 1999.

Reference Book:

R1. V. Sahni, “Quantum Computing”, Tata McGraw-Hill Publishing Company, 2007.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 427(Elective IV)	Data Warehousing & Mining	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory):

- 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.
- 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.
- 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.

- 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.
- 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.

Text Books:

T1. Data Mining – Concepts and Techniques Han &Kumber

T2. Data Mining Techniques – Arun Pujari, University Press

T3. Building the DataWarehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd.

Reference Books:

R1. Data warehousing in the real world – Sam Anahory , Dennis Murray. Pearson ednasia.

R2. Data warehousing fundamentals – Paulrajponnaiahwiley student, edition

R3. The data warehouse life cycle tool kit – Ralph kimballwiley student, edition

R4. Data mining introductory and advanced topics –Margaret h dunham, pearson education

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 428(Elective IV)	Embedded Systems	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory):

- Embedded Computing: Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples
- The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.
- Basic Assembly Language Programming Concepts : The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051.
- Data Transfer and Logical Instructions.
- Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.
- Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.
- Introduction to Real – Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment
- Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real- Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for

- Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.
- Introduction to advanced architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.

Text Books:

T1. Computers and Components, Wayne Wolf, Elseveir.

T2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

T3. An Embedded Software Primer, David E. Simon, Pearson Education.

Reference Books:

R1. Embedding system building blocks, Labrosse, via CMP publishers.

R2. Embedded Systems, Raj Kamal, TMH.

R3. Micro Controllers, Ajay V Deshmukhi, TMH.

R4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.

R5 Microcontrollers, Raj kamal, Pearson Education.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 429(Elective IV)	Spatial Database	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus:

- Introduction: Current Status Spatial Information Tech., Spatial Data & Spatial Database Systems, Application Domains of Geographical Information Systems (GIS), Common GIS data types and analysis.Conceptual Data Models for spatial databases (e.g. pictogram enhanced ERDs).
- Logical data models for spatial databases: raster model (map algebra), vector model (OGIS/ SQL1999). Compression methods for raster and vector data. Process and retrieve geographic data from spatial databases using OGIS/SQL1999 interface and other specific interface (SDK) from database vendors,
- Physical data models for spatial databases: Clustering methods (space filling curves), Storage methods (R-tree, Grid files), Concurrency control (R-link trees), Design conceptual data models for spatial databases using a ER diagram approach.
- Query Optimization: strategies for range query, nearest neighbor query, spatial joins (e.g. tree matching), cost models for new strategies, impact on rule based optimization.
- Spatial networks: Conceptual, logical, and physical data models, query languages, graph algorithms, access methods.Optimize spatial database by applying spatial indexing technologies, pyramid structure, data compressing, etcBasic operations of the Oracle Spatial databases and PostGIS/PostgreSQL open-source spatial database.
- Mining spatial database: auto-correlation, co-location, spatial outliers, classification (SAR, MRF).
- Rastor databases: Raster image operations, content-based retrieval, spatial data warehouses.
- Introduction to modern commercial and open-source (free) spatial databases products, e.g. Oracle 10g Spatial, ArcSDE 9.x, PostGIS 1.3/PostgreSQL 8.2, etc.
- Advances and trends in spatial databases: network data model, spatio-temporal data model, spatial data mining, etc.
- Application Trends: Spatio-temporal Databases, Location based services, Social media, Crowd Sourcing, Global climate change etc.

Textbook

- PostGIS in Action by Regina O. Obe and Leo S. Hsu (ISBN: 1935182269)

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 430(Elective IV)	Human Computer Interaction	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus:

- Introduction: HCI foundation and history Interactive system design (theory and practice) Concept of usability - definition and elaboration, HCI and software engineering, GUI design and aesthetics, Prototyping techniques
- Model-based Design and evaluation: Basic idea, introduction to different types of models, GOMS family of models (KLM and CMN-GOMS), Fitts' law and Hick-Hyman's law, Model-based design case studies, Guidelines in HCI: Shneiderman's eight golden rules, Norman's seven principles, Norman's model of interaction, Nielsen's ten heuristics with example of its use, Heuristic evaluation, Contextual inquiry, Cognitive walkthrough.
- Empirical research methods in HCI: Introduction (motivation, issues, research question formulation techniques), Experiment design and data analysis (with explanation of one-way ANOVA), Hierarchical task analysis (HTA), Engineering task models and Concur Task Tree (CTT).
- Dialog Design: Introduction to formalism in dialog design, design using FSM (finite state machines), State charts and (classical) Petri Nets in dialog design, Cognitive architecture: Introduction to CA, CA types, relevance of CA in IS design, Model Human Processor (MHP), Object Oriented Programming: OOP-Introduction, OOM- Object Oriented Modeling of User Interface Design, Design -Case Studies.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 431(Elective IV)	Organization of Web Information	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus:

- Introduction: Modeling Web Data, Database Technology and Web Applications, Semistructured data, Web Data Management with XML, XML and syntax, XML Data Model, XLink, and XPointer
- XPath and XQuery: Regular Path Expressions, XPath Basics, XPath steps and expressions, Path evaluations, axes, node tests, predicates, XQuery Syntax, FLWOR expression, advanced features, XUpdate
- Typing: Automata on ranked trees, unranked trees, XML Schema, other schema languages, Graph semistructured data, graph bisimulation, data guides, XML query evaluation, XML identifiers, XML evaluation techniques
- Ontologies, Querying and Data Integration: RDF, RDF Schema, OWL, Description Logic, Querying data through ontologies, Querying RDF data, querying through RDFS 8, Answering queries though DL, Global-as-view (GAV) and Local-as-view (LAV) mediation, Ontology based mediation, Peer-to-peer data management systems
- Building Web scale applications:Web search, web crawlers, web information retrieval, Web graph mining and hot topics in web search, Distributed systems, failure management, Required properties of a distributed system, P2P networks, Hash-based structures, distributed indexing, Distributed computing with MapReduce

Text Books

S. Abiteboul, I. Manolescu, P. Rigaux, M. Rousset and P. Senellart, Web Data Management, Cambridge University Press, 2012

S. Abiteboul, P. Buneman and D. Suciu, Data on the Web: From Relational to Semistructured Data to XML, Morgan Kaufman Publisher

Reference Books:

R. Szeliski ***Computer Vision: Algorithms and Applications***, Springer, 2011.

D.A. Forsyth and J. Ponce, ***Computer Vision: A Modern Approach***, Prentice Hall, 2002.

V.S. Nalwa,***A Guided Tour of Computer Vision***, Addison-Wesley, 1993.

R. Klette, K.Schluns, and A. Koschan, ***Computer Vision: Three-Dimensional Data from Images***, Springer Singapore, 1998.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 432(Elective IV)	Computer Vision	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus:

- Introduction: What is computer vision, A brief history.
- Image formation: Geometric primitives and transformations, Photometric image formation, The digital camera
- Image processing: Point operators, Linear filtering, More neighborhood operators, Fourier transforms, Pyramids and wavelets, Geometric transformations, Global optimization
- Feature detection and matching: Points and patches, Edges, Lines
- Segmentation: Active contours, Split and merge, Mean shift and mode finding, Normalized cuts, Graph cuts and energy-based methods
- Feature-based alignment: 2D and 3D feature-based alignment, Pose estimation, Geometric intrinsic calibration
- Structure from motion: Triangulation, Two-frame structure from motion, Factorization, Bundle adjustment, constrained structure and motion
- Dense motion estimation: Translational alignment, Parametric motion, Spline-based motion, Optical flow, Layered motion
- Image stitching: Motion models, Global alignment, Compositing
- Computational photography: Photometric calibration, High dynamic range imaging, Super-resolution and blur removal, Image matting and compositing, Texture analysis and synthesis
- Stereo correspondence: Epipolar geometry, Sparse correspondence, Dense correspondence, Local methods, Global optimization, Multi-view stereo
- 3D reconstruction: Shape from X, Active rangefinding, Surface representations, Point-based representations, Volumetric representations, Model-based reconstruction, Recovering texture maps and albedos
- Image-based rendering: View interpolation, Layered depth images, Light fields and Lumigraphs, Environment mattes, Video-based rendering
- Recognition: Object detection, Face recognition, Instance recognition, Category recognition, Context and scene understanding, Recognition databases and test sets

Books:

R. Szeliski ***Computer Vision: Algorithms and Applications***, Springer, 2011.

D.A. Forsyth and J. Ponce, ***Computer Vision: A Modern Approach***, Prentice Hall, 2002.

V.S. Nalwa,***A Guided Tour of Computer Vision***, Addison-Wesley, 1993.

R. Klette, K.Schluns, and A. Koschan, ***Computer Vision: Three-Dimensional Data from Images***, Springer Singapore, 1998.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 433(Elective IV)	Advanced Computer Graphics	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus:

- Advanced Rendering Techniques: Photorealistic rendering Global Illumination Participating media rendering Ray tracing Monte Carlo algorithm Photon mapping
- Texture Synthesis and Image Processing: Environmental mapping; Texture synthesis; Anisotropic image smoothing;
- Volume Rendering: Volume graphics overview; Marching cubes; Direct volume rendering;
- Surfaces and Meshes: Subdivision; Distance fields and level sets;
- Physically-based Modeling: Stable fluid solver; Lattice Boltzmann method;

Text and Reference Books:

1. Tomas Moller and Eric Haines Real-Time Rendering A K Peters Ltd, 2nd edition, 2002
2. Alan H. Watt and Mark Watt, Advanced Animation and Rendering Techniques : Theory and Practice, Addison-Wesley, 1992
3. Matt Pharr and Greg Humphreys, Physically based rendering, Morgan Kaufmann, 2004
4. James D. Foley, Andries van Dam, Steven K. FeinerandJohn F. Hughes, Computer Graphics : Principles & Practices, Addison Wesley, 2nd edition in C, 1995

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 434(Elective IV)	Ubiquitous Computing	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Introduction to Ubiquitous Computing: Past, present, future; the ubiquitous computing market, m-Business, Challenges and future of Ubiquitous Computing Device Technology for Ubiquitous Computing: Hardware, Human-machine interfaces, Biometrics, Operating Systems, Java for ubiquitous devices, Outlook.
- Device Connectivity: Protocols, Security, Device Management. Web application concepts for ubiquitous computing: History, WWW architecture, Protocols, Trans-coding, Client Authentication via the Internet for ubiquitous computing. WAP and beyond: Introduction, Components of the WAP architecture, WAP infrastructure, WAP security issues, Wireless Markup Language, WAP push, Products, i-Mode.
- Voice Technology: Basics of Speech Recognition, Voice standards, Speech Applications, Speech and Ubiquitous Computing, Security.
- Ubiquitous Web application architecture: Background, Scalability & Availability, Development of ubiquitous computing Web Applications, Ubiquitous Application Architecture
- Access from PCs: Smart-card authentication via the Internet, Ordering goods Access via WAP: WAP functionality, Implementation. Access from Personal Digital Assistants: Extending the example application to personal digital assistants, Implementation for synchronized devices, Implementation for intermittently connected devices, Implementation for connected devices. Access via Voice: Extending the example application to voice access, Implementation

Textbook:

T1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec& Klaus Rindtorff: Ubiquitous Computing: Technology and Architecture of Mobile Internet Applications, Pearson Education, New Delhi, 2006.

Reference Books:

R1.Guruduth S. Banavar, Norman H. Cohen, ChandraNarayanaswami: Ubiquitous Computing: An Application-Based Approach, Wiley Interscience, 2012.

R2. A. Genco, S. Sorce: Ubiquitous Systems and Ubiquitous Computing, WIT Press, 2012.

R3.StefenPoslad: Ubiquitous Computing: Smart Devices, Environments and Interactions, Wiley, Student Edition

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTCS 435(Elective IV)	Database Administration	3	0	0	3

Evaluation Scheme (Theory)					Evaluation Scheme (Practical)			
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation/ Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation / Additional Continuous Evaluation*	Total Marks
20	20	50	10	100	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus:

Introduction, Installation and configuration a database, administering servers and server groups, managing and optimizing schemas,

SQL programs, SQL *PLUS Overview, Modifying Data,, Managing Constraints, Managing Views,

User Access and Security, Oracle Overview and Architecture, Managing Oracle, Control and Redo Log Files, Managing Tables, indexes and Constraints, Managing Users and Security

Introduction to Network Administration, Backup and Recovery Overview, Introduction to performance tuning

Database Backup and recovery, Data Modeling and Design, System Development Projects, Information SystemsTechnology.

Text Books

- C.J. Date, Database Systems, Addison Wesley, 2000
- Chip Dawes, Biju Thomas, Introduction to Oracle 9i SQL, BPB, 2002

Reference Books

- Bob Bryla, Biju Thomas, Oracle 9i DBA Fundamental I, BPB, 2002
- Doug Stums, Matthew Weshan, Oracle 9i DBA Fundamental I, BPB, 2002
- Joseph C. Johnson, Oracle 9i Performance Tuning., BPB, 2002

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

2 Year M.TechProgramme

(Branch: Computer Science & Engineering)

Batch 2015-17

SEMESTER-FOURTH

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MTDS401	Dissertation Stage - II				20

-	-	-	-	-	-	-	-	-	-	-

Operation of the course

a) The student should immediately chalk out a plan of work in Consultation with his supervisor. Current literature (journals, books, etc.) must be methodically reviewed and the status of the work in the field must be considered. The detailed outline of work must reflect a survey of the current literature in the same area and must include topic of research, objective, background of previous work in the area, methodology and a work plan with a time schedule clearly indicating the intermediate milestones and the estimated time to achieve the same along with references and bibliography.

b) Within two weeks of registration, the student should give his Dissertation particulars to the Director-IET office through supervisor in TS-1 Proforma.

c) The student should regularly interact with his supervisor and present seminars and submit reports on the scheduled dates. Proposed examiners and other faculty in relevant area may be requested to attend the presentations.

d) Supervisor will announce the Mid-semester grade to his student and send the MID-SEM Evaluation Form to the Director-IET office.

e) TWO typed copies of Final Dissertation Report and Abstract are to be submitted to the supervisor on or before the last day of class work in each semester. Supervisor will retain his copy and send the remaining ONE copy after the viva voce examination along with the Final Evaluation Form and Dissertation Abstract to the Director-IET Office.

f) The following format for Dissertation Abstract should be used:

Format for submission of Dissertation Abstract

Dissertation Title :

Supervisor :

Semester : First/Second Session :

Name of Student : ID No. :

Abstract

Abstract in the above format should also be included in the bound report.

g) Every student has to sign his attendance regularly with the supervisor or as per the alternative arrangement made by the supervisor. An attendance sheet is being provided for this purpose to the supervisor.
h) The candidate should apply and seek prior permission of his supervisor for going on leave for any genuine needs. If the leave of absence exceeds seven days in the entire semester, the recommended final grade may be revised by the Director-IET in consultation with the supervisor.
i) A separate Dissertation topic has to be assigned to individual students. Wherever the broad area is same, the aspects to be researched by an individual candidate should be clearly focused and spelt out.
j) Utmost care should be taken in the preparation of the FINAL REPORT. A check-list of various items is provided and students should carefully go through these. Supervisors are also requested to examine the draft of the FINAL REPORT keeping in view the items in the check-list.

2. EVALUATION

Evaluation in this course is essentially individual oriented. The various instruments of evaluation along with the weightage of components are given below:

Component	Weightage	Week in which due
Viva –I	15	5th week
Mid. sem. written report	15	10th week
Mid. sem. presentation	15	10th week
Viva –II	15	15th week
Final Dissertation*	25	Last day of class work
Final Viva-voce*	15	Actual date announced by Director-IET

*Final Viva-voce examination and evaluation of the Dissertation is to be jointly done by the Supervisor and the examiner appointed by the Director-IET. The other components are to be evaluated by the supervisor and the details are to be made available to the examiner at the time of final viva. Supervisor will send the copy of Dissertation report to the examiner well in advance. Before sending he should check the contents as per checklist and sign the 'Certificate' page.

The evaluation will recognize the day-to-day work involvement and punctuality of the student in his work. Evaluation in various components shall take into account work progress and achievements, technical/professional competence,

documentation and expression, initiative and originality, punctuality and reliability, self-reliance, and acquisition of special skills. The student should extend full cooperation to his supervisor and interact with him in advance about the time, venue and mode of each evaluation. He should be in constant touch with his supervisor. Supervisor may require his student to sign the attendance sheet before a particular time on each working day.

Grading will be done mainly on the basis of the progress made towards attaining the overall objectives of the Dissertation. The supervisor shall evaluate various prescribed components of evaluation before the submission of final Dissertation. The supervisor shall evaluate the various prescribed components of evaluation before the submission of final report. He/she should seek utmost participation of examiner by inviting him to the various seminars. A full time student is normally registered for 20 credits when registered. Supervisor can reduce/increase the prescribed credits subject to a minimum of 15 and maximum of 25 credits depending on the time and effort devoted by the individual student. Supervisor should maintain all pertinent records of his student. Departures in the number of credits to be registered may be decided by the Director-IET. The final report and performance in the final viva are to be jointly evaluated by the Supervisor and examiner appointed by the Director-IET. Evaluation in various components can be done on the basis of marks or grades. However, the recommendations for the final award shall invariably be made in terms of one of the prescribed letter grade. The student will have to defend the work appearing in his/her Dissertation before the panel of examiners. Immediately after the final viva, ONE copy each of the Dissertation Report and Dissertation Abstract along with the completed Final Evaluation Form are to be submitted to the Director-IET office by the supervisor. The student should also ensure with his supervisor so that these reach the Division well before the last date of comprehensive examination. Supervisor should check that he has signed the 'Certificate Page'.

3. COURSE NOTICES

Notices pertaining to this course will be displayed on Notice Boards by the supervisor.

4. GENERAL

a) It is the responsibility of the student to ensure continuous interaction with his Supervisor.
b) Prescribed formats of the Cover/Title page and certificate from the supervisor should be adhered to in the preparation of final Dissertation Report. Check-list of items for the preparation of the FINAL REPORT should also be consulted. The following sequence may be followed in the preparation of the Dissertation Report:

- Title page (inner cover)
- Acknowledgement
- Certificate from the Supervisor

- List of Symbols & Abbreviations used
- Dissertation Abstract
- Table of contents
- Chapters 1, 2, 3, etc.
- Conclusion
- Appendices
- Bibliography/References
- List of Publications/Conference Presentations, if any.

c) The registration in Dissertation course is normally after the completion of coursework. 15-20 credits of Dissertation will be assigned at the time of registration. Credits put upto a maximum of 25 may be permitted depending upon the total time and effort put in by an individual student.