

**INDIRAGANDHIUNIVERSITY, MEERPUR, REWARI**  
**SCHEME OF STUDIES AND EXAMINATION M. TECH**  
**1st YEAR (COMPUTER SCIENCE & ENGINEERING)**  
**SEMESTER 1st**  
**CBCS Scheme effective from 2019-20**

Sr. No	Course No.	Subject	Teaching Schedule				Examination Schedule (Marks)				Duration of Exam (Hours)	No of hours/ week
			L	T	P	Total Credits	Marks of Classworks	Theory	Practical	Total		
1	MCSE101	Data Communication and Computer Networks	4	0	-	4	50	100	-	150	3	4
2	MCSE102	Advanced Operating Systems	4	0	-	4	50	100	-	150	3	4
3	MCSE103	Advanced Database Management System	4	0	-	4	50	100	-	150	3	4
4	MCSE104	Data Warehouse and Mining	4	0	-	4	50	100	-	150	3	4
5	MCSE105	Mathematical Foundation of Computer Science	4	0	-	4	50	100	-	150	3	4
6	MCSE106	Seminar	-	-	-	1	-	-	-	25	-	-
7	MCSE107	Advanced Operating Systems Lab	-	-	2	2	50	-	50	100	3	2
8	MCSE108	Advanced Database Management System Lab	-	-	2	2	50	-	50	100	3	2
9	MCSE109	Self Study Paper				1				25		
<b>TOTAL</b>			<b>26</b>									

**NOTE:**

Examiner will set nine question in total. Question one will be compulsory and will comprises of all section and remaining eight question to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

**INDIRAGANDHIUNIVERSITY,MEERPUR,REWARI**  
**SCHEME OF STUDIES AND EXAMINATION M.TECH 1st**  
**YEAR (COMPUTER SCIENCE & ENGINEERING)**  
**SEMESTER 2nd**  
**CBCS Scheme effective from 2019-20**

Sr. No	Course No.	Subject	Teaching Schedule				Examination Schedule (Marks)				Duration of Exam (Hours)	No of hours /week
			L	T	P	Total Credits	Marks of Class works	Theory	Practical	Total		
1	MCSE201	Soft Computing	4	0	-	4	50	100	-	150	3	4
2	MCSE202	Algorithm Design	4	0	-	4	50	100	-	150	3	4
3	MCSE203	Seminar	-	-	-	1	25	-	-	25	-	-
4	MCSE204	Soft Computing Lab	-	-	2	2	50	-	50	100	3	2
5	MCSE205	Algorithm Design Lab	-	-	2	2	50	-	50	100	3	2
6	MCSE206A or MCSE206B or MCSE206C or MCSE206D	Elective-1 (DCEC)	4	0	-	4	50	100	-	150	3	4
7	MCSE207	Foundation Elective				2						2
8	MCSE208	Self Study Paper				1				25		
			<b>20</b>									

**NOTE:** Examiner will set nine questions in total. Question One will be compulsory and will comprise of all sections and remaining eight questions to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

**Elective 1:** Choose any one from the following papers MCS

E206A

Mobile and Wireless Communication MCS

E206B

Optimization Techniques

MCSE206C

Discrete Mathematics

MCSE206D

Internet and Web Development

**A candidate has to select this paper from the pool of Foundation Electives provided by the University.**

## General Instructions

### 1. Seminar

Max.Marks-25

Every candidate will have to deliver a seminar of 30 minutes duration on a topic (not from the syllabus) which will be chosen by him/her in consultation with the teacher of the department. The seminar will be delivered before the students and teachers of the department. A

three member committee (one coordinator and two teachers of the department of different branches) duly approved by the departmental

council will be constituted to evaluate the seminar. The following factors will be taken into consideration while evaluating the candidate.

Distribution of marks will be as follows:

1. Presentation 10 marks
2. Depth of the subject matter 10 marks
3. Answer to the questions 05 marks

### 2. Self Study Paper

Max.Marks-25

**Objective:** This course intends to create habits of reading books and to develop writing skills in a manner of creativity and originality. The students are to emphasize his/her own ideas/words which he/she has learnt from different books, journals and newspapers and deliberate the same by adopting different ways of communication techniques and adopting time scheduling techniques in their respective fields. This course aims:-

To motivate the students for innovative, research and analytical work-

To inculcate the habit of self study and comprehension - To infuse the sense of historical background of the problems - To

assess intensity of originality and creativity of the students. Students are guided to select topic of their own interest in the given area in consultation with their teachers/Incharge/Resource Person.

#### Instructions for Students

1. Choose the topic of your interest in the given areas and if necessary, seek the help of your teacher.
2. Select a suitable title for your paper.
3. You are expected to be creative and original in your approach.
4. Submit your paper in two typed copies of A4 size 5-6 pages (both sides in 1.5 line spaces in Times New Roman Font size 12).
5. Organize your paper in three broad steps: (a) Introduction (b) Main Body (c) Conclusion
6. Use headings and sub-headings
7. Use graphics wherever necessary
8. Give a list of books/references cited/used
9. The external examiner will evaluate the self-study paper in two ways i.e. Evaluation 15 Marks and Viva-Voce 10 marks.

## **Distribution of Marks**

1. The evaluation is divided into different segments as under: 15 Marks

- i. Selection of Topic-3 Marks
- ii. Logical Organization of subject matter-5 Marks
- iii. Conclusions-5 Marks
- iv. References-2 Marks

2. Viva-Voce:-10 Marks

The external examiner will hold Viva-

Voce based on contents of the student's Self Study Paper focusing upon the description by the Candidate.

## MCSE101 DATA COMMUNICATION AND COMPUTER NETWORKS

		Marks	Credits
LTP	Exam:	100	4
4- -	Sessional:	50	
	Total:	150	4

**Duration of Exam:** 3hrs.

**NOTE:** Examiner will set nine questions in total. Question One will be compulsory and will comprise of all sections and remaining eight questions to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT 1

**Data communication:** Digital and analog communication, Transmission modes, serial and parallel communication, packet switching, circuit switching and message switching

**Network models:** OSI and TCP/IP model, OSI vs TCP/IP

**MAC:** ALOHA, CSMA, CSMA/CD

### UNIT 2

**Network Layer:-** ARP, RARP, ICMP, IGMP, IPv4, IPv6, IPv4 addressing, classful addressing, CIDR

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Introduction, CIDR addressing, CIDR address blocks and Bit masks, subnets and supernetting, IPv6 addressing, address space allocation, global unicast addresses.

**Routing Algorithms:-**

Distance vector Routing, Link State Routing, Path Vector Routing, Hierarchical Routing, RIP, OSPF, BGP.

### UNIT 3

**Transport Layer:-**

Transport Layer Services, UDP, TCP Protocol, TCP services, TCP features, connection management, congestion control SCTP Protocol, SCTP services, SCTP features, and SCTP association.

**Application layer:-** SMTP, POP, IMAP, and MIME, DHCP, DHCP operation, Configuration FTP, SSH.

### UNIT 4

**Network Management and Security:-** Congestion control, Quality of services, SNMP, Ciphers-traditional, modern, asymmetric, public and private key, key management, digital signature, Network Layer Security, Transport Layer Security, Application Layer security, Firewall, VPN

References:

1. Computer Networks, Tanenbaum Andrew S, International edition,
2. TCP/IP protocols suite, Behrouz A. Forouzan, TMH publication
3. Data Communications and Networking, Behrouz A. Forouzan, TMH
4. Computer Networking: A Top-Down Approach, Kurose and Ross.
5. Computer Networks – A System Approach, Larry L. Peterson & Bruce S. Davie,

## MCSE102ADVANCEDOPERATINGSYSTEMS

		Marks	Credits
LTP	Exam:	100	4
4- -	Sessional:	50	
	Total:	150	4

**DurationofExam:** 3hrs.

**NOTE:**Examinerwillsetninequestionintotal.QuestionOnewillbecompulsoryandwillcomprisesofallsectionandremainingeightquestionstobesetbytakingtwoquestionsfromeachunit.Thestudentshavetoattemptfivequestionsintotal,firstbeingcompulsoryandselectingonefromeachUnit.

### UNIT1

**Introduction:** Operating System Concept, Functions of an Operating System, Design Approaches, Types of Advanced Operating System - Synchronization Mechanisms, Concept of a Process, Concurrent Processes, The Critical Section Problem, Other Synchronization Problems, Language Mechanisms for Synchronization, Axiomatic Verification of Parallel Programs - Process Deadlocks - Preliminaries, Models of Deadlocks, Resources, System State, Necessary and Sufficient conditions for a Deadlock, Systems with Single-Unit Requests, Consumable Resources, Re-usable Resources.

### UNIT2

#### Distributed

**Operating Systems:** Introduction, Issues, Communication Primitives, Inherent Limitations - Lamport's Logical Clock; Vector Clock; Causal Ordering; Global State; Cuts; Termination Detection. Distributed Mutual Exclusion, Non-Token Based Algorithms, Lamport's Algorithm - Token-Based Algorithms, Suzuki - Kasami's Broadcast Algorithm, Distributed Deadlock Detection, Issues, Centralized Deadlock-Detection Algorithms - Distributed Deadlock-Detection Algorithms. Agreement Protocols, Classification - Solutions, Applications.

**Distributed Resource Management:** Distributed File Systems, Architecture, Mechanisms, Design Issues, Distributed Shared Memory, Architecture, Algorithm, Protocols - Design Issues. Distributed Scheduling, Issues, Components, Algorithms.

### UNIT3

**Failure Recovery and Fault Tolerance:** Basic Concepts - Classification of Failures, Basic Approaches to Recovery; Recovery in Concurrent System; Synchronous and Asynchronous Checkpointing and Recovery; Checkpointing in Distributed Database Systems; Fault Tolerance; Issues - Two-phase and Non-blocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols

## UNIT4

**MultiprocessorandDatabaseOperatingSystems:** Structures, Design Issues, Threads, Process Synchronization, Processor Scheduling, Memory Management, Reliability/Fault Tolerance; Database Operating Systems, Introduction, Concurrency Control, Distributed Database Systems, Concurrency Control Algorithms.

Recommended Books:

1. MukeshSinghalandN.G.Shivaratri, "AdvancedConceptsinOperatingSystems", McGrawHill, 2000
2. AbrahamSilberschatz, PeterB.Galvin, G.Gagne, "OperatingSystemConcepts", SixthAddisonWesleyPublishingCo., 2003.
3. AndrewS.Tanenbaum, "ModernOperatingSystems", SecondEdition, AddisonWesley, 2001.

## MCSE103 Advanced Database Management System

		Marks	Credits
LTP	Exam:	100	4
4- -	Sessional:	50	
	Total:	150	4

**Duration of Exam:** 3hrs.

**NOTE:** Examiner will set nine questions in total. Question One will be compulsory and will comprise of all sections and remaining eight questions to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

### UNIT 1

**Introduction:** Architecture, Advantages, Disadvantages, Data models, relational algebra, SQL, Normal forms. **Query Processing:** General strategies for query processing, transformations, expected size, statistics in estimation, query improvement. Query evaluation, view processing, query processor.

### UNIT 2

**Recovery:** Reliability, Transactions, recovery in centralized DBMS, reflecting updates, Buffer management logging schemes, disaster recovery. **Concurrency:** Introduction, Serializability, Concurrency control, Locking schemes, Timestamp based ordering, Optimistic, Scheduling, Multiversion techniques, Deadlocks.

### UNIT 3

**Object Oriented Database Development:** Introduction, Object definition language, creating object instances, Object query language. **Distributed Database:** Basis concepts, options for distributing a database distributed DBMS.

### UNIT 4

**Data Warehousing:** Introduction, basis concepts, data warehouse architecture, data characteristics, reconciled data layer, data transformation, derived data layer, user interface. **Object Relational Databases:** Basic Concepts, Enhanced SQL, Advantages of object relational approach.

### References:

1. An introduction to database systems by Bipin C. Desai, Galgotia Publications.
2. Modern Database Management by Fefferly A Liofer, Mary B. Prescott, Fred R Mcfadden, 6<sup>th</sup> edition, Pearson Education.
3. Principles of distributed database systems, by M. Tamer & Valduriez, 2<sup>nd</sup> edition, LPE Pearson Education.
4. Database system concepts by Korth.-



## MCSE104DATAWAREHOUSEANDMINING

		Marks	Credits
LTP	Exam:	100	4
4- -	Sessional:	50	
	Total:	150	4

**DurationofExam:** 3hrs.

**NOTE:**Examinerwillsetninequestionintotal.QuestionOnewillbecompulsoryandwillcomprisesofallsectionandremainingeightquestionstobesetbytakingtwoquestionsfromeachunit.Thestudentshavetoattemptfivequestionsintotal,firstbeingcompulsoryandselectingonefromeachUnit.

### UNIT1

**Datawarehousing:** Introduction, Operationaldatastores, ETL, Datawarehouses– designguidelinesfordatawarehouseimplementation, Datawarehousemetadata; OLAP– introduction, Characteristics, Multidimensionalviewanddatacube, Datacubeoperations,

### UNIT2

**Datamining:** Introduction, associationrulesmining, Naivealgorithm, Apriorialgorithm, directhashingandpruning(DHP), Dynamicitemsetcounting(DIC), Miningfrequentpatternwithoutcandidategeneration(FP, growth), performanceevaluationofalgorithms,

### UNIT3

**Classification:** Introduction, decisiontree, treeinductionalgorithm– splitalgorithmbasedoninformationtheory, splitalgorithmbasedonGiniindex; naïveBayesmethod; estimatingpredictiveaccuracyofclassificationmethod; classificationsoftware, softwareforassociationrulemining; casestudy; KDDInsuranceRiskAssessment

### UNIT4

**Clusteranalysis:** Introduction, partitional methods, hierarchicalmethods, and density basedmethods, dealingwithlargedatabases, clustersoftware.

**WebDataMining:** WebTerminologyandCharacteristics, LocalityandHierarchyintheweb, WebContentMining, WebUsageMining, WebStructureMining, WebminingSoftware.

### References:

1. HanJ., KamberM. andPeiJ., Dataminingconceptsandtechniques, MorganKaufmannPublishers(2011)3rded.
2. .PudiV., KrishanaP.R., DataMining, OxfordUniversitypress, (2009)1sted.
3. AdriaansP., ZantingeD., Data mining, Pearson education press(1996), 1sted.
4. PooniahP., DataWarehousingFundamentals, WilleyintersciencePublication, (2001), 1sted

**MCSE105 MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE**

		<b>Marks</b>	<b>Credits</b>
<b>LTP</b>	<b>Exam:</b>	100	4
4- -	<b>Sessional:</b>	50	
	<b>Total:</b>	150	4

**Duration of Exam:** 3hrs.

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**UNIT 1**

**Regular Languages:** Finite automata, DFA, NFA, Equivalence of DFA & NFA. An application, Mealy and Moore Models, Regular expressions and languages. Context free languages: CFGs, Applications, Ambiguity removal, CNF, GNF.

**UNIT 2**

**Push Down Automata:** Basics of PDA, Acceptance by PDA, PDA and CFL, Parsing and PDA: Top Down Parsing and Bottom up Parsing

**UNIT 3**

**Turing Machine:** Turing machines, variants of TMs, Restricted TMs, TMs and Computers. **Decidability:** Decidable languages, decidable problems concerning Context free languages, the halting problem, halting problem is undecidable.

**UNIT 4**

**Reducibility and Computability:** Undecidable problems from language theory – Regular expressions, Turing machines, Reduction. A simple undecidable problem (PCP), Primitive recursive functions, tractable decision problems, theory of Optimization, Church-Turing Thesis.

**References:**

1. Introduction to Theory of Computation – Michael Sipser (Thomson Nrools/Cole)
2. Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, Rajeev Motwani & J.D. Ullman (Pearson Education Asia), 2nd Edition.
3. Theory of Computation by Peter Linz
4. Introduction to languages and theory of computation – John C. Martin (MGH)

### MCSE106Seminar

LTP		Marks	Credits
- - -	Sessional:	-	1
	Total :	25	

A candidate has to present a seminar on a recent topic/technology/research advancement and has to submit a seminar report. The marks will be given on the basis of seminar report, contents of the presentation, communication and presentation skills.

### MCSE107ADVANCEOPERATINGSYSTEMLAB

LTP		Marks	Credits
- - 2	Exam :	50	2
	Sessional:	50	
	Total :	100	

A student has to perform 10-12 practicals based on theory paper.

### MCSE108ADVANCEDATABASEMANAGEMENTSYSTEMLAB

LTP		Marks	Credits
- - 2	Exam :	50	2
	Sessional:	50	
	Total :	100	

A student has to perform 10-12 practicals based on theory paper.

## MCSE201SOFTCOMPUTING

		Marks	Credits
LTP	Exam :	100	4
4 --	Sessional:	50	
	Total :	150	4

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### UNIT 1

Neural Networks: History, Overview of Biological Neuro-System, Mathematical Model of Neurons, ANN Architecture, Learning rules, Gradient Descent Algorithm, Learning Paradigms- Supervised, Unsupervised and Reinforcement Learning, ANN Training Algorithms- Perceptrons, Training Rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

### UNIT 2

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

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

### UNIT 3

**Fuzzy Arithmetic:** Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Classical Logic, Multi-Valued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

### UNIT 4

**Uncertainty Based Information:** Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

#### References:

1. Neural Networks Simon Haykin
2. Neural Networks-Kosko.
3. Principles of Soft Computing-Dr. S.N. Sivanandam and Dr. S.N. Deepa,
4. Fuzzy Logic & Fuzzy Sets Klir & Yuan
5. Neural Networks-Satish Kumar

## MCSE202ALGORITHMDESIGN

		Marks	Credits
LTP	Exam :	100	4
4 --	Sessional:	50	
	Total :	150	4

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### UNIT 1

#### Foundation & Data Structure:

Foundation & Elementary Data Structure: Algorithms, Performance analysis: Space & time complexity, Growth of functions, Divide & Conquer, Recurrence Equations, Basic elements of data structure like Stacks & Queues, Trees, Graphs, Linked List, Sorting & Order statistics. Data Structure: Dynamic sets & searching:

Introduction, Array doubling, Amortized time analysis, R-B trees, Hashing, Dynamic equivalence relations & Union-Find programs, Priority queues with decrease key operation.

Graph & graph traversals: DFS, strongly connected components, Bi-connected components.

### UNIT 2

#### Advanced Design & Analysis Techniques:

Greedy & Dynamic Method: General methods, Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Optimal merge patterns, Single-source shortest path, 0/1 Knapsack, Multistage graphs, All-pair shortest path, Optimal binary search trees, Travelling salesperson problem, Flow shop scheduling.

Backtracking & Branch and Bound: General methods, 8 Queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem, Travelling salesperson problem, Efficiency consideration.

### UNIT 3

NP-Hard & NP-Complete Problems: Basic concepts, Cook's Theorem, NP-hard graph problem, NP-Hard scheduling problems.

String Matching: Introduction, A straight forward solution, The Knuth-Morris-Pratt algorithm, The Boyer-Moore algorithm, approximate string matching.

### UNIT 4

Parallel Algorithms: Introduction, Parallelism, The PRAM, and other models, some simple PRAM algorithms, Handling write conflicts, Merge and Sorting, Finding connected components.

Approximational algorithms: Introduction, Absolute approximations,  $\epsilon$ -approximations, Polynomial time approximation schemes, Fully Polynomial time approximation schemes.

## References:

1. Computer Algorithms: Introduction to design and analysis (3<sup>rd</sup> edition) by Sara Baase and Allen Van Gelder, Pearson, 2000.
2. Fundamentals of Algorithms by Gilles Brassard and Paul Bratley
3. Design and Analysis of Algorithms (Computer Science Series) by Jeffrey D. Smith Publ.
4. Fundamentals of Computer Algorithms, Ellis Horowitz and S. Rajasekaran 1978, Galgotia Publ.
5. Algorithms Design (PIE) by Eva Tardos and Jon Kleinberg, person.
6. Introduction to Algorithms, Thomas Cormen, Charles Leiserson and Ronald Rivest: 1990, T MH.

**MCSE203 Seminar**

<b>LTP</b>		<b>Marks</b>	<b>Credits</b>
- - -	<b>Sessional:</b>		1
	<b>Total :</b>	25	

A candidate has to present a seminar on a recent topic/technology/research advancement and has to submit a seminar report. The marks will be given on the basis of seminar report, contents of the presentation, communication and presentation skills.

**MCSE204 SOFT COMPUTING LAB**

<b>LTP</b>		<b>Marks</b>	<b>Credits</b>
- - 2	<b>Exam :</b>	50	2
	<b>Sessional:</b>	50	
	<b>Total :</b>	100	

A student has to perform 10-12 practicals based on theory paper.

**MCSE205 ALGORITHM DESIGN LAB**

<b>LTP</b>		<b>Marks</b>	<b>Credits</b>
- - 2	<b>Exam :</b>	50	2
	<b>Sessional:</b>	50	
	<b>Total :</b>	100	

A student has to perform 10-12 practicals based on theory paper.

		Marks	Credits
LTP	Exam:	100	4
4- -	Sessional:	50	
	Total:	150	4

**Duration of Exam:** 3hrs.

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### UNIT 1

Application, history, market, reference model and overview. Wireless Transmission-Frequencies, signals, antennae, signal propagation, multiplexing, modulation, spread spectrum, cellular system.

**MAC and Telecommunication System:** Specialized MAC, SDMA, FDMA, TDMA—Fixed TDM, classical ALOHA, Slotted, ALOHA, CSMA, DAMA, PKMA, reservation TDMA. Collision avoidance, polling inhibits sense multiple access. CDMA, comparison, CSM-mobile services, architecture radio, interface, protocol, localization, calling handover, security, new data services, Introduction to W'LL.

### UNIT 2

**Satellite and Broadcast Systems:** History, Applications, GEO, LEO, MEO, routing, localization, handover in satellite system. Digital audio and video broadcasting. **WIRELESS LAN:** IEEE 802.11-System and protocol architecture, physical layer. MAC layered management. Bluetooth-User scenarios, physical layer, MAC Layer, networking, security and link management.

### UNIT 3

**Mobile Network Layer:** Mobile IP-

goals, assumptions, requirement, entities, terminology, IP packet delivery. Agent advertisement and discovery, registration, tunneling, encapsulation, optimization, reservation tunneling, IPv6. DHCP. Ad hoc Networks, Routing, destination sequenced distance vector, dynamic source routing, hierarchical algorithm, algorithm, algorithm metric.

### UNIT 4

**Mobile Transport Layer:** Traditional TCP, Indirect TCP, Snooping; TCP, Mobile TCP fast retransmission, Transaction oriented TCP. **Support for Mobility:** File, system, WWW-HIT, HTML, system architecture. WAP-architecture, Wireless datagram, protocol, wireless transport layer security, wireless transaction protocol, application environment, telephony application.



## References:

1. Jochen Schiller, "Mobile Communication", Pearson Education, 2002
2. LEE, "Mobile Cellular Telecommunications" McGRAW-Hill, 2<sup>nd</sup> Edition.
3. Wireless Communications: Theodore S Rappaport; Pearsons

**MCSE206B      OPTIMIZATIONTECHNIQUES**

		<b>Marks</b>	<b>Credits</b>
<b>LTP</b>	<b>Exam:</b>	100	4
4- -	<b>Sessional:</b>	50	
	<b>Total:</b>	150	4

**DurationofExam:**3hrs.

**NOTE:**Examinerwillsetninequestionintotal.QuestionOnewillbecompulsoryandwillcomprisesofallsectionandremainingeightquestionstobesetbytakingtwoquestionsfromeachunit.Thestudentshavetoattemptfivequestionsintotal,firstbeingcompulsoryandselectingonefromeachUnit.

**UNIT1**

**LinearProgramming:**SimplexMethod,BigM-Method,DualityinLinearProgramming,SensitivityAnalysis,RevisedSimplexMethod,Two-PhaseSimplexMethod,DualSimplexMethod.IntegerLinearProgramming:BranchandBoundAlgorithms,GomoryCuttingPlaneMethod.

**UNIT2**

**TransportationProblems:**TypesofTransportationProblems,MathematicalModels,TransportationAlgorithms.**Assignments:**Definition,DifferencesbetweenTransportationandAssignmentModels,RepresentationAssignmentProblemasTransportationProblemandasLinearProgramming,AssignmentAlgorithm-HungarianMethod

**UNIT3**

**Non-**

**LinearProgramming:**ClassicaloptimizationTechniques,NLPwithconstraints:GraphicalSolution,MultivariableOptimizationwithEqualityconstraints(LagrangeMultipliersMethod),withinequalityconstraints-Kuhn-Tuckerconditions,QuadraticProgrammingandSeparableProgramming:Standardform,Wolf'sMethod,Beale'sMethod.  
.SearchMethodforUnconstrainedNon-LinearProgramming Problems.

**UNIT4**

**Reliability:**Basicconcepts,conditionalfailureratefunction,Failuretimedistributions,certainlifeModels,Reliabilityofasystemintermsofthereliabilityofitscomponents,seriesystem,parallelsystem.QueueingTheory:Introduction,elementsorParametersofQueueingsystem,SteadystateBalanceEquation,Kendall'sNotationforRepresentingQueueingModels,Model1:SingleserverModel( $M/M/1/\infty/\infty/FCFS$ ),Model2: $M/M/1/\infty/N/FCFS$ )Finite CapacityQueueSystem,Model3:Multi-serverModel,Model4:MachineServicingModel.

**References:**

1. OptimizationTechniquesbyC.MohanandKusumDeep,NewAgeInternational
2. OperationsResearchbyK.Rajagopal,PHI,India.
3. ReliabilityEngineeringbyKKAgarwal,Springer.

**MCSE206C DISCRETE MATHEMATICS**

		<b>Marks</b>	<b>Credits</b>
<b>LTP</b>	<b>Exam:</b>	100	4
4- -	<b>Sessional:</b>	50	
	<b>Total:</b>	150	4

**Duration of Exam:** 3hrs.

**NOTE:** Examiner will set nine questions in total. Question One will be compulsory and will comprise of all sections and remaining eight questions to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

**UNIT 1**

Propositions, Logical Connectives, Conditionals and Biconditionals, Tautologies, Logical Equivalences, Predicates, Quantifiers, Inference theory, Validity Probability, Information and Mutual Information

**UNIT 2**

Poset, Lattices, Principle of Duality, Basic Properties of Lattices, Some Special Lattices, Boolean Algebras, Identities of Boolean Algebra, Uniqueness of Finite Boolean Algebras, Boolean Functions and Boolean Expressions, Normal Forms, The Karnaugh Map method, Application of Boolean Algebra to Switching Circuits

**UNIT 3**

Introduction to Graphs, Types of Graphs, Representation of graphs, Paths and Circuits, Graph Traversals, Shortest Path in Weighted Graphs, Dijkstra Algorithm, Euler Graphs, Fleury's Algorithm, Hamiltonian Graphs, Travelling Salesman Problem, Planar Graphs, Kuratowski's Two Graph, Euler's Theorem, Colouring of Graphs, Transport Networks Trees, Rooted Trees, Representation of Algebraic Expressions by Binary Trees, Binary Search Trees, Spanning Trees and Cut-Sets, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm

**UNIT 4**

Languages, Phrase Structure Grammars, Types of Grammars and Languages, Finite State Machines, Equivalent Machines, Finite State Machines as Language Recognizers, Finite State Languages and Type-3 Languages, Turing Machine

**References:**

1. Elements of Discrete Mathematics: A Computer Oriented Approach, C.L.Liu and D.P.Mo hapatra, McGraw Hill Education

2. DiscreteMathematicalStructureswithApplicationstoComputerScience, J. P Tremblay and R. Manohar, TataMcGrawHillEdition
3. MathematicalStructuresforComputerScience, J.L. Gersting, ComputerSciencePress, New York
4. DiscreteMathematicalStructures, B. Kolman, R. C. Busby and S Ross, PHI
5. DiscreteMathematics, Babu Ram, Vinayak Publishers and Distributors, Delhi
6. DiscreteMathematics, Semyour Lipschutz and Marc Lipson, Schaum's outline
7. DiscreteMathematics, R. K. Bisht and H. S. Dhami, Oxford University Press

**MCSE206D****INTERNETANDWEB DEVELOPMENT**

		<b>Marks</b>	<b>Credits</b>
<b>LTP</b>	<b>Exam:</b>	100	4
4- -	<b>Sessional:</b>	50	
	<b>Total:</b>	150	4

**DurationofExam:**3hrs.

**NOTE:**Examinerwillsetninequestionintotal.QuestionOnewillbecompulsoryandwillcomprisesofallsectionandremainingeightquestionstobesetbytakingtwoquestionsfromeachunit.Thestudentshavetoattemptfivequestionsintotal,firstbeingcompulsoryandselectingonefromeachUnit.

**UNIT1**

**Introduction:**Internetprotocolmodel,Internetaddresses,IPRoutingconcepts,TableDrivenanddnxthoprouting,otherroutingrelatedprotocols,InternetAccessthroughPPP,SLIP,WWW

**UNIT2**

**Router technology:**Hubs,Bridges,Routers,RoutingProtocols,Routing security,Switchbasedrouting,Routing in unicast environment,multicasting,mobile routing.

**UNIT3****WebserverandBrowser:**

WebServers(IIS/PWS&Apache),HTTPrequesttypes,systemarchitecture,client-sidescripting,accessingweb servers,HTTP,secureHTTP, Secure SocketsLayer,WWWProxies,WebBrowser,Bookmarks,Cookies,ProgressIndicators,CustomizationofBrowsers,BrowsingTricks,NextGenerationWebBrowsing,SearchEngines,ArchitectureofSearchEngines,SearchTools,WebCrawlers

**UNIT4**

**WebsiteDevelopment:**DHTML,XHTML,AJAX,XML:Structuringdata,XMLnamespaces,DTDandschemas,XMLvariables,DOMmethods,simpleAPIforXML,webservices,andapplicationofXML.  
ActiveServerPages(ASP):HowASPworks,ASPobjects,filesystem,objects,ASP.NET

**References:**

1. FundamentalsoftheInternetandtheWorldWideWeb,RaymondGreenLawandEllenHep-2011, TMH.
2. InternetandWorldWideWebProgramming,Deitel,DeitelandNeito,2000,PearsonEducation.

3. BeginningXHTMLbyFrankBoumpery,CassandraGreer,DaveRagett,JennyRagett,SubastiaSchintenbaumerandTedWugofski2000,WROXPress(IndianShroffPublication SPD)1stEdison.
4. CompleteReferenceGuidetoJavaScript,AronWeiss,QUIE,1977.
5. IntranetandInternetEngg.ByMinoli.