IET, DR. R.L. AVADH UNIVERSITY, AYODHYA



EVALUATION SCHEME & SYLLABUS FOR

B. TECH. SECOND YEAR INFORMATION TECHNOLOGY

AS PER
AICTE MODEL CURRICULUM

[Effective from the Session: 2024-25]

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B.TECH.(INFORMATION TECHNOLOGY)

SEMESTER- III

s.	Subject	Subject	Pe	rio	ds		Eva	luatio	n Schei	me	Seme	10	Total	Credit
No.	Codes	Sunject	L	T	F	1	er	TA	Total	PS	TE	PE		-
1	ITB301	Engineering Science Course [ESC]	3	0	(,	30	20	50		100		150	3
•	1TH301	Technical Communication	2	0	1	2	30	20	50		100		150	3
2		Data Structure Using C	3	1	+	0	30	20	50	\top	100		150	4
3	FFC301	ATTENDED TO THE PARTY OF THE PA			+	-	20	20	50	-	100		150	4
4	1TC302	Computer Organization and Architecture	3	1		0	30	20	30		100			-
5	ITC303	Discrete Structures & Theory of Logic	3	1		0	30	20	50		100		150	4
	ITC351	Data Structures Using C Lab	0	1	5	2				25		25	50	1
6	110331		0	1	0	2		-		25	1	25	5 50	1
7	1TC352	Computer Organization Lab					_	1	-	-	-	1		1
8	ITC353	Discrete Structure & Logic Lab	0	1	0	2				2:	•	2.	5 50	1
9	ITC354	Mini Project or Internship Assessment*	0		0	2				50			50	1
1	0 MAB30	Environmental Science	1	2	0	0	15	5 10	0 2	5	5	0		NC
-		Total		6	3	10				1			95 Il be asses	

*The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during
III semester.

NC'; Non-Credit Course

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S. Subject		Subject	Per	iods		Ev	aluatio	on Schen	me	Seme	W. S. C.	Total	Credit
No.	Codes	Subject	L	T	P	CT	TA	Total	PS	TE	PE		
1	ATS401	Mathmatics-1V ^a	3	1	0	30	20	50		100		150	4
	APS 402	Environmental and Biology	3	0	0	30	20	50		100		150	3
2	TTC401	Operating Systems	3	0	0	30	20	50		100		150	3
4	ITC402	Theory of Automata and Formal Languages	3	1	0	30	20	50		100		150	4
5	ITC403	Web Designing	3	1	0	30	20	50		100		150	4
6	ITC451	Operating Systems Lab	0	0	2				25		25	50	1
7	ITC453	Web Designing Lab	0	0	2				25		25	50	1
8	ITC454	Python Language Programming Lab	0	0	2				25		25	50	1
9	ITNCI	Cyber Security	2	0	0	15	10	25		50			NC
L		Total	17	1 3	3 (+						900	2

Annexure-B (ii)

EngineeringScienceCourses (To be offered to students)

1	EngineeringMechanics	Tobcofferedtoany EngineeringbranchexceptME/CE/AGa
2	MaterialScience	ndattiedbranches
3	EnergyScience& Engineering	Tobeofferedtoany Engineeringbranchexcept EE and alli edbranches
4	Sensor&Instrumentation	2207411110
5	BasicsDataStructure&Algorithms	Tobeofferedtoany Engineeringhranchexcept CSE and alt
6	IntroductiontoSoftcomputing	edbranches
7	AnalogElectronicsCircuits	TobcofferedioanyEngineeringbranchexceptECandalli edbranches
8	Electronics Engineering	equiralities

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B.TECH. (INFORMATION TECHNOLOGY) THIRD SEMESTER (DETAILED SYLLABUS)

	Course Outcome (CO) Bloom's Knowledge Level	(KL)						
	At the end of course, the student will be able to	and the second						
		ζ,						
CO 1	Discuss the computational efficiency of algorithms and analyze its time and space	K2,						
CO 2		K						
CO3	Implementation of Trees and Graphs and perform various operations on these data structure.	K,						
CO 4	Use the concept of recursion, application of recursion and its implementation and removal of	K,						
CO 5	Design the alternative implementations of data structures using stack and queue.							
-	DETAILED SYLLABUS	3-1-0						
Unit	Торіс	Proposed Lecture						
1	Introduction: Basic Terminology, Elementary Data Organization, Built in Data Types in C. Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big							
π	Algorithm, Efficiency of an Algorithm, Time and Space Computer (ADT) Oh, Big Theta and Big Omega, Time-Space trade-off. Abstract Data Types (ADT) Oh, Big Theta and Big Omega, Time-Space trade-off. Abstract Data Types (ADT) Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Derivation of Index Formulae for 1-D,2-D,3-D and n-D Array Order, and Column Major Order, Derivation of Index Formulae for 1-D,2-D,3-D and n-D Array Order, and Column Major Order, Derivations and their representations. Application of arrays, Sparse Matrices and their representations. Application of arrays, Sparse Matrices and their representation of Singly Linked Lists, Doubly Linked lists: Array Implementation and Pointer Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition Subtraction & Multiplications of Single variable & Two							
ım	variables Polynomial. Searching: Concept of Searching, Sequential search, Index Sequential Search, Binary Search Concept of Hashing & Collision resolution Techniques used in Hashing. Sorting: Insertion Sort Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort and Radix Sort.							
IV	Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort and Radia Social Graphs: Terminology used with Graph, Data Structure for Graph Representations: Adjacency Matrices, Adjacency List, Adjacency. Graph Traversal: Depth First Search and Breadth First Matrices, Adjacency List, Adjacency. Graph Traversal: Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijkstra Algorithm.							
v	Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linke Implementation of Stack in C. Application of stack: Prefix and Postfix Expressions, Evaluation postfix expression, Iteration and Recursion-Principles of recursion, Tail recursion, Removal recursion Problem solving using iteration and recursion with examples such as binary search Fibonacci numbers, and Hanoi towers. Tradeoffs between iteration and recursion. Queues: Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and	of ch, 08						

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Text books:

Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein, "Data Structures Using C and C++", PHI

Learning Private Limited, Delhi India

Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd DelhiIndia. Lipschutz, "Data Structures" Schaum's Outline Series, Tata McGraw-hill Education (India) Pvt.Ltd. 2

Thareja, "Data Structure Using C" Oxford HigherEducation.

AK Sharma, "Data Structure Using C", Pearson EducationIndia.

Rajesh K. Shukla, "Data Structure Using C and C++" Wiley DreamtechPublication. 5.

Michael T. Goodrich, Roberto Tamassia, David M. Mount "Data Structures and Algorithms inC++", 7. WileyIndia.

P. S. Deshpandey, "C and Data structure", Wiley DreamtechPublication.

R. Kruse etal, "Data Structures and Program Design in C", PearsonEducation.

Berztiss, AT: Data structures, Theory and Practice, AcademicPress.

Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures withapplications", McGraw Hill.

Adam Drozdek "Data Structures and Algorithm in Java", CengageLearning

	Computer Organization and Architecture (ITC302)	(7/1)						
	Course Outcome (CO) Bloom's Knowledge Level	(KL)						
	At the end of course, the student will be able to							
	At the same computer arithmetic operations.	K1, K2						
CO1	Define and explain basic concepts of Computer and perform computer arithmetic operations. Design various organizations of computer and explain various concept of cache mapping	K2, K6						
CO2	L. Bullering	K ₂						
CO3	describe the Organization of Input Output Module							
CO4	explain pipeline and its applications	3-1-0						
25	DETAILED SYLLABUS	Proposed						
Unit	Init							
1	Introduction: Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization, types of buses and bus arbitration and addressing modes.							
11	Arithmetic and logic unit: Look ahead carries adders, Without and logic operations. Floating point multiplication, Booth's algorithm and array multiplier. Division and logic operations. Floating point multiplication, Booth's algorithm and array multiplier. Division and logic operations. Floating point multiplication, Booth's algorithm and array multiplier. Division and logic operations. Floating point multiplication, Booth's algorithm and array multiplier. Division and logic operations. Floating point							
m	arithmetic operation, Arithmetic & logic unit design. The Standard Ref Fidures Control Unit: Instruction types, formats, instruction cycles and sub cycles (fetchandexecute etc.), microoperations, execution of a complete instruction. Program Control, Reduced Instruction Set microoperations, execution of a complete instruction. Program Control; micro programme sequencing, Computer Picelining, Hardwire and micro programmed control: micro programme sequencing,							
IV	Computer, Piperinting. concept of horizontal and vertical microprogramming. Memory: Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory Memory: Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories. Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories: magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation.							
v	Virtual memory: concept implementation. Input / Output: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Serial Communication: Synchronous& asynchronous communication, standard communication interfaces.	08						

Text books:

1. Computer System Architecture - M.Mano

- 2. Carl Harnacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint2012
- 3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998. Referencebooks
- 4. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventh edition,2006.
- Behrooz Parahami, "Computer Architecture", Oxford University Press, Eighth Impression, 2011.
- 6. David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Etsevier, a division of reed India Private Limited, Fifth edition, 2012
- Structured Computer Organization, Tannenbaum(PHI)

	Discrete Structures & Theory of Logic(ITC303)	- FORTH
	Course Outcome (CO) Bloom's Knowledge Level	(KL)
	At the end of course, the student will be able to	5247
	Explain and differentiate various concepts of set theory, relations and functions.	K2, K4
001	Discuss the basics of Lattices, recurrence relation and generating function.	K ₂
00 2	Identify and differentiate various logics.	K2,K
	Demonstrate different algebraic structures: group, rings and fields.	К3
CO 4	Properties and implement problems of non-linear data structures like graphs and trees.	K2, K3
CO 5	DETAILED SYLLABUS	3-1-0
	Topic Set	Proposed Lecture
	Set Theory: Introduction, Combination of sets, Multi sets, ordered pairs, Set Identities. Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Order of relations. Functions: Definition, Classification of functions, Operations on functions,	
11	Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hassediagram. Lattices: Definition, Properties of lattices — Bounded, Complemented, Modular and Complete Lattice, Morphisms of lattices. Recurrence Relation: Recursive definition of functions, Recursive algorithms, Method of solving recurrences. Generating function: Definition of generating function, Useful Facts About Power Series, Using Generating Functions to Solve Recurrence Relations.	r
111	Propositional Logic: Proposition, well-formed formula, Fruit Laboration of Proposition of Proposition, Theory of Inference, Natura Deduction. Predicate Logic: First order predicate, well-formed formula of predicate and predicate logic.	o8 e,
īv	Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Gloups, Coscillagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Groups, Homomorphism's, Definition and elementary properties of Rings and Fields, Integer	API OO
v	Trees: Definition, Binary tree, Binary tree traversal, Binary search tree.	ns, 08

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1. Koshy, Discrete Structures, Elsevier Pub. 2008 Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, Text books:

2. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.

3.E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.

4.R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004

5. Liptschutz, Seymour, "Discrete Mathematics", McGraw Hill. 6. Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill.

7. Deo, Narsingh, "Graph Theory With application to Engineering and Computer Science.", PHI.

8. Krishnamurthy, V., "Combinatories Theory & Application", East-West Press Pvt. Ltd., New Delhi

Data Structure using C Lab (ITC351)

Write C Programs to illustrate the concept of the following:

- SortingAlgorithms-Non-Recursive.
- SortingAlgorithms-Recursive.
- SearchingAlgorithm.
- Implementation of Stack using Array.
- Implementation of Queue using Array.
- Implementation of Circular Queue usingArray.
- Implementation of Stack using LinkedList.
- Implementation of Queue using LinkedList.
- Implementation of Circular Queue using LinkedList.
- 10. Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletionin BST.
- 11. Graph Implementation, BFS, DFS, Minimum cost spanning tree, shortest pathalgorithm.

Computer Organization Lab (ITC352)

- Implementing HALF ADDER, FULL ADDER using basic logicgates
- Implementing Binary -to -Gray, Gray -to -Binary codeconversions.
- Implementing 3-8-line DECODER. 3.
- Implementing 4x1 and 8x1MULTIPLEXERS.
- Verify the excitation tables of variousFLIP-FLOPS. 5.
- Design of an 8-bit Input/ Output system with four 8-bit Internal Registers.
- Design of an 8-bit ARITHMETIC LOGICUNIT.
- Design the data path of a computer from its register transfer languagedescription. 8.
- Design the control unit of a computer using either hardwiring or microprogramming based on its register transfer languagedescription.
- Implement a simple instruction set computer with a control unit and a data path.



Discrete Structures & Theory of Logic lab(ITC353)

- 1. Write a program in C to create two sets and perform the Union operation on sets.
- 2. Write a program in C to create two sets and perform the Intersection operation on sets.
- 3. Write a program in C to create two sets and perform the Difference operation on sets.
- 4. Write a program in C to create two sets and perform the Symmetric Difference operation.
- 5. Write a program in C to perform the Power Set operation on a set.
- 6. Write a program in C to Display the Boolean Truth Table for AND, OR, NOT.
- 7. Write a C Program to find Cartesian Product of two sets
- 8. Write a program in C for minimum cost spanning tree.
- 9. Write a program in C for finding shortest path in a Graph

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B.TECH. (INFORMATION TECHNOLIGY)

FOURTH SEMESTER (DETAILED SYLLABUS)

	Operating system (ITC401)							
_	Course Outcome (CO) Bloom's Knowledge Leve	I (KL)						
	At the end of course, the student will be able to							
	F6 - Von -F00	K ₂						
COI	Describe the structure and functions of OS Define and implement inter-process communication and tasks performed by the process	K _{1.} K ₃						
CO 2		K5,K2						
CO3	Tuelain and cimulate strategies used for memory, vincent many							
CO 4 Study I/O management and File system of operating system.		K ₂ ,K ₄						
	DETAILED SYLLABUS	3-0-0						
Jnit	Topic	Proposed Lecture						
1	Introduction: Operating system and functions, Classification of Operating systems- Batch, Interactive, Time-sharing, Real-Time System, Multiprocessor Systems, Multiuser Systems, Multiprocessing Systems, Multithreaded Systems, Operating System Structure- Layered structure, Multiprocessing Systems, Multithreaded Systems, Operating System Systems, Monolithic and Microkernel Systems							
	Systems. Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Mutual Exclusion, Critical Section Problem in Concurrency- Dining Philosopher Problem, Sleeping Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Process generation.							
11	Mutual Exclusion, Critical Section Problem, Decker's Solution, Philosopher Problem, Sleeping Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping	08						
ın	Mutual Exclusion, Critical Section Problem, Decker's solution, Philosopher Problem, Sleeping Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation. CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification Diagram, Schedulers, Process Control Block (PCB), Process address space, Process of Scheduling information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling, Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection,							
	Mutual Exclusion, Critical Section Problem, Decker's solution, Philosopher Problem, Sleeping Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation. CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Identification Diagram, Scheduling, Process Control Block (PCB), Process address space, Process identification Diagram, Scheduling, Process Control Block (PCB), Process address Space, Processor Scheduling.							

Text books:

- 1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
- 2. Sibsankar Halder and Alex A Aravind, "Operating Systems", PearsonEducation
- 3. Harvey M Dietel, "An Introduction to Operating System", PearsonEducation
- 4. D M Dhamdhere, "Operating Systems: A Concept based Approach", 2ndEdition,
- 5. TMH 5. William Stallings, "Operating Systems: Internals and Design Principles", 6th Edition, PearsonEducation



	Theory of Automata and Formal Languages (ITC402) Source Outcome (CO) Bloom's Knowledge Leve	(KL)							
	Course Outcome (CO) At the end of course, the student will be able to								
201	Classify Language and Grammar in Type0, Type1, Type2 and Type3 and Design the Grammar for	K2, K6							
002	O 2 Apply the pumping lemma for regular languages to determine if a language is not regular and								
CONTRACTOR OF THE PARTY OF THE	Closure operation on regular languages. Demonstrate that a grammar is ambiguous. Simplification of the CFG, representations of grammars in CNF and GNF.								
	DO 4 Explain PDA and various concepts of CFL and Convert PDA to CFG and vice versa.								
CO 5 State and explain the various aspects of Turing machine									
	DETAILED SYLLABUS	3-1-0							
Unit	Topic	Proposed Lecture							
1	Basic Concepts and Automata Theory: Introduction to Theory of Computation- Automata, Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability of a String and Language, Non- Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with a-Transition, Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with a-Transition, Equivalence of NFA's with and without a-Transition, Finite Automata with output-Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machine, Minimization of Finite Automata, Myhill-Nerode Theorem, Simulation of DFA and NFA								
11	Regular Expressions and Languages: Regular Expressions, Transition Graph, Rechord Using Arden's Finite Automata and Regular Expression- Arden's theorem, Algebraic Method Using Arden's Theorem, Regular and Non-Regular Languages, Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties. Finite Automata and Regular Languages, Regular Languages and Computers.								
III	Simulation of Transition Graph and Regular language. Regular and Non-Regular Grammars: Context Free Grammar(CFG)-Definition, Derivations, Languages, Derivation Trees and Ambiguity, Regular Grammars-Right Linear and Left Linear languages, Conversion of FA into CFG and Regular grammar into FA, Simplification of CFG, grammars, Conversion of FA into CFG and Regular grammar into FA, Simplification of CFG, Normal Forms- Chomsky Normal Form(CNF), Greibach Normal Form (GNF, Chomsky								
IV	Push Down Automata and Properties of Context Free Languages: Nondeterministic Pushdown Automata (NPDA) - Definition, Moves, A Language Accepted by NPDA, Deterministic Pushdown Automata (NPDA) - Definition, Moves, A Language Accepted by NPDA, Deterministic Pushdown Automata for								
v	Turing Machines and Recursive Function Theory: Basic Turing Machine Model, Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques for Turing Machine Construction, Modifications of Turing Machine, Turing Machine as Computer of Integer Functions, Universal Turing machine, Linear Bounded Automata, Church's Thesis, Recursive and Recursively Enumerable language, Halting Problem, Post's Correspondence Problem, Introduction to Recursive Function Theory.	08							

1. Introduction to Automata theory, Languages and Computation, J.E.Hopcraft, R.Motwani, and Ullman, 2nd edition, Pearson EducationAsia

2. Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw-Hill

3. Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI 4. Mathematical Foundation of Computer Science, Y.N.Singh, New Age International

	Web Designing (ITC403)								
	Course Outcome (CO)	Bloom's Knowledge Leve	l (KL)						
	At the end of course, the student will be	able to							
COI	Understand principle of Web page design and about types of web	sites	K3, K4						
CO2	Visualize and recognize the basic concept of HTML and applicati	ion in web designing.	K1, K2						
CO 3	Recognize and apply the elements of Creating Style Sheet (CSS).		K2, K4						
W. B.	Understanding the basic concept of Java Script and its application		K2, K3						
CO 4	the device appears of Web Hosting and apply the concept of SEO		K2, K3						
cos	DETAILED SYLLABUS		3-0-0						
Unit	Topic		Proposed Lecture						
1	Introduction: Basic principles involved in developing a web site, Planning process, Domains and Hosting, Responsive Web Designing, Types of Websites (Static and Dynamic Websites), Web Standards and W3C recommendations, Introduction to HTML: What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks								
11	Elements of HTML: HTML Tags., Working with Text, Working with Lists, Tables and Frames,								
ш	Working with Hyperlinks, Images and Multimedia, Working with Forms and controls Concept of CSS: Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties) CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.								
IV	Introduction to Client-Side Scripting, Introduction to Java Script, Ja Operators in JS, Conditions Statements, Java Script Loops, JS Pope Working with Arrays, JS Objects, JS Functions, Using Java Script in Validation of Forms, Related Examples	ip Boxes, JS Events, JS Arrays, Real time,	08						
v	Web Hosting: Web Hosting Basics, Types of Hosting Packages, Name Servers, Using Control Panel, Creating Emails in Cpanel, U website Concepts of SEO: Basics of SEO, Importance of SEO, Onpage Op	Ising FTP Client, Maintaining a	08						

1. Steven M. Schafer, "HTML, XHTML, and CSS Bible, 5ed", WileyIndia

2. Ian Pouncey, Richard York, "Beginning CSS: Cascading Style Sheets for Web Design", WileyIndia

ITNC1: CYBER SECURITY

1. To discover software bugs that pose cyber security threats and to explain how to fix the bugs to mitigate such threats

2. To discover cyber-attack scenarios to web browsers and web servers and to explain how to

mitigate such threats

3. To articulate the urgent need for cyber security in critical computer systems, networks, and world wide web, and to explain various threat scenarios

4. To articulate the well-known cyber-attack incidents, explain the attack scenarios, and explain

mitigation techniques.

Unit	Topic Topic	Proposed Lecture
ī	Introduction: Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.	08
11	Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce, Electronic Payment System, e- Cash, Credit/Dahit Cards, Digital Signature.	08
m	Basic cryptography: Public key cryptography, RSA public key crypto, Digital signature Hash functions, public key distribution, Real world protocols, Basic terminologies, Email security certificates, Transport Layer security TLS, IP	08
ıv	Internet Infrastructure: Basic security problems, Routing security, DNS revisited, Summary of weaknesses of internet security, Link layer connectivity and TCP IP connectivity, firewall, Intrusion detection	08

- 1. Charles P. Pfleeger, Shari Lawerance Pfleeger, "Analysing Computer Security", Pearson Education
- 2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi
- 3.Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla, "Introduction to Information Security and Cyber Law" Willey Dreamtech Press.
- 4. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill. 5.CHANDER, HARISH, "Cyber Laws and It Protection", PHI Learning Private Limited, Delhi, India







-	ITB301: Electronics Engineering	2-0-0
Unit	Topic	Proposed Lecture
ı	Semiconductor Diode Depletion layer, V-I characteristics, ideal and practical, diode resistance, capacitance, Diode Equivalent Circuits, Transition and Diffusion Capacitance, Zener Diodes breakdown mechanism (Zener and avalanche) Diode Application Series, Parallel and Series, Parallel Diode Configuration, Half and Full Wave rectification, Clippers, Clampers, Zener diode as shunt regulator, Voltage-Multiplier Circuits Special Purpose two terminal Devices Light-Emitting Diodes, Varactor (Varicap) Diodes, Tunnel Diodes, Liquid-Crystal Displays.	08
п	Bipolar Junction Transistor Transistor Construction, Operation, Amplification action. Common Base, Common Emitter, Common Collector Configuration DC Biasing BJTs Operating Point, Fixed-Bias, Emitter Bias, Voltage-Divider Bias Configuration. Collector Feedback, Emitter-Follower Configuration. Bias Stabilization. CE, CB, CC amplifiers and analysis of single stage CE amplifier Field Effect Transistor Construction and Characteristic of JFETs. Transfer Characteristic. CS, CD, CG amplifier and analysis of CS	08
ш	Operational Amplifiers Introduction, Differential Amplifier Circuits, Op-Amp Basic, Practical Op-Amp Circuits (Inverting Amplifier, Noninverting Amplifier, Unit Follower, Summing Amplifier, Integrator, Differentiator), Differential and Common-Mode Operation	08
IV	Digital Voltmeter: Introduction, RAMP Techniques Digital Multimeters: Oscilloscope, Introduction, Basic Principle, CRT, Block Diagram of Oscilloscope, Simple CRO, Massivement of voltage, current phase and frequency using CRO	08
v	Fundamentals of Communication Engineering: Elements of a Communication System, Need of modulation, electromagnetic spectrum and typical applications, terminologies in communication systems, Basics of signal representation and analysis, Fundamentals of amplitude and angle modulation, modulation and demodulation techniques.	08

Text Books

1. Robert L. Boylestad & Louis Nashelsky "Electronic Devices and Circuit Theory", Tenth Edition, Pearson Education, 2013

2. H S Kalsi, "Electronics Instrumentation," Third Edition, TMH Publication 2012 6

3. George Kennedy, "Electronic Communication System", Fifth Edition, TMH Publication, 2012

Reference Books

4. Devid A. Bell "Electronics Devices and Circuits", 5th Edition, OXFORD University Press 2008

5. Jacob Millman/ Christos C. Halkias/ Satyabrata Jit "Electronics Devices and Circuits", 3rd Edition, TMH 2008



OPERATING SYSTEM LAB (ITC451)

- 1. Study of hardware and software requirements of different operating systems (UNIX,LINUX,WINDOWSXP, WINDOWS7/8
- Execute various UNIX system callsfor
 - i. Processmanagement
 - ii. Filemanagement
 - iii. Input/output Systemscalls
- 3. Implement CPU SchedulingPolicies:
 - i. SJF
 - ii. Priority
 - iii. FCFS
 - iv. Multi-level Queue
 - Implement file storage allocation

technique:

- i. Contiguous(usingarray)
 - ii. Linked -list(usinglinked-list)
 - iii. Indirect allocation(indexing)
- Implementation of contiguous allocationtechniques:
 - i. Worst-Fit
 - ii. Best-Fit
 - iii. First-Fit
- Calculation of external and internal fragmentation
 - Free space list of blocks fromsystem
 - ii. List process file from thesystem
- 7. Implementation of compaction for the continually changing memory layout and calculate total movement ofdata
- 8. Implementation of resource allocation graph (RAG)
- Implementation of Bankersalgorithm
- 10. Conversion of resource allocation graph (RAG) to wait for graph (WFG) for each type of method used forstoring graph.
- 11. Implement the solution for Bounded Buffer (producer-consumer)problem using inter

process communication techniques-Semaphores

12. Implement the solutions for Readers-Writer's problem using inter process communication technique-Semaphore

WEB DESIGNING LAB (ITC453)

- To create a simple html file to demonstrate the use of differenttags. 1.
- To create an hund file to link to different hund page which contains images, tables, and also link within apage. 2.
- To create an html page with different types of frames such as floating frame, navigation frame & mixedframe. 3.
- To create a registration form as mentionedbelow. 4.

Procedure: Create an html page named as "registration.html"

- a) set backgroundcolors
- b) use table foralignment
- c) provide font colors &size
- To create an himl file by applying the different styles using inline, external & internal stylesheets. 5.
- To write a Javascript program to define a user defined function for sorting the values in anarray. 6.
- To create an himl page to explain the use of various predefined functions in a string and math object in javascript. 7.
- To create an html page to explain the use of various predefined functions in an array & Date object in Javascript. 8.
- To create an himl page to demonstrate exception handling injavascript 9.
- To display the calendar using javascript code by getting the year from theuser. 10.
- To create a html registration form and to validate the form using javascriptcode. 11.
- To create a html file. To open new window from the current window usingjavascript. 12



13. To create an html page to change the background color for every click of a button usingjavascript.

14. To create an html page with 2 combo boxes populated with month & year, to display the calendar for the selected month & year from combo box using avascript.

15. To create a himit page to display a new image & text when the mouse comes over the existing content in thepage.

PYTHON LANGUAGE PROGRAM LAB(ITC454)

- To write a python program that takes in command line arguments as input and print the number of arguments.
- 2. To write a python program to perform MatrixMultiplication.
- To write a python program to compute the GCD of twonumbers.
- To write a python program to find the most frequent words in a textfile.
- 5. To write a python program find the square root of a number (Newton'smethod).
- To write a python program exponentiation (power of anumber).
- To write a python program find the maximum of a list of numbers.
- 8. To write a python program linearsearch.
- 9. To write a python program Binarysearch.
- To write a python program selectionsort.
- 11. To write a python program Insertionsort.
- 12. To write a python program mergesort.
- 13. To write a python program first n prime number,
- To write a python program simulate bouncing ball in Pygame.

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IET, DR. R.L. AVADH UNIVERSITY, AYODHYA



Evaluation Scheme & Syllabus

For

B. Tech. Third Year (Information Technology)

AS PER

AICTE Model Curriculum

(Effective from the Session: 2024-25)

16/62/2024 Just

B. Tech. (Information Technology)

5TH SEMESTER

il. No.	Subject Codes	Subject	Peri	ods		E	evaluati	on Schen	ie	End	Sem	Total	Credit
1000		V. Carlotte Maria	L	Т	P	CT	TA	Total	PS	TE	PE		
1	(TC501	Database Management Systems	3	ı	0	30	20	50		100		150	4
2	ITC502	Design and Analysis of Algorithm	3	1	0	30	20	50		100		150	4
3	FTC503	Software Engineering	3	1	D	30	20	50		100		150	4
4	ITE-1	Departmental Elective-I	3	0	0	30	20	50		100		150	3
5	ITE-2	Departmental Elective-II	3	0	0	30	20	50		100		150	3
6	псзэ	Database Management Systems Lab	0	0	2				25		25	50	1
7	ITC552	Design and Analysis of Algorithm Lab	U	0	2				25		25	50	1
8	1TC553	Software Engineering Lab	0	u.	2				25		25	50	1
9	ITC554	Mini Project or Internship Assessment*	0	U	2				50			50	1
10	ITMOOCI*	IT Related Course	0	n	0								3
-		Total	15	3	8							950	2

'The Mini Project or totarmining (4 weeks) conducted during summer break effer IV semester and will be assessed during V semester.

"The MOOC course (approved from AICT) must be done from colline platform such as HPTEL (preferred). Coursers, MIT, edX, Standford Online etc. If a student is unable to pass this course, then the University will conduct backlog examination same as other exam as per the university guideline.

A MARIE

2 June

B.Tech. (Information Technology) 6TH SEMESTER

SI. No.	Subject Codes	Subject	Periods			Evaluation Scheme			End Sem		Total	Credit	
			i.	Т	P	ст	TA	Total	PS	TE	PE		
1	ITC601	Compiler Design	3	1	0	30	20	50		100		150	4
2	TTC602	Computer Network	3	1	0	30	20	50		100		150	4
3	1TC603	Machine Learning	1	1	0	30	20	50		100		150	4
4	[TE3	Departmental Elective-III	3	0	0	30	20	50		100		150	3
5	VACITI	IT Related Value- Added Course	3	0	0	30	20	50		100		150	3
6	ITC651	Compiler Design	0	0	2				25		25	50	1
7	[TC652	Computer Networks Lab	0 .	0	2				25		25	50	1
g	1TC653	Machine Learning Lab	0	0	2				25		25	50	ı
	-	Total	15	3	6			the same				900	2



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B. Tech. (Information Technology)

DEPARTMENTAL ELECTIVES

IT-ELECTIVE -1: Information Technology Elective-1

- 1- ITEI1: COMPUTER GRAPHICS
- 2- ITE12: NEURAL NETWORK
- 3- ITE13: GAME PROGRAMMING

IT-ELECTIVE-2: Information Technology Elective-2

- I-- ITE21: SOFTWARE TESTING & AUDIT
- 2-ITE22: OBJECT ORIENTED TECHNIQUES
- 4—ITE23: ADVANCE IMAGE PROCESSING TECHNIQUES

IT-ELECTIVE-3: Information Technology Elective-3

- 1-ITE31: DESIGN AND DEVELOPMENT OF APPLICATIONS
- 2—ITE32: DATAWAREHOUSING & DATA MINING
- 3-ITE33: GRAPH THEORY
- 4-ITE34: SOFT COMPUTING & ITS APPLICATION

VALUE ADDED COURSE:

1. ITVACI: IOT

2. ITVAC2: Operation Research

3. ITVAC3: Cloud Computing

4. ITVAC4: Big Data Analysis

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	ITC-501: Database Management Systems	3-1-0
Joit	Topic	Proposed Lecture
1	Introduction: Overview, Database system Vs file system, Database system concept and architecture, data model schema and instances, data independence and database language and interfaces, data definitions language, DML, Overall Database Structure. Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationship of higher degree.	08
II	Relational Data Model and Language: Relational data model Concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus. Introduction on SQL: Churacteristics of SQL, advantage of SQL. SQl data type and literals. Types of SQL commands. SQL operators and their procedure, Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL.	08
ш	Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss tess join decompositions, normalization using FD, MVD and IDs alternative approaches to database design	08
IV	Transaction Processing Concept: Transaction system, testing of scrializability, scrializability of schedules, conflict & view scrializable schedule, recoverability, Recuvery from transaction failures, log-based recovery, checkpoints, deadlock handling. Distributed Database: distributed data storage, concurrency control, directory system.	08
v	Concurrency Control Techniques: Concurrency Control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation-based protocol, multiple granularities, Multi version schemes, Recovery with concurrent transaction, case study of Oracle.	0.0

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References:

- 1. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
- 2. Date C J, "An Introduction to Database Systems", Addision Wesley
- Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley
- 4. O'Neil, Databases, Elsevier Pub.
- 5. RAMAKRISHNAN "Database Management Systems", McGraw Hill
- 6. Leon & Leon, "Database Management Systems", Vikas Publishing House
- 7. Bipin C. Desai, "An Introduction to Database Systems", Galgotia Publications
- 8. Majumdar & Bhattacharya, "Database Management System", TMH
- 9. R.P. Mahapatra, Database Management System, Khanna Publishing House

Course Outcomes:

- Describe the fundamental elements of relational database management systems
- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- Design ER-models to represent simple database application scenarios
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
- · Improve the database design by normalization.
- Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.

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_	ITC-502: Design and Analysis of Algorithm	3-1-0
Unit	Topic	Proposed Lecture
ı	Introduction: Algorithms, analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, Sorting and order Statistics - Shell sort, Quick sort, Merge sort, Heap sort, Comparison of sorting algorithms, Sorting in linear time.	08
n	Advanced Data Structures: Red-Black trees, B - trees, Binomial Heaps, Fibonacci Heaps,	08
111	Divide and Conquer with Examples such as Sorting, Matrix Multiplication, Convex hull and searching. Greedy methods with Examples such as Optimal Reliability Allocation, Knapsack, Minimum Spanning trees - Prim's and Kruskal's algorithms, Single source shortest paths - Different's and Reliman Ford algorithms.	08
IV	Dynamic Programming with Examples such as Knapsack. All pair shortest paths – Wa rshal's and Floyd's algorithms, Resource allocation problem, Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Such of subsets.	08
v	Selected Topics: Algebraic Computation, Fast Fourier Transform, String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms	08

References:

- Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India
- 2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
- Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.
- 4. LEE "Design & Analysis of Algorithms (POD)", McGraw Hill
- 5. Richard E. Neapolitan "Foundations of Algorithms" Jones & Bartlett Learning
- 6. 6.Gajendra Sharma, Design & Analysis of Algorithms, Khanna Publishing House
- 7 Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005.
- Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.
- 9. Harry R. Lewis and Larry Denemberg, Data Structures and Their Algorithms, Harper Collins, 1997.
- 10. Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.
- 11. Harsh Bhasin, "Algorithm Design and Analysis", First Edition, Oxford University Press.
- 12. Gilles Brassard and Paul Bratley, Algorithmics: Theory and Practice, Prentice Hall, 1995

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Course Outcomes:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamicprogramming algorithms, and analyze them.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
 Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
- Explain the major graph algorithms and their analyses. Employ graphs to model
 engineering problems, when appropriate. Synthesize new graph algorithms and algorithms
 that employ graph computations as key components, and analyze them.
- Explain what amortized running time is and what it is good for. Describe the different methods of amortized analysis (aggregate analysis, accounting, potential method). Perform amortized analysis.
- Explain what competitive analysis is and to which situations it applies. Perform competitive analysis.
- Compare between different data structures. Pick an appropriate data structure for a design situation.
- Explain what an approximation algorithm is, and the benefit of using approximation
 algorithms. Be familiar with some approximation algorithms, including algorithms that are
 PTAS or FPTAS. Analyze the approximation factor of an algorithm.



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	ITVACI: INTERNET OF THINGS	re subserver
	DETAILED SYLLABUS	3-0-0
Init	Topic	Proposed Lecture
1	Internet of Things (IoT): Vision, Definition, Conceptual Framework, Architectural view, technology behind IoT, Sources of the IoT, M2M Communication, IoT Examples. Design Principles for Connected Devices: IoT/M2M systems layers and design standardization, communication technologies, data enrichment and consolidation, ease of designing and affordability.	1
11	Hardware for IoT: Sensors, Digital sensors, actuators, radio frequency identification (RFID) technology, wireless sensor networks, participatory sensing technology. Embedded Platforms for IoT: Embedded computing basics, Overview of IOT supported Hardware platforms such as Arduino, Raspberry pi, Beagle Bone and ARM cortex.	a
111	Network & Communication aspects in IoT: Wireless Medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination	111
IV	Programming the Arduino: Arduino Platform Boards Anatomy, Arduino IDE coding, using emulator, using libraries, operators, if-else, loops, functions in Arduino programming. IoT Data Analysis: Concept of Big Data, Machine Learning Introduction, Data Analysis methods.	IV
V	Challenges in IoT Design challenges: Development Challenges, Security Challenges, Other challenges. IoT Applications: Case Studies Smart Metering, E-health, City Automation, Automotive Applications, home automation, smart cards, communicating data with H/W units, Designing of smart street lights in smart city. rences:	v

- 1. Olivier Hersent, David Boswarthick, Omar Elloumi "The Internet of Things key applications and protocols", willey

 2. Jeeva Jose, Internet of Things, Khanna Publishing House
- 3. Michael Miller "The Internet of Things" by Pearson
- 4. Raj Kamal "INTERNET OF THINGS", McGraw-Hill, 1st Edition, 2016
- 5. Arshdeep Bahga, Vijay Madisetti "Internet of Things (A hands on approach)" 181 edition, VP1 publications,2014
- 6. Adrian McEwen, Hakin Cassimally "Designing the Internet of Things" Wiley India

Course Outcome

- Able to Recognise the factors that contributed to the emergence of IoT.
- Able to Design and program IoT devices.
- Able to understand applications of IoT.



16.711	ITVAC2: OPERATION RESEARCH	3-0-0
Unit	Topic	Proposed Lecture
I	Definition and scope of operations research (OR), OR model, solving the OR model, art of modelling, phases of OR study. Linear Programming: Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.	08
11	Transportation Problems: Types of transportation problems, mathematical models, transportation algorithms, Assignment: Allocation and assignment problems and models, processing of job through machines.	08
ш	Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem. Project Management: Phases of project management, guidelines for network construction, CPM and PERT.	08
IV	Theory of Games: Rectangular games, Minimax theorem, graphical solution of 2 x n or m x 2 games, game with mixed strategies, reduction to linear programming model. Quality Systems: Elements of Queuing model, generalized Poisson queuing model, single server models.	08
v	Control: Models of inventory, operation of inventory system, quantity discount. Replacement: Replacement models: Equipment's that deteriorate with time, equipment's that fail with time.	08



References:

- 1. Wayne L. Winston, "Operations Research" Thomson Learning, 2003.
- Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education, 2003.
- 3. R. Panneer Seevam, "Operations Research" PHI Learning, 2008.
- V.K.Khanna, "Total Quality Management" New Age International, 2008.
- 5. T. Veerarajan "Operation Research" Universities Press

COURSE OBJECTIVE:

- The central objective of operations research is optimization, i.e., "to do
 things best under the given circumstances. Then, by systematically
 adjusting the values of all decision variables, a "good" (feasible) or "very
 best" (optimal) solution is selected.
- This course aims at familiarizing the students with quantitative tools and techniques, which are frequently applied to business decision-making & to provide a formal quantitative approach to problem solving and an intuition about situations where such an approach is appropriate.



	ITEIL: COMPUTER GRAPHICS	S- 1
	DETAILED SYLLABUS	3-0- 0
Unit		Proposed Lecture
1	Introduction and Line Generation: Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Mid-point circle generating algorithm, and parallel version of these algorithms.	08
11	Transformations: Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. Windowing and Clipping: Viewing pipeline, viewing transformations, 2-D Clipping algorithms—Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non-rectangular clip windows; Polygon clipping—Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping	

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m	Three Dimensional: 3-D Geometric Primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.	08
IV	Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects, Introductory concepts of Soline, Bspline and Bezier curves and surfaces.	08
v	Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models. Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows.	08

Text books:

Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education

Foley, Vandam, Feiner, Hughes – "Computer Graphies principle", Pearson Education.

3. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill

4. W. M. Newman, R. F. Sproull - "Principles of Interactive computer Graphics" - Tata MCGraw Hill.

5. Amrendra N Sinha and Arun D Udai," Computer Graphics", Tata MCGraw Hill.

6. R.K. Maurya, "Computer Graphics" Wiley Dreamtech Publication.

7. Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI Learning Private Limited.

8. Donald Hearn and M Pauline Baker, "Computer Graphics with OpenGL", Pearson education



	ITE12: NEURAL NETWORK	3-0-0
Unit	Topic	Proposed Lecture
ı	Neural Networks-I (Introduction & Architecture): Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Knowledge representation, Al and NN.	08
п	Neural Networks-II (Back propagation networks): Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule coefficient; back propagation algorithm, factors affecting backpropagation training, applications.	08

ıv	Self-Organization Maps (SOM): Introduction, Two basic feature mapping Models, Self-Organization Map, SOM Algorithm, Properties of	08
m	Multilayered Network Architecture: Back propagation algorithm, heuristics for making BP-algorithm performs better. Accelerated learning BP (like recursive least square, quickprop, RPROP algorithm), approximation properties of RBF networks and comparison with multilayer perceptron.	08

References:

1.J.A. Anderson, An Introduction to Neural Networks, MIT

2. Hagen Demuth Beale, Neural Network Design, Cengage Learning

3. Munesh Chandra Trivedi, NN Jani, Artificial Neural Network Technology, Khanna Publishing House

4. Laurene V. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications", Pearson India

Kosko, Neural Network and Fuzzy Sets, PHI 5. Hagan, Neural Network Design w/CD, Cengage Learning

Objective: The objective of such artificial neural networks is to perform such cognitive functions as problem solving and machine learning. This knowledge is modeled as the connections between the processing elements (artificial neurons) and the adaptive weights of each of these connections.

This course is designed to be a broad, self-contained, yet fairly rigorous introduction to the principles of neural computation with emphasis on machine learning, data mining and knowledge discovery, and their applications in artificial intelligence, neural and cognitive modelling, data mining and knowledge discovery, for undergraduate and graduate students in computer science, bioinformatics and computational biology, engineering, mathematics, psychology, neuroscience, cognitive science, and related disciplines.

	ITE21: SOFTWARE TESTING & AUDIT	3-0-0
Unit	Topic	Proposed Lecture
I	Review of Software Engineering: Overview of Software Evolution, SDLC, Testing Process, Terminologies in Testing: Error, Fault, Failure, Verification, Validation, Difference Between Verification and Validation, Test Cases, Testing Suite, Test, Oracles, Impracticality of Testing All Data; Impracticality of Testing All Paths. Verification: Verification Methods, SRS Verification, Source Code Reviews, User Documentation Verification, Software, Project Audit, Tailoring Software Quality Assurance Program by Reviews, Walkthrough, Inspection and Configuration Audits.	08
n	Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique. Structural Testing: Control Flow Testing, Path Testing, Independent Paths, Generation of Graph from Program, Identification of Independent Paths, Cyclomatic Complexity, Data Flow Testing, Mutation Testing.	08
m	Regression Testing: What is Regression Testing? Regression Test cases selection, Reducing the number of test cases, Code coverage prioritization technique. Reducing the number of test cases: Prioritization guidelines, Priority category, Scheme, Risk Analysis.	08
ıv	Software Testing Activities: Levels of Testing, Debugging, Testing techniques and their applicability, Exploratory Testing Automated Test Data Generation: Test Data, Approaches to test data generation, test data generation using genetic algorithm, Test Data Generation Tools, Software Testing Tools, and Software test Plan.	. 08
v	Object Oriented Testing: Definition, Issues, Class Testing, Object Oriented Integration and System Testing. Testing Web Applications: Web Testing, User Interface Testing, Usability Testing, Security Testing, Performance Testing, Database testing, Post Deployment Testing. Testing.	y 08

References: I Yogesh Singh, "Software Testing", Cambridge University

Press, New York, 2012

 K. K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, New Delhi, 2003.

 Roger S. Pressman, "Software Engineering - A Practitioner's Approach", Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.

Marc Roper, "Software Testing", McGraw-Hill Book Co., London, 1994.

5. M.C. Trivedi, Software Testing & Audit, Khanna Publishing House

 Horis Beizer, "Software System Testing and Quality Assurance", Van Nostrand Reinhold, New York, 1984.

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COURSE OBJECTIVES:

Develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time

Student learn systematic approach to the development, operation, maintenance, and retirement of software

_ _ _ Student learn how to use available resources to develop software, reduce cost of software and how to maintain quality of software

Methods and tools of testing and maintainace of software's



	ITE22: OBJECT ORIENTED TECHNIQUES	3-0-0
Unit		Proposed Lecture
I	Object Modeling: Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data; candidate keys, constraints.	06
u	Dynamic Modeling: Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model.	06
111	Functional Modeling: Data flow diagram, specifying operations, constraints, a sample functional model. OMT (object modeling techniques) methodologies, examples and case studies to demonstrate methodologies, comparisons of methodologies, SA/SD, ISD.	96
IV	Java Programming: Introduction, Operator, Data types, Variables, Arrays, Control Statements, Classes, Objects, Methods, Methods Overloading, Overriding Methods, Abstract Methods and classes, Inheritance, Multithread Programming: Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities synchronizing threads.	09

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C#: Introduction, Implementation of various Object-Oriented Concepts such as Class, Objects, Components, Encapsulation, Data Abstraction, Inheritance, Polymorphism. Java Library: String Handling, Event Handling, Introduction to AWT: Working with window& Graphics, AWT Controls: Button, CheckBox, Choice, Label, List, Scroll-Bar & Text Field.

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Text Books:

V

- 1. James Rumbaugh etal, "Object Oriented Modeling and Design", PHI
- 2. Herbert Schieldt, "The Complete Reference: Java", TMH.
- 3. E. Balagurusamy, "Programming in JAVA", TMH.

References:

- Booch Grady, "Object Oriented Analysis & Design with application 3/e", Pearson Education, New Delhi
- An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
- 3. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
- 4. Object Oriented Programming through Java, P. Radha Krishna, University Press.
- 5. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.

COURSE OUTCOME

CO1- Able to solve real world problems using OOP techniques.

CO2- Able to understand the use of abstract classes.

CO3- Able to develop multithreaded applications with synchronization.

CO4- Able to design GUI based applications

CO5- Able to develop applets for wab applications.

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	ITC 503: SOFTWARE ENGINNERING	3-0-0
Init	Topic	Proposed Lecture
1	Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.	08
11	Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.	07
ш	Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.	07
IV	Software Testing: Testing Objectives, Unit Testing, Integration Testing Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Driver and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products.	g 09



	Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.	
v	Software Maintenance and Software Project Management: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.	09
1.	ences: RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill. Pankaj Jalote, Software Engineering, Wiley	
3 4	 Rajib Mall, Fundamentals of Software Engineering, PHI Publication. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers. Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, Physiciation. Ian Sommerville, Software Engineering, Addison Wesley. Kassem Salch, "Software Engineering", Cengage Learning. P fleeger, Software Engineering, Macmillan Publication 	
Cou	rse Outcome: -	
CO		K2 K2
~~	Modeling. To understand the different design techniques and their implementation.	K2, K3

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ITC551: Database Management Systems

Lab

Objectives:

- 1. Installing oracle/ MYSQL
- Creating Entity-Relationship Diagram using case tools.
- Writing SQL statements Using ORACLE /MYSQL:
 - Writing basic SQL SELECT statements.
 - Restricting and sorting data.
 - Displaying data from multiple tables.
 - Aggregating data using group function.
 - Manipulating data.
 - E-Creating and managing tables.
- 4. Normalization
- 5. Creating cursor
- Creating procedure and functions
- 7. Creating packages and triggers
- 8. Design and implementation of payroll processing system
- Design and implementation of Library Information System.
- 10. Design and implementation of Student Information System
- 11. Automatic Backup of Files and Recovery of Files

ITC552: Design and Analysis of Algorithm Lab

Objectives: -

- Program for Recursive Binary & Linear Search.
- 2. Program for Heap Sort.
- Program for Merge Sort.
- 4. Program for Selection Sort.
- Program for Insertion Sort.
- Program for Quick Sort.
- Knapsack Problem using Greedy Solution
- 8. Perform Travelling Salesman Problem

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- 9. Find Minimum Spanning Tree using Kruskal's Algorithm
- 10. Implement N Queen Problem using Backtracking

ITC553: Software Engineering Lab

- 1 Prepare an SRS document in line with the IEEE recommended standards.
- 2 Draw the Entity relationship diagram of a project.
- 3 Draw the data flow diagrams at level 0 and level 1.
- 4 Draw use case diagram in argo UML.
- 5 Draw activity diagram in argo UML.
- 6 Draw class diagram in argo UML.
- 7 Draw the component diagram in argo UML.
- 8 Draw sequence diagram in argo UML.
- 9 Draw collaboration diagram in argo uml.

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B.Tech. (Information Technology) 6TH SEMESTER

	ITC-601: COMPILER DESIGN	
ourse Outcome (CO) Bloom's Knowledge Lo (KL)		ledge Level
	At the end of course, the student will be able to understand	
CO I	Acquire knowledge of different phases and passes of the compiler and able to the compiler tools like LEX, YACC, etc. Students will also be able to different types of compiler tools to meet the requirements of the realistic construction of compilers.	esign raints
CO 2	Understand the parser and its types i.e., Top-Down and Bottom-up parsers an construction of LL, SLR, CLR, and LALR parsing table.	K2, Ke
CO3	Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes.	Ka, Ks
CO 4	Acquire knowledge about run time data structure like symbol table organiz and different techniques used in that.	
CO 5	Understand the target machine's run time environment, its instruction set for code generationand techniques used for code optimization.	K2, K4

		3-1-0
Unit		Proposed Lecture
L	Introduction to Compiler: Phases and Passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Optimization of DFA-Based Pattern Matchers implementation of lexical analyzers, lexical-analyzer generator, LEX compiler, Formal grammars, and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.	08

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11	Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top-down parsing, predictive pursers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR (0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables.	08
ш	Syntax-Directed Translation: Syntax-directed Translation schemes, Implementation of Syntax-directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top-down parser. More about translation: Array references in arithmetic expressions, procedures call, declarations, and case statements.	08
IV	Symbol Tables: Data structure for symbols tables, representing scope information. Run- Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.	08
v	Code Generation: Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Code Generator. Code optimization: Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.	08

REFRENCES:

- 1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education
- 2. V Raghvan, "Principles of Compiler Design", TMH
- 3. Kenneth Louden," Compiler Construction", Cengage Learning.
- 4. Charles Fischer and Ricard LeBlanc," Crafting a Compiler with C*, Pearson Education
- 5. K. Munceswaran, Compiler Design, First Edition, Oxford University Press.
- 6. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw-Hill, 2003.
- 7. Henk Albias and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PH),

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	ITC 602: COMPUTER NETWORKS	3-1-0
Init	Topic	Proposed Lecture
1	Introduction Concepts: Goals and Applications of Networks, Network structure and Architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling	08
ΤΙ	Medium Access Sub Layer: Medium Access Sub Layer - Channel Allocations, LAN Protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.	
m	Network Layer: Network Layer - Point - to Pont Networks, routing. Congestion control Internetworking -TCP / IP, IP packet, IP address, Ipv6.	0.8
IV	Transport Layer: Transport Layer - Design issues, connection management, session Layer Design issues, remote procedure call. Presentation Layer-Design issues. Data compression techniques, cryptography - TCP - Window Management.	08
v	Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks – Internet and Public Networks	

References:

- Forouzen, "Data Communication and Networking", TMH
- 2. A.S. Tanenbaum, Computer Networks, Pearson Education
- 3. W. Stallings, Data and Computer Communication, Macmillan Press
- Gary R. Wright, W. Richard Stevens "TCP/IP (flustrated, Volume2 the Implementation" Addison-Wesley
- Michael A. Gallo and William M. Hancock "Communication and Networking Technology" Cengage Learning
- Bhavneet Sidhu, An Integrated approach to Computer Networks, Khanna Publishing House
- Anuranja Misra, "Computer Networks", Aeme Learning
- 8. G. Shanmugarathinam," Essential of TCP/ IP", Firewall Media

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COURSE OUTCOMES:

Students will be able to:

- CO1-Identify the different types of network topologies and protocols.
- CO2-Understand and explain Data Communications System and its components.
- CO3-To demonstrate proper placement of different layers of ISO model and illuminate its function.
- CO4-To understand internals of main protocols such as HTTP, FTP, SMTP, TCP, UDP, IP.
- CO5-To analyze simple protocols and can independently study literature be concerning computer networks.

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ITC-603: MACHINE LEARNING		
	DETAILED SYLLABUS	3-1-
Unit	Topic	Proposed Lecture
I	Introduction and Data-preprocessing Definition, Application, Supervised Learning, Unsupervised Learning, Model and Cost Function, gradient descent.	08
11	Regression Linear regression with one variable and with multiple variables: multiple features, gradient descent for multiple variables, polynomial regression. Support vector regression, decision tree regression, random forest regression.	08
111	Classification Logistic regression, support vector machine (SVM), Boundary Decision, Large Margin classification, SVM with kernels, kernel SVM, K-Nearest Neighbors (KNN), Naive Bayes, decision tree, random forest classification.	08
Įγ	Clustering and Reinforcement Learning K-means clustering, K- means for non-separated clusters, optimization objective, Hierarchical clustering, upper confidence bound, Thompson sampling.	08
v	Dimensionality Reduction and Model Selection Principal component analysis (PCA), Linear Discriminant Analysis, kernel PCA, Model selection and training/validation and test sets, diagnosing bias vs. variance, Regularization and bias/variance, over-fitting, Learning curves.	08

 Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

 Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.

 Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

4. Bishop, C., Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.

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Course Outcomes:

Students will be able to:

- CO1. Students will be able to define mathematical concepts of Machine learning, various types, and their applications.
- CO2. Students will be able to explain and calculate cost, gradient of Linear regression and support vector regression.
- CO3. Students will be able to calculate and apply classification like SVM, KNN etc.
- CO4. Students will be able to develop basic concept of clustering and reinforcement learning.
- CO5. Students will be able to choose appropriate parameters and features for dimensionality reduction in a model.

	ITE 31: DESIGN AND DEVELOPMENT OF APPLICATIONS	3-0-0
Unit	Topic	Proposed Lecture
1	INTRODUCTION: Introduction to mobile applications — Embedded systems - Market and business drivers for mobile applications — Publishing and delivery of mobile applications — Requirements gathering and validation for mobile applications	08
п	BASIC DESIGN: Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both bardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security availability and modifiability.	
111	ADVANCED DESIGN: Designing applications with multimedia and web access capabilities - Integration with GPS and social media networking applications - Accessing applications hosted in a cloud computing environment - Design patterns for mobile applications	Ua
IV	TECHNOLOGY I - ANDROID: Introduction - Establishing the development environment - Android architecture - Activities and views - Interacting with UI - Persisting data using SQLite - Packaging and deployment - Interaction with server-side applications - Using Google Maps, GPS and Wi-Fi - Integration with social media applications.	08

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TECHNOLOGY II -iOS: Introduction to Objective C - iOS features - UI implementation - Touch frameworks - Data persistence using Core Data and SQLite - Location aware applications using Core Location and Map Kit - Integrating calendar and address book with social media application - Using Wi-Fi - iPhone marketplace. Swift: Introduction to Swift, features of swift.

08

References: 1. Chartie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", Dream Tech, 2012

- Anubhav Pradhan, Anil V Despande Composing Mobile Apps, Learn, explore, apply
- James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
- Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
- David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS
- Development: Exploring the iOS SDK", Apress, 2013.

CO:

- CO1. Acquire the skills to edit, test and implement software for a client-server environment;
- CO2. Develop programs to retrieve data from forms and files to produce user displays and reports; CO3. Learn programming constructs and develop programs that use strings, dates, arrays, functions, classes and objects;
- CO4. Design and develop user interfaces to collect and present data and information;
- CO5. Develop code to use regular expressions, handle exceptions and validate data for file and database storage;
- CO 6. Implement measures to create secure web sites;
- CO 7. Design, create, and process a database;

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	ITE 32: DATAWAREHOUSING & DATA MINING	3-0-0
Unit	Topic	Proposed Lecture
I	Data Mining: Overview, Motivation, Definition & Functionalities, Data Processing, Form of Data Pre-processing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction: -Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Discretization and Concept hierarchy generation, Decision Tree	08
ri .	Data Warehousing: Overview, Definition, Data Warehousing Components, building a Data Warehouse, Warehouse Database, Mapping the Data Warehouse to a Multiprocessor Architecture, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept	08
m	Data Visualization and Overall Perspective: Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse. Warehousing applications and Recent Trends: Types of Warehousing Applications, Web Mining, Spatial Mining and Temporal Mining	08
IV	Classification and Prediction: Problem definition, General Approaches to solving a classification problem, Issues regarding classification and prediction, Classification by Decision tree induction, Bayesian Classification, classification by back propagation, Rule-based classification, Support Vector Machine	- ma
v	Clustering: Introduction, Similarity and Distance Measures, Hierarchical and Partitioned Algorithms. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE Model Based Method -Statistical Approach, Association rules: Introduction Lurge Itemsets. Basic Algorithms, Parallel and Distributed Algorithms, Neural Network approach.	08

References:

- 1. Alex Berson, Stephen J. Smith "Data Warehousing, Data-Mining & OLAP", TMH
- 2. Mark Humphries, Michael W. Hawkins, Michelle C. Dy, "Data Warehousing: Architecture and Implementation",

Pearson

- 3. I Singh. Data Mining and Warehousing, Khanna Publishing House
- 4. Margaret H. Dunham, S. Sridhar, "DataMining: Introductory and Advanced Topics" Pearson Education
- 5. Arun K. Pujari, "Data Mining Techniques" Universities Press
- 6. Pieter Adriauns, DolfZantinge, "Data-Mining", Pearson Education

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COURSE OUTCOMES:

- Gct exposure to Data warehouse and its architectures.
- Understand multi-dimensional data model like OLAP
- Understand the data pre-processing techniques aggregation, sampling, Feature Subset selection, dimensionality reduction, discretization and binarization
- Apply Data Mining to real world datasets.
- Interpret the Data Mining results.
- Analyze relationship among itemsets using techniques like Apriori and FP-growth.
- Understand classification algorithms like Decision tree, Bayesian, Neural networks etc.
- Understand classification algorithms like K-means, Hierarchical, DBSCAN etc.
- Extract knowledge using data mining techniques

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	ITE 33: Graph Theory	3-0-0
Unit	Topie	Proposed Lecture
1	Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, culer graphs, various operation on graphs, Hamiltonian paths and circuits, the traveling sales man problem.	08
11	Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and Dijkstra Algorithms.	08
111	Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets, connectivity and separability, network flows Planer graphs, combinatorial and geometric dual: Kuratowski graphs, detection of planarity, geometric dual, Discussion on criterion of planarity, thickness and crossings.	08
IV	Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set subspaces, Matrix representation of graph — Basic concepts; Incidence matrix, Circuit matrix, Path matrix, Cut-set matrix and Adjacency matrix.	08
v	Coloring, covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem Discussion of Graph theoretic algorithm wherever required.	08

References:

- 1. Deu, N, Graph theory with applications to Engineering and Computer Science, PHI
- 2. Gary Chartrand and Ping Zhang, Introduction to Graph Theory, TMH
- 3. Robin J. Wilson, Introduction to Graph Theory, Pearson Education
- 4. Harary, F, Graph Theory, Narosa
- 5. Bondy and Murthy: Graph theory and application. Addison Wesley.
- 6. V. Balakrishnan, Schaum's Outline of Graph Theory, TMH
- 7. Geir Agnarsson, Graph Theory: Modeling, Applications and Algorithms, Pearson

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Course Outcomes: After completion of the course, the student will be able to:

CO1: Explain the basic concepts of graph theory.

CO2: apply the basic concepts of mathematical logic

CO3: describe and solve some real time problems using concepts of graph theory.



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ITE 52: GAME PROGRAMMING		
	DETAILED SYLLABUS	3-0-
Uni t		Proposed Lecture
ı	3D GRAPHICS FOR GAME PROGRAMMING: 3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-Based Simulation, Scene Graphs.	08
n	GAME ENGINE DESIGN: Game Engine Architecture, Engine Support Systems, Resources and File Systems, Game Loop And Real-Time Simulation, Human Interface Devices, Collision and Rigid Body Dynamics, Game Profiling.	08
ш	GAME PROGRAMMING: Application Layer, Game Logic, Game Views, Managing Memory, Controlling the Main Loop, Loading and Caching Game Data, User Interface Management, Game Event Management.	08
IV	GAMING PLATFORMS AND FRAMEWORKS: 2D And 3D Game Development Using Flash, DirectX, Java, Python, Game Engines – DX Studio, Unity.	08
v	GAME DEVELOPMENT: Developing 2D And 3D Interactive Games Using DirectX or Python – Isometric and Tile Based Games, Puzzle Games, Single Player Games, Multi-Player Games.	08

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- Mike Mc Shaffirfy And David Graham, "Game Coding Complete", Fourth Edition, Cengage Learning, PTR, 2012.
- 2. Jason Gregory, "Game Engine Architecture", CRC Press / A K Peters, 2009.
- David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" 2nd Editions, Morgan Kaufmann, 2006.
- Ernest Adams And Andrew Rollings, "Fundamentals of Game Design", 2nd Edition Prentice Hall / New Riders, 2009.
- Bric Lengyel, "Mathematics For 3D Game Programming and Computer Graphics", 3rd Edition, Course Technology PTR, 2011.
- Jesse Schell, The Art of Game Design: A Book of Lenses, 1st Edition, CRC Press, 2008.



THE RESERVE

PROCESSING TECHNIQUES		
	DETAILED SYLLABUS	3-0-0
Unit		Proposed Lecture
ı	DIGITAL IMAGE FUNDAMENTALS: Steps in Digital Image Processing — Components — Elements of Visual Perception — Image Sensing and Acquisition — Image Sampling and Quantization — Relationships between pixels — Color image fundamentals — RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms — DFT, DCT.	08
ш	IMAGE ENHANCEMENT: Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.	08
ın	IMAGE RESTORATION: Image Restoration – degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Hand reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering	68
īv	IMAGE SEGMENTATION: Edge detection, Edge linking via Hough transform - Thresholding - Region based segmentation - Region growing - Region splitting and merging - Morphological processing- crossion and dilation, Segmentation by morphological watersheds - basic concepts - Dam construction - Watershed	08



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	segmentation algorithm.	
٧	IMAGE COMPRESSION AND RECOGNITION: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.	08
Sec. and	nooks: Refael C. Gonzalez, Richard E. Woods, Digital Image Processing Pearson, Third Edition	, 2010
1.	Anil K Jain Fundamentals of Digital Image Processing Pearson, 2002.	
2. 3.	Venneth P. Custleman Digital Image Processing Pearson, 2006.	
4.	Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB Pearson Education, Inc., 2011.	
5.	D. B. Dudgeon and RM. Mersereau, Multidimensional Digital Signal Processing Prentice Hall Professional Technical Reference, 1990.	e
6.	William K. Pratt, Digital Image Processing John Wiley, New York, 2002 Milan Sonka et al Image processing, analysis and machine vision Brookes/Cole, Vikus	
7.	Publishing House, 2nd edition, 1999	



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ITE 32: SOFT COMPUTING & ITS APPLICATION		
	DETAILED SYLLABUS	3-0-0
Unit		Proposed Lecture
I	Neural Networks-1 (Introduction & Architecture): Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.	08
u	Neural Networks-II (Back propogation networks): Architecture: perception model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient; back propagation algorithm, factors affecting	
111	Fuzzy Logic-1 (Introduction): Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.	08





IV	Fuzzy Logic -II (Fuzzy Membership, Rules): Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications, and Fuzzy algorithms, Fuzzifications & Defuzzification's, Fuzzy Controller, Industrial applications	08
v	Genetic Algorithm (GA): Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.	08

- S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.
- 2. N.P. Padhy, "Artificial Intelligence and Intelligent Systems" Oxford University Press. Reference Books:
- 3. Siman Haykin, "Neural Networks" Prentice Hall of India
- 4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
- 5. Kumar Satish, "Neural Networks" Tata Mc Graw Hill





	ITVAC3: CLOUD COMPUTING	
	DETAILED SYLLABUS	3-1-0
Unit	Topie	Proposed Lecture
ı	INTRODUCTION Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.	08
11	CLOUD ENABLING TECHNOLOGIES Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish- Subscribe Model – Basics of Virtualization – Types of Virtualizations – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices – Virtualization Support and Disaster Recovery.	
ın	CLOUD ARCHITECTURE, SERVICES AND STORAGE Layered Cloud Architecture Design - NIST Cloud Computing Reference Architecture - Public, Private and Hybrid Clouds - laaS - PaaS - SaaS - Architectural Design Challenges - Cloud Storage - Storage-as-a-Service -	



	Advantages of Cloud Storage - Cloud Storage Providers - S3.	
īv	RESOURCE MANAGEMENT AND SECURITY IN CLOUD Inter Cloud Resource Management - Resource Provisioning and Resource Provisioning Methods - Global Exchange of Cloud Resources - Security Overview - Cloud Security Challenges - Software-as-a-Service Security - Security Governance - Virtual Machine Security - IAM - Security Standards.	08
v	CLOUD TECHNOLOGIES AND ADVANCEMENTS Hadoop - MapReduce - Virtual Box - Google App Engine - Programming Environment for Google App Engine - Open Stack - Federation in the Cloud - Four Levels of Federation - Federated Services and Applications - Future of Federation.	08

- 1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Murgan Kaufmann Publishers, 2012.
- 2. Rittinghouse, John W., and James F. Ransome, -Cloud Computing: Implementation, Management and Security, CRC Press, 2017.
- 3. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
- 4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing A Practical Approach, Tata Mcgraw Hill, 2009.
- 5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.



-	ITVAC4: BIG DATA ANALYTICS	
	DETAILED SYLLABUS	3-0-0
Unit	Topic	Proposed Lecture
1	INTRODUCTION TO BIG DATA AND HADOOP Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analyzing Data with Unix tools, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere Big Insights and Big Sheets	

11	HDFS (Hadoop Distributed File System) The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O; Compression, Serialization, Avro and File-Based Data structures.	08
ш	Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.	08
IV	Hadoop Eco System Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grant, Pig Latin, User Defined Functions, Data Processing operators. Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase: HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL: Introduction	08
v	Data Analytics with R Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.	08

Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

References

- Michael Bernhold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
- 2.Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
- Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge

University Press, 2012.

4. Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007

COURSE OUTCOMES: The students will be able to:

- CO 1: Identify Big Data and its Business Implications.
- CO 2: List the components of Hadoop and Hadoop Eco-System
- CO 3: Access and Process Data on Distributed File System
- CO 4: Manage Job Execution in Hadoop Environment
- CO 5: Develop Big Data Solutions using Hadoop Eco System
- CO 6: Analyze Infosphere BigInsights Big Data Recommendations.
- CO 7: Apply Machine Learning Techniques using R.

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ITC651: Compiler Design lab

- Lab 1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and newlines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language.
- Lab2. Write a C program to identify whether a given line is a comment or not
- Lab 3. Write a C program to simulate lexical analyzer for validating operators.
- Lab 4. Implement following programs using Lex.
 - 1. Create a Lexer to take input from text file and count no of characters, no. of lines & no.
 - 2. Write a Lex program to count number of vowels and consonants in each input string.
- Lab 5. Write a Lex program to count the number of comment lines in each C program. Also eliminate them and copy that program into separate file
- Lab 6. Write a C program for constructing of LL (1) parsing
- Lab 7. Write a C program for constructing recursive descent parsing.
- Lab 8. Write a C program to implement LALR parsing.
- Lab 9. Create Yacc and Lex specification files to recognizes arithmetic expressions involving +, -, * and /.
- Lab 10. Create Yacc and Lex specification files are used to generate a calculator which accepts, integer and float type arguments

ITC652: COMPUTER NETWORKS LAB

- Lab 1: Study various network devices
- Lab 2: Networks Cabling
- Lab 3: Switches configuration using Packet Tracer
- Lab 4: Connect the computers in Local Area Network using Packet Tracer
- Lab 5: Configure the Network Topology using Packet Tracer
- Lab 6: Router Configuration Using Packet Tracer
- Lab 7: Static Route Configuration on Router-Part
- Lab 8: Configure a Network Using Distance Vector Routing protocol
- Lab 9: Configure a Network Using Link state routing, Routing protocol
- Lab 10: Wireless connection using packet tracer

Note: The instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

Course Outcomes (COs)

- CO1: Computer network Device enhance the knowledge network hubs.
- CO2: To get the knowledge about the network router and Switches
- CO3: Data cabling help us in connectivity with different computers in a small area
- CO4: Understand the purpose of packet tracers.
- CO5: Interconnect device and configure them using simple interface.
- CO6: Packet tracker helps us to design complex large networks.

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CO7: Enhance the interior gateway routing protocol.

CO8: To develop an understanding of modern network architecture from a design.

CO9: View router configuration information and configure the host name interface description.

CO10: Configure static route on two routers so that there is a network connection between computers in the two LANs.

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ITC653: Machine learning LAB

Course Outcomes:

Students will be able to:

CO1. Students will be able to perform programs on data-preprocessing

CO2. Students will be able to write programs of regression

CO3. Students will be able to perform classification on real world classification problems.

CO4. Students will be able to develop programs for clustering and reinforcement learning.

CO5. Students will be able to use appropriate parameters and features for dimensionality reduction.

Practical List

Section 1: Practice of number of programs on data-preprocessing.

Section 2: Programs on various aspects of Regression.

Section 3: Programs on Classification

Section 4: Programs covering various concepts of clustering and reinforcement learning

Section 5: Programs covering various concepts of dimensionality reduction.

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IET, DR. R.L. AVADH UNIVERSITY, AYODHYA



Evaluation Scheme & Syllabus

For

B. Tech. Fourth Year (Information Technology)

AS PER

AICTE Model Curriculum

(Effective from the Session: 2024-25)

Liter John June

B.Tech. (Information Technology) VII^{TH} SEMESTER

SL No.	Subject Codes	Subject	Pe	riod	s	F	valua	tion Sel	ieme	End Semes	ter	Total	Credit
		The state of the s	L	T	P	CT	TA	Total	PS	TE	PE	A CONTRACTOR	3/10/5/8/5
1	MAB 701	Business Environment	3	0	0	30	20	50	1	100		150	3
2	ITE 4	Departmental Elective-IV	3	0	0	30	20	50		100		150	3
3	ITE 5	Departmental Elective-V	3	0	0	30	20	50		100		150	3
4	OE1	Open Elective-II [Annexure - B(iv)]	3	0	0	30	20	50	12	100		150	3
5	ITE 4-L	Departmental Elective-IV Lab	0	0	2		(-8880)		25		25	50	1
6	ITCSSI	Mini Project or Internship Assessment*	0	0	2				50			50	1
7	ITC552	Project	0	0	8				50		100	150	4
_		Total	12	0	12			- Inte		1000		850	18



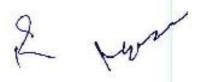


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B.Tech. (Information Technology) VIII SEMESTER

SI. No.	Subject Codes	Subject	P	eriod	s	F	Lvalus	tion Sci	heme	End Semes	ter	Total	Credit
1400	Cours		1	T	P	CT	TA	Total	PS	TE	PE		
1	MAB801	Entrepreneurship	3	0	0	30	20	50		100		150	3
2	OE 2	OpenElective- III[Annexure- B(iv)]	3	0	0	30	20	50		100		150	3
3	OE 3	OpenElective- IV[Annexure- B(iv)]	3	0	0	30	20	50		100		150	3
4	ITC851	Project	0	0	18				100		300	400	9
6	-	Total	9	0	18				10 10 10 10 10 10 10			850	1





DEPARTMENTAL ELECTIVES

IT-ELECTIVE -4

- 1. ITE 41: Cryptography & Network Security
- 2. ITF. 42: Block chain ArchitectureDesign
- 3. ITE 43: Agile SoftwareDevelopment
- 4. NE 44: Augmented & VirtualReality

IT-ELECTIVE-5

- 5. ITE 51: Artificial Intelligence
- 6. ITE 52:Mobile Computing
- 7. 1 TE 53: Deep Learning
- 8. 1 TF. 54:Parallel&Distributed Computing

OPEN ELECTIVE

OPEN ELECTIVE-1

1. OE 11: Natural Language Processing

2. OE 12: Human Computer Interface

3. OE 13: IT in Forensic

OPEN ELECTIVE-2

1. OE 21:Robotics

2. OE 22:Multimedia System

3. OE 23:Introduction to Biotechnology

OPEN ELECTIVE-3

1. OE 31: Integrated Waste Management for Smart City

2. OE 32: Quantum Computing 3. OE 33: Grid Computing

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B.TECH. (INFORMATION TECHNOLOGY)

VII & VIII SEMESTER (DETAILED SYLLABUS)

	ITE 41: CRYPTOGRAPHY & NETWORK. SECURITY	
	DETAILED SYLLABUS	3-1-0
Unit	Topic	Proposed Lecture
1	Introduction to security attacks, services and mechanism, Classical encryption techniques-substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES	08
п	Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, primarily testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA	08
т	Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA) Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm,	048
IV	Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos, Electronic mail security: pretty good privacy (PGP), S/MIME.	08
v	IP Security: Architecture, Authentication header, encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic, transaction (SET) System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls	08

- 1. William Stallings, "Cryptography and Network Security: Principals and Practice", PearsonEducation.
- 2. Behrouz A. Frouzan: Cryptography and Network Security, Tata McGrawHill
- 3.C K Shyamala, N Harini, Dr. T.R. Padmnabhan Cryptography and Security, Wiley
- 4. Bruce Schiener, "Applied Cryptography". John Wiley & Sons
- 5. Bernard Menezes," Network Security and Cryptography", Cengage Learning.
- 6. Atul Kahate, "Cryptography and Network Security", Tata McGrawHill

Course Outcome: -

- CO1- Classify the symmetric encryption techniques and illustrate various public key cryptographic techniques.
- CO2- Understand security protocols for protecting data on networks and be able to digitally sign emails and files.
- CO3- Understand vulnerability assessments and the weakness of using passwords for authentication
- CO4- Be able to perform simple vulnerability assessments and password audits
- CO5- Summarize the intrusion detection and its solutions to overcome the attacks.

	ITE 51: ARTIFICIAL INTELLIGENCE	
=0.00	DETAILED SYLLABUS	3-0-0
Unit	Topic	Proposed Lecture
1	Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.	08
п	Introduction to Search: Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning	08
Ш	Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.	08
IV	Machine Learning: Supervised and unsupervised learning, Decision trees, Statistical learning models, learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,	08
v	Pattern Recognition: Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques - Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K - means clustering.	08

- 1. Stuart Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", PearsonEducation
- 2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill
- 3. E. Charniak and D McDermott, "Introduction to Artificial Intelligence", PearsonEducation
- 4. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall ofIndia,

Course Outcome:-

- CO | Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents.
- CO 2 Understand search techniques and gaming theory.
- CO 3 The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications.
 CO 4 Student should be aware of techniques used for classification and clustering.
- CO 5 Student should aware of basics of pattern recognition and steps required for it.



ITE 41 - L: -CRYPTOGRAPHY & NETWORK SECURITY LAB

The following programs may be developed -

- 1. To implement the simple's substitution technique named Caesar cipher using g C language.
- 2. To write a C program to implement the Playfair Substitution technique
 - 3. To write a C program to implement the hill cipher substitution technique.
 - 4. To implement the Vigenere Cipher substitution technique using C program.

5. To write a C program to implement the rail fence transposition technique

6.To write a C program to implement Data Encryption Standard (DES) using C Language.

7.To write a C program to implement the RSA encryption algorithm.

8.To implement the Diffie-Hellman Key Exchange algorithm using C language.

9.To write a C program to implement the MD5 hashing technique.
10. Calculate the message digest of a text using the SHA-1 algorithm inJAVA.



	OE 12: HUMAN COMPUTER INTERFACE	
	DETAILED SYLLABUS	3-0-0
Unit	Topi c	Proposed Lecture
1	Introduction:Importance of user Interface – definition, importance of 8 good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface	08
TT.	Design process: Human interaction with computers, importance of 8 human characteristics human consideration, Human interaction speeds, understanding business junctions. III Screen Designing: Design goals – Scre	08
ш	Screen Designing:Design goals - Screen planning and purpose, 8 organizing screen elements, ordering of screen data and content - screen navigation and flow - Visually pleasing composition - amount of information - focus and emphasis - presentation information simply and meaningfully - information retrieval on web - statistical graphics - Technological consideration in interface design.	08
IV	Windows: New and Navigation schemes selection of window, 8 selections of devices based and screen-based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors	48

v	Software tools: Specification methods, interface – Building Tools. 8 Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.	08
m		

- Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale Human Computer Interaction, 3rd Edition Prentice Hall, 2004.
- Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, Research Methods in HumanComputer Interaction, Wiley, 2010.
- 3. Ben Shneiderman and Catherine Plaisant Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition, pp. 672, ISBN 0-321-53735-1, March 2009), Reading, MA: Addison-Wesley PublishingCo.



000000	DETAILED SYLLABUS	3-0- 0
Unit	Topi c	Proposed Lecture
1	Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products Stages of Multimedia Projects. Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page-based authoring tools.	
11	Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.	08
m	Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modelling, Finite Context Modelling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio lossless & lossy compression.	
IV	Speech Compression & Synthesis Digital Audio concepts, Sampling Variables, Loss less compression of sound, lossy compression & silence compression.	08

Images: Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file
V formatanimations Images standards, JPEG Compression, Zig Zag Coding.

Video: Video representation, Colors, Video Compression, MPEG standards, MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast Services, Indexing and retrieval of Video Database, recent development in Multimedia.

Text books:

- 1. Tay Vaughan, "Multimedia, Making IT Work", McGraw Hill.
- 2. Buford, "Multimedia Systems", Addison Wesley.
- 3. Mark Nelson, "Data Compression Hand Book", BPB.
- 4. Sleinreitz, "Multimedia System", Addison Wesley.

Course Outcome: -

CO1: To Critically and analyze the key components of multimedia technologies including text, graphics, voice, video and animation and the broad principles associated with multimedia concepts used in computer graphics.

CO2: Create vector and typographic designs and apply masking effect to images and create an animation using the tools panel.

CO3: Design an image using image editing tools and apply effectively. Create animated sequence with titles applying the principles of animation.

CO4: Apply acquired knowledge in the field of multimedia for the good cause like advertisement in practice and independently continue to expand knowledge in this field.



Mark

OE 33: Grid Computing		
	DETAILED SYLLABUS	3-0-0
Unit	Topic	Proposed Lecture
ì	CONCEPTS AND ARCHITECTURE Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing-Anatomy and Physiology of Grid- Web and Grid Services-Grid Standards - OGSA-WSRF - Trends, Challenges, and applications.	08
п	GRID MONITORING Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- R-GMA - GridICE MDS- Service Level Agreements (SLAs) - Other Monitoring Systems- Ganglia, GridMon, Hawkeye and Network Weather Service.	08

[1]	GRID SECURITY AND RESOURCE MANAGEMENT 9 Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management, Gridway and Gridbus Broker-principles of Local Schedulers, Overview of Condor, SGE, PBS, LSF-Grid Scheduling with QoS.	08
ΙV	DATA MANAGEMENT AND GRID PORTALS 9 Data Management-Categories and Origins of Structured Data-Data Management Challenges, Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals-Generations of Grid Portals.	08
v	GRID MIDDLEWARE List of globally available Middleware - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features. Features of Next generation grid.	08

1. Ian Foster, Carl Kesselman, The Grid 2: Blueprint for a New Computing Infrastructure, Elsevier Series, 2004.

2. Vladimir Silva, Grid Computing for Developers, Charles River Media, January 2006.

3. Parvin Asadzadeh, Rajkumar Buyya, Chun Ling Kei, Deepa Nayar, and Srikumar Venugopal, Global Grids and Software Toolkits: A Study of Four Grid Middleware Technologies, High Performance Computing: Paradigm and Infrastructure, Laurence Yang and Minyi Guo (editors), Wiley Press, New Jersey, USA, June 2005.

4. Jarck Nabrzyski, Jennifer M. Schopf, Jan Weglarz, Grid Resource Management: State of the Art and Future Trends, (International Series in Operations Research & Management Science), Springer; First edition, 2003

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	OE 31: Integrated Waste Management for Smart City	
	DETAILED SYLLABUS	3.0-0
Unit	Topie	Proposec Letture
1	INTRODUCTION TO SOLID WASTE MANAGEMENT: Municipal Solid Waste Sources; composition; generation rates Swachh Bhurat Mission and Smart Cities Program. Current Issues in Solid Waste Management and Review of MSW Management Status in First List of 20 Smart Cities in the Country.	08

п	MUNICIPAL SOLID WASTE MANAGEMENT – FUNDAMENTALS: Municipal Solid Waste, Characteristics and Quantities, Collection, Transportation, segregation and Processing.	08
Ш	DISPOSAL OF MUNICIPAL SOLID WASTE: Landfill, Biochemical Processes and Composting, Energy Recovery from Municipal Solid Waste. Municipal Solid Waste (MSW) Rules 2016.	08
ΙV	CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT: Overview of C&D Waste – Sources, Effects, and Regulations, Beneficial Reuse of C&D Waste Materials	08
v	ELECTRONIC WASTE (E-WASTE) MANAGEMENT: Sources, Effects, Issues and Status in India and globally, controlling measures, E-Waste Management Rules 2016 and Management Challenges.	08

 William A Worrell and P. Aarne Veslind, "Solid Waste Engineering", 2nd Edition Cengage Learning, 2012 (ISBN-13: 978-1-4390-6217-3)

 George Tchobanoglous, Hilary Theisen and Samuel A Vigil, "Integrated Solid Waste Management", Tata McGraw Hill, 1993.

 The Central Public Health and Environmental Engineering Organization (CPHEEO), "Manual on Solid Waste Management", India, 2016.

Course Outcome: -

1. To know about the classification of waste.

2. To know the disposal of various waste.

3. To learn the demolition waste and disposal.

4. To learn the E waste and their disposal.



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OE 21: Robotics DETAILED SYLLABUS 3-		1100-100-100
		3-0-0
Unit	Topic	Proposed Lecture
1	Brief History, Types of robots, Overview of robot subsystems, resolution, repeatability and accuracy, Degrees of freedom of robots, Robot configurations and concept of workspace, Mechanisms and transmission, End effectors and Different types of grippers, vacuum, and other methods of gripping. Pneumatic, hydraulic, and electrical actuators, applications of robots, specifications of different industrial robots.	08
п	Rotation matrices, Euler angle and RPY representation, Homogeneous transformation matrices, Denavit-Hartenberg notation, representation of absolute position and orientation in terms of joint parameters, direct kinematics.	08
Ш	Inverse Kinematics, inverse orientation, inverse locations, Singularities, Jacobian, Trajectory Planning: joint interpolation, task space interpolation, executing user specified tasks.	08
IV	Static force analysis of RP type and RR type planar robots, Dynamic analysis using Lagrangian and Newton-Euler formulations of RR and RP type planar robots, Independent joint control, PD and PID feedback, actuator models, nonlinearity of manipulator models, Computed torque control, force control, hybrid control.	08
Y	Sensors and controllers: Internal and external sensors, position, velocity and acceleration sensors, proximity sensors, force sensors, laser range finder. Robot vision: image processing fundamentals with effect from 2015 – 16 for robotic applications, image acquisition and preprocessing. Segmentation and region characterization object recognition by image matching and based on features	08

1. Nagrath and Mittal, "Robotics and Control", Tata McGraw-Hill, 2003.

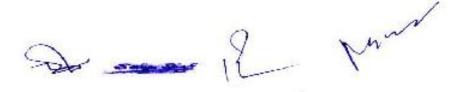
2. Spong and Vidhyasagar, "Robot Dynamics and Control", John Wiley and sons, 2008.

 Fu. K.S., Gonzalez, R.C., Lee, C.S.G. Robotics, control, sensing, Vision and Intelligence, McGraw Hill International, 1987

4. Harry Asada &Slottine "Robot Analysis& Control", Wiley Publications, 2014

5. S K Saha, "introduction to Robotics", 2

2nd edition, TMH, 2013



	OE 23: Introduction to Biotechnology	
	DETAILED SYLLABUS	3-0-0
Unit	Topie	Proposed Lecture
I	INTRODUCTION TO BIOTECHNOLOGY Fundamentals of Biochemical Engineering, Biotechnology and Society. Principles and Processes: Application in Health, food, medicine, and Agriculture; genetically modified (GM) organisms; biosafety issues.	08
n	BIOMOLECULES Building Blocks of Biomolecules-Structure and dynamics. Structure and function of Macromolecules (Carbohydrates, Proteins, Lipids). Classification of Enzymes; Purification and characterization of enzymes from natural sources. Comparison of chemical and enzyme catalysis.	08
111	CELL AS A BASIC UNIT OF LIFE Introduction: Definition, Study of Microbes, Types of microbes, Classification of microbes. Origin of microbiology. Application of microbes in fermentation Biotechnology. Cellular Techniques including chromatography.	
IV	HISTORY OF BIOINFORMATICS Introduction and application. Biological databases (nucleotide and protein data bases, Structure databases) and their retrieval. Sequence file formats. Information Sources Analysis using Bioinformatics tools.	
v	GENOMICS Introduction Genome Sequencing Projects, Gene Prediction and counting, Genome similarity, SNPs, and comparative genomics.	80

- 1. Text book of Biotechnology by H.K. Dass (Wiley India publication)
 - 2. Biotechnology by B.D. Singh (Kalyani Publishers)
 - 3. Text book of Biotechnology by R.C. Dubey (S. Chand and company)



	ITE42: BLOCKCHAIN ARCHITECTURE DESIGN	
	DETAILED SYLLABUS	3-1-0
Unit	Topie	Proposed Lecture
1	Introduction to Blockchain: Digital Money to Distributed Ledgers, Design Primitives: Protocols, Security, Consensus, Permissions, Privacy. Blockchain Architecture and Design: Basic crypto primitives: Hash, Signature,) Hashchain to Blockchain, Basic consensus mechanisms	08
П	Consensus: Requirements for the consensus protocols, Proof of Work (PoW), Scalability aspects of Blockchain consensusprotocols Permissioned Blockchains: Design goals, Consensus protocols for Permissioned Blockchains	08
ш	Hyperledger Fabric (A): Decomposing the consensus process, Hyperledger fabric components, ChaincodeDesign and Implementation Hyperledger Fabric (B): BeyondChaincode:fabricSDKandFrontEnd(b)Hyperledger composer tool	08
ıv	Use case 1:Blockchain in Financial Software and Systems (FSS): (i) Settlements, (ii) KYC, (iii) Capital markets, (iv) Insurance Use case 2: Blockchain in trade/supply chain: (i) Provenance of goods, visibility, trade/supply chain finance, invoice management discounting, etc.	08
v	Use case 3: Blockchain for Government: (i) Digital identity, land records and other kinds of record keeping between government entities, (ii) public distribution system social welfare systems Blockchain Cryptography, Privacy and Security on Blockchain	08
Text b	TANKET OF THE PROPERTY OF THE	
1.	Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by AndreasAntonopoulos	
2.	Blockchain by Melanie Swa,O'Reilly	
3.	Hyperledger Fabric -https://www.hyperledger.org/projects/fabric	
4.	Zeroto Blockchain - AnlBMRedbookscourse,byBobDill,D	avid\$rnits

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OE 13: IT in Forensic Science		
	DETAILED SYLLABUS	
Unit	Topie	Proposed Lecture
I	Overview of Biometrics, Biometric Identification, Biometric Verification, Biometric Enrollment, Biometric System Security. Authentication and Biometrics: Secure Authentication Protocols, Access Control Security Services, Matching Biometric Samples, Verification by humans. Common biometrics: Finger Print Recognition, Face Recognition, Speaker Recognition, Iris Recognition, Hand Geometry, Signature Verification	08
n	Introduction to Information Hiding: Technical Steganography, Linguistic Steganography, Copy Right Enforcement, Wisdom from Cryptography Principles of Steganography: Framework for Secret Communication, Security of Steganography System, Information Hiding in Noisy Data, Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding in Written Text.	08
ш	A Survey of Steganographic Techniques: Substitution systems and Bit Plane Tools, Transform Domain Techniques: - Spread Spectrum and Information hiding, Statistical Steganography, Distortion Techniques, Cover Generation Techniques. Steganalysis: Looking for Signatures: - Extracting hidden Information, Disabling Hidden Information.	08
IV	Watermarking and Copyright Protection: Basic Watermarking, Watermarking Applications, Requirements and Algorithmic Design Issues, Evaluation and Benchmarking of Watermarking system. Transform Methods: Fourier Transformation, Fast Fourier Transformation, Discrete Cosine Transformation, Mellin-Fourier Transformation, Wavelets, Split Images in Perceptual Bands. Applications of Transformation in Steganography.	o.com
v	Computer Forensics, Rules of evidence, Evidence dynamics, Evidence collection, Data recovery, Preservation of digital evidence, surveillance tools for future warfare.	08

- 1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing tothe Internet of Things", Morgan Kaufmann Publishers, 2012.
- 2. Rittinghouse, John W., and James F. Ransome, -Cloud Computing: Implementation, Management andSecurity, CRC Press,2017.
- 3. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computing, Tata Mcgraw Hill,2013.
- 4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing A Practical Approach, Tata Mozraw Hill,2009.
- 5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.

Course Outcome of IT in Forensic Science

- 1. Demonstrate competency in the collection, processing, analyses, and evaluation of evidence.
- Demonstrate competency in the principles of crime scene investigation, including the recognition, collection, identification. preservation, and documentation of physical evidence.
- Demonstrate an understanding of the scientific method and the use of problem-solving within the field of forensic science.
 Identify the role of the forensic scientist and physical evidence within the criminal justice system.
 Demonstrate the ability to document and orally describe crime scenes, physical evidence, and scientific processes.

- 6. Identify and examine current and emerging concepts and practices within the foreasic science field.

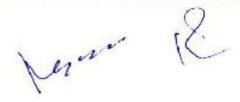
DETAILED SYLLABUS 3-		3-1-0
Unit	Topie	Proposed Lecture
1	AGILE METHODOLOGY Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values	08
п	AGILE PROCESSES Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview - Lifecycle - Work Products, Roles and Practices.	08
ш	AGILITY AND KNOWLEDGE MANAGEMENT Agile Information Systems – Agile Decision Making – Earls Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment, leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).	08
ĮV	AGILITY AND REQUIREMENTS ENGINEERING Impact of Agile Processes in RE-Current Agile Practices - Variance - Overview of RE Using Agile - Managing Unstable Requirements - Requirements Elicitation - Agile Requirements Abstraction Model - Requirements Management in Agile Environment, Agile Requirements Prioritization-AgileRequirementsModelingandGeneration- ConcurrencyinAgile Requirements Generation.	08
v	AGILITY AND QUALITY ASSURANCE Agile Product Development - Agile Metrics - Feature Driven Development (FDD) - Financial and Production Metrics in FDD - Agile Approach to Quality Assurance - Test Driven Development - Agile Approach in Global Software Development.	08

 David J. Anderson and Eli Schragenheim, "Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results", Prentice Hall, 2003.

2. Hazza and Dubinsky, "Agile Software Engineering, Series: Undergraduate Topics in Computer Science", Springer, 2009.

3. Craig Larman, "Agile and Iterative Development: A Managers Guide", Addison-Wesley, 2004.

4. Kevin C. Desouza, "Agile Information Systems: Conceptualization, Construction, and Management", Butterworth- Heinemann, 2007.



	ITE 44: AUGMENTED & VIRTUAL REALITY	100
	DETAILED SYLLABUS	3-1-0
Unit	Topic	Proposed Lecture
I	VIRTUAL REALITY AND VIRTUAL ENVIRONMENTS: The historical development of VR: Scientific landmarks Computer Graphics, Real-time computer graphics, Flight simulation, Virtual environments, Requirements for VR, benefits of Virtual reality. HARDWARE TECHNOLOGIES FOR 3D USER INTERFACES: Visual Displays Auditory Displays, Haptic Displays, Choosing Output Devices for 3D User Interfaces.	08
п	3D USER INTERFACE INPUT HARDWARE: Input device characteristics, Desktop input devices, Tracking Devices, 3D Mice, Special Purpose Input Devices, Direct Human Input, Home - Brewed Input Devices, Choosing Input Devices for 3D Interfaces.	08
ш	SOFTWARE TECHNOLOGIES: Database - World Space, World Coordinate, World Environment, Objects - Geometry, Position / Orientation, Hierarchy, Bounding Volume, Scripts and other attributes, VR Environment - VR Database, Tessellated Data, LODs, Cullers and Occluders, Lights and Cameras, Scripts, Interaction - Simple, Feedback, Graphical User Interface, Control Panel, 2D Controls, Hardware Controls, Room / Stage / Area Descriptions, World Authoring and Playback, VR toolkits, Available software in themarket	08
IV	3D INTERACTION TECHNIQUES: 3D Manipulation tasks, Manipulation Techniques and Input Devices, Interaction Techniques for 3D Manipulation, Design Guidelines - 3D Travel Tasks, Travel Techniques, Design Guidelines - Theoretical Foundations of Wayfinding, User Centered Wayfinding Support, Environment Centered Wayfinding Support, Evaluating Wayfinding Aids, Design Guidelines - System Control, Classification, Graphical Menus, Voice Commands, Gestrual Commands, Tools, Multimodal System Control Techniques, Design Guidelines, Case Study: Mixing System Control Methods, Symbolic Input Tasks, symbolic Input Techniques, Design Guidelines, Beyond Text and Number entry. DESIGNING AND DEVELOPING 3D USER INTERFACES: Strategies for Designing and Developing Guidelines and Evaluation. VIRTUAL REALITY APPLICATIONS: Engineering, Architecture, Education, Medicine, Entertainment, Science, Training.	08
v	Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.	08

- 1. Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality Applications: Foundations of Effective Design", Morgan Kaufmann, 2009.
- 2. Gerard Jounghyun Kim. "Designing Virtual Systems: The Structured Approach",2005.

3. DougABowman, Ernest Kuijff, Joseph Jk-a Viola, Jrandlvan Poupyrev, "3DUserInterfaces, Theoryand Practice",

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	ITE 52: Mobile Computing	
	DETAILED SYLLABUS	3-1-0
Unit	Topic	Proposed Lecture
I	Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.	08
II	Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.	08
ш	Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.	08
IV	Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.	08
v	Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.	08
	books: 1. J. Schiller, Mobile Communications, Addison Wesley. 2. Charles Perkins, Mobile IP, Addison Wesley. 3. Charles Perkins, Ad hoc Networks, Addison Wesley. dhyaya, "Mobile Computing", Springer	

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	ITE 54: PARALLEL AND DISTRIBUTE COMPUTING	
	DETAILED SYLLABUS	3-1-0
Unit	Topic	Proposed Lecture
1	Introduction: Scope, issues, applications, and challenges of Parallel and Distributed Computing ParallelProgrammingPlatforms:ImplicitParallelism:Trends inMicroprocessor Architectures, Dichotomy of Parallel Computing Platforms, Physical Organization, Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks, GPU, co- processing. Principles of Parallel Algorithm Design: Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for LoadBalancing.	08
п	CUDA programming model: Overview of CUDA, Isolating data to be used by parallelized code, API function to allocate memory on parallel computing device, to transfer data, Concepts of Threads, Blocks, Grids, developing a kernel function to be executed by individual threads, Executionofkernelfunctionbyparallelthreads, transferringdatabacktohostprocessorwithAPI function.	08
Ш	Analytical Modeling of Parallel Programs: Sources of Overhead in Parallel Programs, Performance Metrics for Parallel Systems, The Effect of Granularity on Performance, Scalability of Parallel Systems, Minimum Execution Time, and Minimum Cost-Optimal Execution Time	08
IV	Dense Matrix Algorithms: Matrix-Vector Multiplication, Matrix-Matrix Multiplication, Issuesin Sorting on Parallel Computers, Bubble Sort and Variants, Quick Sort, Other Sorting Algorithms Graph Algorithms: Minimum Spanning Tree: Prim's Algorithm, Single-Source Shortest Paths: Dijkstra's Algorithm, All-Pairs Shortest Paths, Transitive Closure, Connected Components, Algorithms for Sparse Graph	08
v	Search Algorithms for Discrete Optimization Problems: Sequential Search Algorithms, Parallel Depth-First Search, Parallel Best-First Search, Speedup Anomalies in Parallel Search Algorithms	08
Text b	ooks:	
1.	A Grama, A Gupra, G Kurypis, V Kumar. Introduction to Parallel Computing (2nd ed.). Addis Wesley, 2003.	
2.	C Lin, L Snyder, Principles of Parallel Programming, USA: Addison-Wesley Publishing Comp	pany.2008
3.	J Jeffers, J Reinders, Intel Xeon Phi Coprocessor High-Performance Programming, Morgan KaufmannPublishing and Elsevier, 2013.	
4.	T Mattson, B Sanders, B Massingill. Patterns for Parallel Programming. Addison-Wesley Professional, 2004.	

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	DETAILED SYLLABUS	3-0-0
Unit	Topic	Proposed Lecture
1	INTRODUCTION: Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression)- Intro to Neural Nets: What a shallow network computes-Training a network: loss functions, back propagation, and stochastic gradient descent- Neural networks as universal function approximates	08
11	NETWORKS: History of Deep Learning- A Probabilistic Theory of Deep Learning Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets- Deep Vs Shallow Networks-Convolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning	08
ш	DIMENTIONALITY REDUCTION: Linear (PCA, LDA) and manifolds, metric learning – Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization	08
IV	OPTIMIZATION AND GENERALIZATION: Optimization in deep learning—non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience	08
v	CASE STUDY AND APPLICATIONS: Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint Detection-Bioinformatics- Face Recognition- Scene UnderstandingGathering Image Captions	08
Text l	pooks:	
. Cosr	na Robilla Shalizi, Advanced Data Analysis from an Elementary Point of View, 2015. 2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013. 3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016. 4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.	

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	DETAILED SYLLABUS	3-0-0
Unit	Topic	Proposed Lecture
I	Fundamental Concepts: Global Perspectives, Quantum Bits, Quantum Computation, Quantum Algorithms, Quantum Information, Postulates of Quantum Mechanisms.	08
п	Quantum Computation: Quantum Circuits – Quantum algorithms, Single Orbit operations, Control Operations, Measurement, Universal Quantum Gates, Simulation of Quantum Systems, Quantum Fourier transform, Phase estimation, Applications, Quantum search algorithms – Quantum counting – Speeding up the solution of NP – complete problems – Quantum Search for an unstructureddatabase.	AQ.
111	QuantumComputers: Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance	08
IV	Quantum Information: Quantum noise and Quantum Operations – Classical Noise and Markov Processes, Quantum Operations, Examples of Quantum noise and Quantum Operations – Applications of Quantum operations, Limitations of the Quantum operations formalism, Distance Measures for Quantum information.	08
v	Quantum Error Correction: Introduction, Shor code, Theory of Quantum Error – Correction, Constructing Quantum Codes, Stabilizer codes, Fault – Tolerant Quantum Computation, Entropy and information – Shannon Entropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource.	08

Text Dooks:

1. Micheal A. Nielsen. & Issac L. Chiang, "Quantum Computation and Quantum Information", Cambridge University Press, Fint South Asian edition, 2002.

2.Eleanor G. Rieffel, Wolfgang H. Polak, "Quantum Computing - A Gentle Introduction" (Scientific and Engineering Computation) Paperback –Import, 3 Oct 2014

3. Computing since Democritus by Scott Aaronson

 Computer Science: An Introduction by N. DavidMermin 5. Yanofsky's and Mannucci, Quantum Computing for Computer Scientists.

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	OE 11: Natural Language Processing	3-1-0
Unit	Торіс	Proposed Lecture
1	Sound: Biology of Speech Processing; Place and Manner of Articulation; NLTK, Python 3 and the Jupyter Notebook; Textual Sources and Formats: "What's in a Text?"; HMM and Speech Recognition.	08
11	Words and Word Forms: Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Tokenization, N-grams; Stemming and Lemmatization; POS Tagging and Stopwords; Text "Features" and TF-IDF Classification; Named Entities; Sentiment Analysis.	08
ш	Structures: Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Text as in Web documents; Document Clustering and Word Vectors; Doc2vec, Word2vec; Advanced Vector Analyses.	08
IV	Meaning: Lexical Knowledge Networks, Wordnet Theory; Indian Language Wordnets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; WSD and Multilinguality; Metaphors; Coreferences.	08
v	Web 2.0 Applications: Sentiment Analysis; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual Information Retrieval (CLIR).	08

References:

- 1. Allen, James, Natural Language Understanding, Second Edition, Benjamin/Cumming, 1995.
- 2. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
- 3. Jurafsky, Dan and Martin, James, Speech and Language Processing, Second Edition, Prentice Hall, 2008.
- Manning, Christopher and Heinrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999

Course Outcome

Able to Recognize the factors that contributed to the emergence of NLP.

Able to Design and program various NLP applications.

Able to understand applications of NLP.

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Syllabus ForM.Tech Part Time (Information Technology)

(Effective from the Session:2024-25)

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(Part Time Program)

Study and Evaluation Scheme

SEMESTER-1

S.N.	Course Code	Subject		abject Periods			Evaluation Scheme				
		N1				Sessio	onal		ESE		
		Theory	L	Т	Lab	CT	TA	Total	Total		
1,	MTPITIII	Cloud Computing	3	1		20	30	50	100	150	
2.	MTPIT112	Computer Organization and Architecture	3	1		20	30	50	100	150	
3.	MTPIT113	OS & DBMS	3	1	2	20	30*	50	100	150	
		Total	9	3	2			150	300	450	

M. Tech. - IT

(Part Time Program)

2024-25

Study and Evaluation Scheme

SEMESTER-II

S.N.	Course Code	Subject	Periods				Subject Total			
						Sessio	nal		ESE	
			L	Т	Lab	CT	TA	Total	Total	
1.	МТРІТ211	Mobile Computing	3	1		20	30*	50	100	150
2.	MTPIT 212	Multimedia System	3	1		20	30*	σZ	100	150
3,	MTPIT 213	Data Network	3	1		20	30*		100	150
72.7		Total	9	4		60	90	150	300	450

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2-24-25

(Part Time Program)

Study and Evaluation Scheme

SEMESTER-III

S.N.	Course Code		Periods				Subject Total			
						Sessional			ESE	
			L	Т	Lab	СТ	TA	Total	Total	
1.	MTPIT311	Distributed DBMS	3	1		20	30*	50	100	150
2,	MTPIT312	Artificial Intelligence	3	1		20	30*	50	100	150
		Total	6	2		40	60	100	200	300





(Part Time Program)

2024-25

Study and Evaluation Scheme

SEMESTER-IV

S.N.	Course Code	Subject		Periods			Evaluation Scheme				
						Sessional			ESE		
		Theory	L	Т	Lab (*)	СТ	TA	Total	Total		
1.	MTPIT411	Cryptography & Network Security	3	1		20	30*	50	100	150	
2.	MTPIT412	Data Warehouse	3	ı		20	30*	50	100	150	

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	Total	6	2		40	60	100	200	300
1								N.	
			-	-		×	line -		



(Part Time Program)

2024-25

Study and Evaluation Scheme

SEMESTER-V

S.N.	Course Code	Subject		Perio	ds		Evalu	ation Sch	eme	Subject Total
		Theory				Sessional			ESE	
			L	Т	Lab	СТ	TA	Total	Total	

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(Part Time Program)

Study and Evaluation Scheme

2024-25

SEMESTER-V

S.N.	Course Code	Subject	Subject Periods						valuation Scheme				
	-					Sessio	onal		ESE				
		Theory	L	Τ	Lab	Ċſ	TA	Total	Total				
1,	MTPIT511	Professional Aspects in Software Engineering	2					50		50			
2	MTPIT512	Seminar	-	- 1	-	15-3	-	50	-	50			
3.	MTPIT513	&Dissertation	-			-	-	100	•	100			
		Total	2			7	-	200	-	200			

- * 30 marks are kept for tutorials, assignments, quizzes, and lab
- ** Refer the list of streams and their respective courses for the values of x and y
- (*) The existence of 2 periods of lab for elective/dissertation will be decided as per the nature of the elective/dissertation

March

2024-25

(Part Time Program)

Study and Evaluation Scheme

SEMESTER-VI

S.N.	Course Code	Subject		Period	ls		Evalu	ation Sc	heme	Subject Total
						Session	omal		- ESE	
		Theory	L	Т	Lab	CT	TA	Total	Total	
1.	MTPIT611	Dissertation	-	-	1,7		•	100	200	300
		Total						100	200	300

(*) The existence and duration of lab will be decided as per the nature of the dissertation

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MTPIT412 Data Warehouse

UNIT-I: Data Warehousing and Business Analysis: - Data warehousing Components, building a Data warehouse, Mapping the Data Warehouse to a Multiprocessor Architecture, DBMS Schemas for Decision Support, Data Extraction, Cleanup, and Transformation Tools, Metadata reporting, Query tools and Applications, Online Analytical Processing (OLAP) - OLAP and Multidimensional Data Analysis.

UNIT-II: Data Mining: - Data Mining Functionalities - Data Preprocessing, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods, Mining Various Kinds of Association Rules, Association Mining to Correlation Analysis, ConstraintBased Association Mining.

UNIT-III: Classification and Prediction: - Issues Regarding Classification and Prediction, Classification by Decision Tree Introduction, Bayesian Classification, Rule Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor, Ensemble Methods, Model Section. UNIT-IV: Cluster Analysis: - Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical methods, Density-Based Methods. Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, ConstraintBased Cluster Analysis, Outlier Analysis.

UNIT-V: Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

REFERENCES:

- 1. Jiawei Han and Micheline Kamber "Data Mining Concepts and Techniques" Second Edition,
- 2. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw Hill Edition, Tenth Reprint 2007.
- 3. G. K. Gupta "Introduction to Data Mining with Case Studies". Easter Economy Edition, Prentice Hall of India, 2006.
- 4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.
- 5. Soman K.P., Shyam Diwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
- 6. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

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Syllabus ForM. Tech. (Information Technology)

(Effective from the Session:2024-25) (Program -Regular)

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SEMESTER-I

S.No	Subject	Name of Subject		Perio	ds	Credit		Subject Total				
	Code			-			Theory			Practi		
			L	T	P		CT	TA	ESE	TA	ESE	
1.	MITIO	Cloud Computing	3	0	0	3	20	10	70			100
2.	MJT 102	Advance Computer Organization & Architecture	3	0	0	3	20	10	70			100
3.	MIT103	Advance Operating System	3	0	0	3	20	10	70	-		100
4.	MIT112	Departmental Elective I	3	0	0	3	20	10	70			100
5.	MIT12?	Departmental Elective II	3	0	0	3	20	10	70			100
6.	MIT151	Lab-1: Cloud computing	0	0	3	2		-		50		50
7.	MIT152	Lab-II: Advance operating system	0	0	2	1				50		50
		Total		12 6		18	1					600

SEMESTER-II

S.No	Subject	Name of Subject	Periods		Credit		Subject					
	Code						Theory			Practic	100	
			L	Т	p	0	CT	TA	ESE	TA	ESE	
1.	MIT 201	Development of Mobile Computing	3	0	0	3	20	10	70			100
2.	MIT 202	Advance Digital Image Processing	3	0	0	3	20	10	70		-	100
3.	MIT 23?	Elective - III	3	0	0	3	20	10	70			100
4.	MIT 24?	Elective - IV	3	0	0	3	20	10	70			100
5.	MIT26?	Elective - V	3	0	0	3	20	10	70			100
6.	MIT251	Lab-III: Development of Mobile Computing	0	0	3	2		-		50		50
7.	MIT252	Seminar-1	0	q	2	ı				50		50
		Total				18					-	600

Seminar-I: Seminar on Advanced topics from refereed journals by each student.

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SEMESTER-III

S.No	Subject Code	Name of Subject		Periods		Credit		Subject				
		14			P		Theory			Practic		
			l	T			CT	TA	ESE	TA	ESE	3
1.	MIT351	Seminar-II	0	0	6	3	1-	-		100	-	100
2.	MIT352	Dissertation Phase-I	0	0	30	15				250	250	500
		Total			1	18						600

SEMESTER-IV

S.No.	Subject Code	NOT THE REAL PROPERTY OF THE PARTY OF THE PA	Periods		Credit		Subject Total					
				1 T	P		Theory			Practic	7.0.0.	
			ı				CT	TA	ESE	TA	ESE	
i.	MIT451	Dissertation (Final)	0	0	36	18				300	300	600
-		Total		+		18		14 - 1	-	-		600



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Departmental Elective I:

- 1. MIT111 Data Network
- 2. MIT112 Object Oriented Programming
- 3. MIT113 Simulation and Modelling
- 4. MIT114 Multimedia Databases

Departmental Elective II:

- 1. MIT121 Cryptography& Network Security
- 2. MIT122 Distributed Computing
- 3. MIT123 Data Centre Management
- 4. MIT124 Requirements Engineering.

Departmental Elective III:

- 1. MIT231 Distributed DBMS
- 2. MIT232 Big Data Analytics
- 3. MIT233 Approximation Algorithm
- 4. MIT234 Analysis & Design of Real-Time Systems

Departmental Elective IV:

- 1. MIT241 Conceptual Modelling
- 2. MIT242 Artificial Intelligence
- 3. MIT243 Cyber Security and laws
- 4. MIT244 Internet Programming and Web service Engineering.

Departmental Elective V:

- 1. MIT261 Development of Multimedia System
- 2. MIT262 Natural Language Processing
- 3. MIT263 Internet of Things
- 4. MIT264 VLSI Design

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