परीक्षा नियंत्रण प्रकोष्ठ, जबलपुर इंजीनियरिंग महाविद्यालय, जबलपुर (म.प्र.)

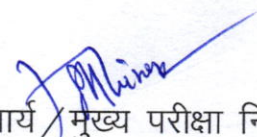क्रमांक / प.नि.प्र. / 2024 /2682   जबलपुर, दिनांक 18 / 10 / 2024

सूचना

महाविद्यालय में अध्ययनरत B.Tech. (AICTE) / B.Tech. (PTDC) [AICTE] [Regular/Ex.] विद्यार्थियों को सूचित किया जाता है कि वे नवम्बर 2024 की परीक्षा एवं आगामी सत्र की परीक्षाओं में सम्मिलित होने से पूर्व अपने पेपर / विषय का Equivalence Syllabus महाविद्यालय के पोर्टल से Download कर प्राप्त कर सकते हैं अथवा महाविद्यालय के परीक्षा नियंत्रण प्रकोष्ठ में संपर्क कर सकते हैं। नवम्बर 2024 परीक्षा एवं आगामी सत्र की परीक्षा में उन्हें अपने पेपर / विषय में Equivalence Syllabus में ही सम्मिलित होना है। अतः Equivalence Syllabus की जानकारी न होने की दशा में सम्पूर्ण जिम्मेदारी स्वयं छात्र / छात्राओं की होगी।

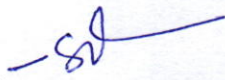Equivalence Syllabus हेतु निम्नानुसार Link का उपयोग कर सकते है:–

https://www.jecjabalpur.ac.in/UploadContent/frm_ViewScheme.aspx

प्राचार्य / मुख्य परीक्षा नियंत्रक
जबलपुर इंजीनियरिंग महाविद्यालय
जबलपुर

पृ.क्रमांक / प.नि.प्र. / 2024 /   जबलपुर, दिनांक   / 10 / 2024
प्रतिलिपि:–

01.   समस्त विभागाध्यक्ष, जबलपुर इंजीनियरिंग महाविद्यालय, जबलपुर।
02.   पीटीडीसी कार्यालय, जबलपुर इंजीनियरिंग महाविद्यालय, जबलपुर।

प्राचार्य / मुख्य परीक्षा नियंत्रक
जबलपुर इंजीनियरिंग महाविद्यालय
जबलपुर

EQUIVALENCE OF SUBJECTS OF DIFFERENT SCHEMES OF UNDER GRADUATE COURSES (B.Tech.)
OF Information Technology

S.No.	Schemes	Subject Code & Subject Name (Semester) Having Equivalence in Syllabus	Final Subject code & subject (after equivalence)
1	AICTE	IT303 Data Structure & Algorithm **B.Tech. III Sem.**	IT33 Data Structure and Algorithm **B.Tech. III Sem.**
	Scheme 2023	IT33 Data Structure and Algorithm **B.Tech. III Sem.**	
2	AICTE	IT304 Object Oriented Concept on C++ **B.Tech. III Sem.**	IT34 Object Oriented Concept on C++ **B.Tech. III Sem.**
	Scheme 2023	IT34 Object Oriented Concept on C++ **B.Tech. III Sem.**	
3	AICTE	IT305 Electronics & Digital Communication **B.Tech. III Sem.**	IT35 Electronics & Digital Circuits **B.Tech. III Sem.**
	Scheme 2023	IT35 Electronics & Digital Circuits **B.Tech. III Sem.**	
4	AICTE	IT402 Analysis & Design of Algorithm **B.Tech. IV Sem.**	IT42 Analysis and Design of Algorithm **B.Tech. IV Sem.**
	Scheme 2023	IT42 Analysis and Design of Algorithm **B.Tech. IV Sem.**	
5	AICTE	IT403 Computer Architecture **B.Tech. IV Sem.**	IT43 Computer Architecture **B.Tech. IV Sem.**
	Scheme 2023	IT43 Computer Architecture **B.Tech. IV Sem.**	
6	AICTE	IT404 Principles of Communication **B.Tech. IV Sem.**	IT44 Principles of Communication **B.Tech. IV Sem.**
	Scheme 2023	IT44 Principles of Communication **B.Tech. IV Sem.**	
7	AICTE	IT502A Automata and Compiler Design **B.Tech. V Sem.**	IT51A Automata and Compiler Design **B.Tech. V Sem.**
	Scheme 2023	IT51A Automata and Compiler Design **B.Tech. V Sem.**	

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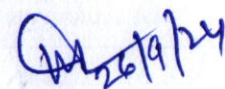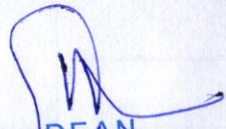Jabalpur - 482 011 (M.P.)

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8	AICTE	IT502B Computer Graphics and Multimedia **B.Tech. V Sem.**	IT51B Computer Graphics and Multimedia **B.Tech. V Sem.**
	Scheme 2023	IT51B Computer Graphics and Multimedia **B.Tech. V Sem.**	
9	AICTE	IT502C Management Information System **B.Tech. V Sem.**	IT51C Management Information System **B.Tech. V Sem.**
	Scheme 2023	IT51C Management Information System **B.Tech. V Sem.**	
10	AICTE	IT503 Computer Network **B.Tech. V Sem.**	IT52 Computer Network **B.Tech. V Sem.**
	Scheme 2023	IT52 Computer Network **B.Tech. V Sem.**	
11	AICTE	IT504 Operating System **B.Tech. V Sem.**	IT53 Operating System **B.Tech. V Sem.**
	Scheme 2023	IT53 Operating System **B.Tech. V Sem.**	
12	AICTE	IT505 Data Base Management System **B.Tech. V Sem.**	IT54 Data Base Management System **B.Tech. V Sem.**
	Scheme 2023	IT54 Data Base Management System **B.Tech. V Sem.**	
13	AICTE	IT605 Internet and Web Technology **B.Tech. VI Sem.**	IT55 Internet and Web Technology **B.Tech. V Sem.**
	Scheme 2023	IT55 Internet and Web Technology **B.Tech. V Sem.**	
14	AICTE	IT601A Information Theory and Coding **B.Tech. VI Sem.**	IT61A Information Theory and Coding **B.Tech. VI Sem.**
	Scheme 2023	IT61A Information Theory and Coding **B.Tech. VI Sem.**	
15	AICTE	IT601B E-Commerce and E-Governance **B.Tech. VI Sem.**	IT61B E-Commerce and E-Governance **B.Tech. VI Sem.**
	Scheme 2023	IT61B E-Commerce and E-Governance **B.Tech. VI Sem.**	

16	AICTE	IT601C Artificial Intelligence **B.Tech. VI Sem.**	IT61C Artificial Intelligence **B.Tech. VI Sem.**
	Scheme 2023	IT61C Artificial Intelligence **B.Tech. VI Sem.**	
17	AICTE	IT602A Microprocessor and Interfacing **B.Tech. VI Sem.**	IT62A Microprocessor and Interfacing Coding **B.Tech. VI Sem.**
	Scheme 2023	IT62A Microprocessor and Interfacing Coding **B.Tech. VI Sem.**	
18	AICTE	IT602B Intellectual Property Rights **B.Tech. VI Sem.**	IT62B Intellectual Property Rights- Governance **B.Tech. VI Sem.**
	Scheme 2023	IT62B Intellectual Property Rights-Governance **B.Tech. VI Sem.**	
19	AICTE	IT602C Digital Signal and Image Processing **B.Tech. VI Sem.**	IT62C Digital Signal and Image Processing **B.Tech. VI Sem.**
	Scheme 2023	IT62C Digital Signal and Image Processing **B.Tech. VI Sem.**	
20	AICTE	IT701 Cloud Computing **B.Tech. VII Sem.**	IT65 Cloud Computing **B.Tech. VI Sem.**
	Scheme 2024	IT701M Cloud Computing **B.Tech. VII Sem.**	
	Scheme 2023	IT65 Cloud Computing **B.Tech. VI Sem.**	
21	AICTE	IT702 Information Retrival **B.Tech. VII Sem.**	IT702M Information Retrieval **B.Tech. VII Sem.**
	Scheme 2024	IT702M Information Retrieval **B.Tech. VII Sem.**	
22	AICTE	IT703 Machine Learning **B.Tech. VII Sem.**	IT703M Machine Learning **B.Tech. VII Sem.**
	Scheme 2024	IT703M Machine Learning **B.Tech. VII Sem.**	

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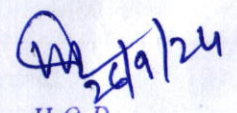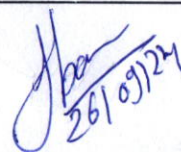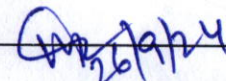
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23	AICTE	IT704A Simulation and Modeling **B.Tech. VII Sem.**	IT71A Simulation and Modeling **B.Tech. VII Sem.**
	Scheme 2024	IT704M A Simulation and Modelling **B.Tech. VII Sem.**	
	Scheme 2023	IT71A Simulation and Modeling **B.Tech. VII Sem.**	
24	AICTE	IT704B Advanced Computer Architecture **B.Tech. VII Sem.**	IT71B Advance Computer Architecture **B.Tech. VII Sem.**
	Scheme 2024	IT704M B Advanced Computer Architecture **B.Tech. VII Sem.**	
	Scheme 2023	IT71B Advance Computer Architecture **B.Tech. VII Sem.**	
25	AICTE	IT704C Real Time Systems **B.Tech. VII Sem.**	IT71C Real Time Operating Systems **B.Tech. VII Sem.**
	Scheme 2024	IT704M C Real Time Systems **B.Tech. VII Sem.**	
	Scheme 2023	IT71C Real Time Operating Systems **B.Tech. VII Sem.**	
26	AICTE	IT705A Wireless and Mobile Communication **B.Tech. VII Sem.**	IT72 A Wireless and Mobile Communication **B.Tech. VII Sem.**
	Scheme 2024	IT705M A Wireless & Mobile Communication **B.Tech. VII Sem.**	
	Scheme 2023	IT72A Wireless and Mobile Communication **B.Tech. VII Sem.**	
27	AICTE	IT705B Embedded Systems **B.Tech. VII Sem.**	IT72B Embedded Systems **B.Tech. VII Sem.**
	Scheme 2024	IT705M B Embedded Systems **B.Tech. VII Sem.**	
	Scheme 2023	IT72B Embedded Systems **B.Tech. VII Sem.**	
28	AICTE	IT705C Distributed Systems **B.Tech. VII Sem.**	IT72C Distributed Systems **B.Tech. VII Sem.**
	Scheme 2024	IT705M C Distributed Systems **B.Tech. VII Sem.**	
	Scheme 2023	IT72C Distributed Systems **B.Tech. VII Sem.**	

29	AICTE	IT801 Information and Cyber Security **B.Tech. VIII Sem.**	IT73 Information and Cyber Security **B.Tech. VII Sem.**
	Scheme 2023	IT73 Information and Cyber Security **B.Tech. VII Sem.**	
30	AICTE	IT802 Data Mining **B.Tech. VIII Sem.**	IT64 Data Mining **B.Tech. VI Sem.**
	Scheme 2023	IT64 Data Mining **B.Tech. VI Sem.**	
31	AICTE	IT803A Network Management **B.Tech. VIII Sem.**	IT63 Network Management **B.Tech. VI Sem.**
	Scheme 2024	IT801M A Network Management **B.Tech. VIII Sem.**	
	Scheme 2023	IT63 Network Management **B.Tech. VI Sem.**	
32	AICTE	IT803B Natural Language Processing **B.Tech. VIII Sem.**	IT81B Natural Language Processing **B.Tech. VIII Sem.**
	Scheme 2024	IT801M B Natural Language Processing **B.Tech. VIII Sem.**	
	Scheme 2023	IT81B Natural Language Processing **B.Tech. VIII Sem.**	
33	AICTE	IT803C Sensor Networks **B.Tech. VIII Sem.**	IT81C Sensor Networks **B.Tech. VIII Sem.**
	Scheme 2024	IT801M C Sensor Networks **B.Tech. VIII Sem.**	
	Scheme 2023	IT81C Sensor Networks **B.Tech. VIII Sem.**	
34	AICTE	IT804A Internet of Things **B.Tech. VIII Sem.**	IT75 Internet of Things **B.Tech. VII Sem.**
	Scheme 2024	IT802M A Internet of Things **B.Tech. VIII Sem.**	
	Scheme 2023	IT75 Internet of Things **B.Tech. VII Sem.**	
35	AICTE	IT804B Image Processing and GIS B.Tech. **VIII Sem.**	IT82B Image Processing and GIS **B.Tech. VIII Sem.**
	Scheme 2024	IT802M B Image Processing and GIS B.Tech. **VIII Sem.**	
	Scheme 2023	IT82 B Image Processing and GIS B.Tech. **VIII Sem.**	

36	AICTE	IT804C Computer Vision **B.Tech. VIII Sem.**	IT82 C Computer Vision **B.Tech. VIII Sem.**
	Scheme 2024	IT802M C Computer Vision **B.Tech. VIII Sem.**	
	Scheme 2023	IT82 C Computer Vision **B.Tech. VIII Sem.**	

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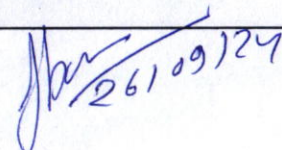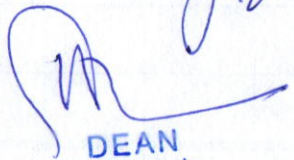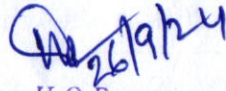26/9/24
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w.e.f. July 2023

COURSE CONTENT

Subject Code	Subject Name and Title	Maximum Marks Allotted						Hours/Week			Total Credits
		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT 33	Data Structure And Algorithm	70	20	10	30	20	150	3	-	2	4

Module I

Introduction Data, data type, data object. Types of data structure – primitive &n non-primitive, linear & non- linear. Operations on data structures – traversing, searching, inserting, deleting. Complexity analysis – worst case, best case, average case. Time – space trade off, algorithm efficiency, asymptotic notations – big oh , omega , theta.

Module II

Arrays & Structure Introduction , declaration of arrays , operations on arrays – inserting , deleting , merging of two arrays , 1 dimensional & 2 dimensional arrays, row & column major representation , address calculation in array , storing values in arrays , evaluation of polynomial – addition & representation. Searching & sorting – Introduction, sequential search, binary search, Fibonacci search , indexed sequential search, hashed search. Types of sorting with general concepts – bubble, heap, insertion, selection, quick, heap, shell, bucket, radix and merge sort.

Module III

Stacks & Queues Basic concept of stacks & queues, array representation of stacks, operation on stacks – push and pop , create , getTop , empty , linked representation of stack , multiple stack. Application of stack – Conversion: infix , prefix , postfix and evaluation of arithmetic expression. Linked representation of queue, operations on queue – insertion & deletion. Types of queue with functions – circular, deque, priority queue. Applications of queues –job scheduling, Josephus problem.
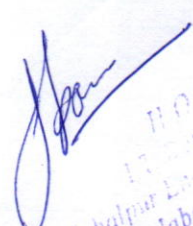
Module IV

Linked List Introduction – basic terminology , memory allocation & deallocation for linked list. Linked list variants – head pointer , head node , types linked list – linear & circular linked list. Doubly linked list , creation of doubly list, deletion of node from doubly linked list, insertion of a node from doubly linked list, traversal of doublylinked list. Circular linked list – singly circular linked list , circular linked list with header node , doubly circular linked list. Applications of linked list – polynomial representation & garbage collection.

Module V

Trees Basic terminology – general tree , representation of general tree, types of trees, binary tree- realization and properties , traversal in binary trees – inorder , preorder , postorder , applications of trees. Graph- Basic Terminologies and representations, Graph search and traversal algorithms.

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w.e.f. July 2023

Reference Books :

1. Varsha H. Patil "Data Structure Using C++" Oxford.
2. Rajesh K. Shukla "Data Structures Using C & C++" Wiley India.
3. Reema Thareja " Data Structure Using C " Oxford.
4. D. S Malik "Data Structure Using C++ " Second Edition Cengage. 5
5. Kushwaha and Mishra "Data Structure: A programming Approach with C", PHI Learning.
6. A. K Sharma "Data Structure Using C" Pearson.
7. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures",

Course Outcomes:

CO 1. To impart the basic concepts of various data structure and algorithms efficiency.

CO 2. To develop the skills to understand and design the searching and sorting algorithms using arrays and compare their performance.

CO 3. To analyze application of stacks and queues.

CO 4. To develop applications using linked lists.

CO 5. To understand the applications of the data structure in solving real life problems using trees and graphs.

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COURSE CONTENT

Subject Code	Subject Name and Title	Maximum Marks Allotted						Hours/Week			Total Credits
		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT 34	Object Oriented Concept on C++	70	20	10	30	20	150	3	-	2	4

Module I

Concept of Object Oriented methodology: Role of programming methodology in software development, Comparison the concepts of structured-oriented programming (SOP) and object-oriented programming (OOP). Need for object oriented programming. Fundamental concepts of object-oriented programming (OOP): abstraction, encapsulation, modularity, data hierarchy through inheritance, Information Hiding, polymorphism and typing, parallelism and stability.

Module II

Elements of object oriented: Object, Class, message passing. Relationships among objects:- links, aggregation. Relationships among classes:- association, aggregation, using, instantiation, meta-class.

Module III

Beginning with C++: What is C++, Difference between C and C++. C++ program life cycle. Functions in C++: Different forms of functions, function prototyping, call by value; call by Reference, Inline and friend Functions. Command Line Arguments
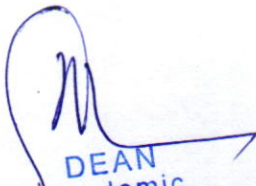
Module IV

Encapsulation and Abstraction in C++: Classes and Objects in C++, defining classes, defining member functions, declaration of objects to class, access to member variables from objects etc, Initialization and assignment for objects. Different forms of member functions, dependence on access specifiers (i.e. Private, public, protected), static data members. Constructor and Destructor in C++: constructors, parameterized constructors Multiple constructors in class dynamic initialization of objects destructors.
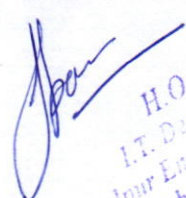Implementation of relationship.
Inheritance in C++: Introduction, types of inheritance, single inheritance, multiple inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance etc, virtual base class, abstract class, constructors in derived class.

Module V

Polymorphism in C++: type of polymorphism, function overloading, operator overloading- introduction, defining operator overloading, overloading -(unary, binary operators), overloading binary operators using friends, Rules for overloading operators. Function overriding- introduction to pointers, pointers to objects, this pointer, pointers to derived class, virtual functions, abstract class, pure virtual functions. Introduction to C++ templates.

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w.e.f. July 2023

References Books:

1.   Herbert Schildt, " C++ the complete reference", III edition, TMH 1999

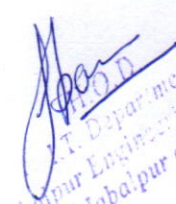2.   Balagurusamy, Entrepreneurial, "object oriented programming with C++", TMH

List of experiments:

1. Program to demonstrate use of function overloading.

2. Write a function which accepts object as a parameter and returns object.

3. Write a program to demonstrate the virtual base class.

4. Write a program to demonstrate use of polymorphism (virtual function).

5. Write a program to overload++ operator to increment age of person by one month.

6. Write a program to illustrate the use of scope resolution operator.

7. Write a program to find the square root using inline function. 8. Write a program to illustrate the use of friend
    function.

9. Create two employee objects and display each object's yearly salary.

10. Give each employee a 10% raise and display each Employee's yearly salary again.

11. Write C++ program to create five object of book, get information of book using getdata() function including name.
    price, publication and author.

Course Outcomes:

CO 1. To understand the principles used in OOP and its elements.

CO 2. To introduce the OO programming concepts using C++.

CO 3. To understand functions in C++.

CO 4. To discuss the encapsulation, inheritance and abstraction in C++.

CO 5. To familiarize with the polymorphism and overloading.

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w.e.f. July 2023

COURSE CONTENT

Subject Code	Subject Name and Title	Maximum Marks Allotted					Total	Hours/Week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT 35	Electronics and Digital Circuits	70	20	10	30	20	150	3	-	2	4

Module I

Semiconductor device, theory of P-N junction, temperature dependence and break down characteristics, junction capacitances. Zener diode, Transistors BJT, FET, MOSFET, types, workingprincipal, characteristics, and region of operation, load line biasing method. Transistor as an amplifier, Feedback amplifier, negative feedback, voltage-series, voltage shunt, current series and current shunt feedback.

Module II

Switching characteristics of diode and transistor, turn ON, OFF time, reverse recovery time, transistor as switch, Multivibrators, Bistable, Monostable, Astable multivibarators. Operational amplifier characteristics, slew rate, full power bandwidth, offset voltage, bias current, application , inverting , non inverting amplifier , summer , averager , differentiator, integrator, differential amplifier, instrumentation amplifier , log and antilog amplifier , voltage to current and current to voltage converters , comparators.

Module III

Number systems & codes, Binary arithmetic, Boolean algebra and switching function. Minimization of switching function, Concept of prime implicant , Karnaugh map method, Quine & McCluskey's method, Cases with don't care terms, Multiple output switching function.
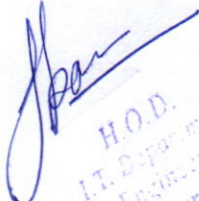
Module IV

Introduction to logic gates, Universal gate, Analysis and design procedure of Combinational circuits,Half adder, Half subtractor, Full adder, Full subtractor circuits, Series & parallel addition, BCD adders, Look ahead carry generator. Decoders, Encoders, Multiplexers, Demultiplexers, Introductionto various semiconductor memories & designing with ROM and PLA.

Module V

Analysis and design procedure of synchronous Sequential circuits, Introduction to Shift Registers, Counters, Synchronous & asynchronous counters.

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w.e.f. July 2023

Text Books:

1. Digital Design, PHI, 2/e and digital logic and computer design, PHI, by M. Morris Mano
2. Microprocessor Arch. Programming & Application with 8085 by R.S. Gaonkar
3. Digital Computer & Electronics by A.P. Malwino and J.A. Brown, TMH, 3/e
4. 0000 to 8085 Introduction to Microprocessors by P.K. Ghosh & P.R. Sridhar, PHI, 2/e
5. Logic Design Theory, by N.N. Biswas, PHI
6. Milliman Hallkias -Integrated Electronics; TMH Pub.
7. Gayakwad; OP-amp and linear Integrated Circuits; Pearson Education

Course Outcomes:

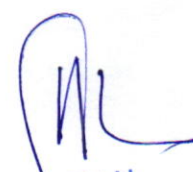CO1 To understand semiconductor devices.

CO2: To understand diode, transistor.

CO3: Getting command of number system and K-map.

CO4: To understand logic gate and devices.

CO5: Understanding sequential circuits.

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COURSE CONTENT

Subject Code	Subject Name and Title	Maximum Marks Allotted					Total	Hours/Week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work					
IT42	Analysis and Design algorithm	70	20	10	30	20	150	3	-	2	4

Module I

Algorithm properties. Analysis of Algorithms: Priori analysis and Posteriori analysis. Worst, Best and Average Vcase analysis. RAM model for analysis. Space and Time Complexities of algorithms. Step count and Recurrence, Relation. Asymptotic notations Big O , Big Ω, θ, little o, little ω.

Module II

Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, and Stassen's matrix multiplication.

Module III

Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm, etc.

Module IV

Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm, etc. Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc.

Module V

Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Lower bound theory and its use in solving algebraic problem. Deterministic and Non Deterministic Algorithm.NP-completeness: P, NP, NP-Hard and NP-Complete problems.
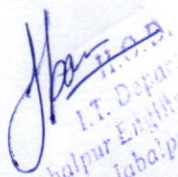
Text Books:
1. Horowitz & Sahani; Analysis & Design of Algorithm
2. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia,   2003.

Reference Books:
1. Coremen Thomas, Leiserson CE, Rivest RL; Introduction to Algorithms; PHI.
2. Dasgupta; algorithms; TMH
3. Ullmann; Analysis & Design of Algorithm;
4. Michael T Goodrich, Robarto Tamassia, Algorithm Design, Wiely India

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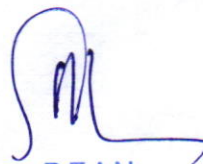**w.e.f. July 2023**

List of Experiments:

1. Perform recursive binary and linear search
2. Short a given set of elements using Heap sort technique.
3. Sort a given set of elements using Merge short technique
4. Find solution of Knapsack problem using Greedy approach
5. Implement o/1 knapsack problem using dynamic programming.
6. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
7. Sort a given set of elements using Quick sort technique.
8. Find minimum cost spanning tree of a given undirected graph using Kruskal's algorithm.
9. Print all the nodes reachable from a given starting node in a digraph using Breadth first search technique.
10. Implement all pair shortest paths problem using Floyd's algorithm.
11. Find minimum cost spanning tree for a given undirected graph using Prim's algorithm.
12. Print all the nodes reachable from a given starting node in a given digraph using Depth first search technique.
13. Compute the transitive closure of a given directed graph using Warshall's algorithm.
14. Implement n-Queens problem using backtracking technique.

Course Outcomes:

CO1 - To understand the space and time complexities and asymptotic notations for algorithms.

CO2 - To familiarize with divide and conquer techniques based algorithms.

CO3 - To understand Greedy strategy and job sequencing with deadlines.

CO4 - To understand the dynamic programming approach and based algorithms.

CO5 - To introduce with the branch and bound methods, deterministic and non-deterministic algorithms.

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COURSECONTENT

Subject Code	SubjectNameand Title	MaximumMarksAllotted						Hours/Week			Total Credits
		Theory			Practical		Total	L	T	P	
		End Sem	MidSem Exam	Quiz Assignment	End Sem	Lab Work					
IT43	Computer Architecture	70	20	10	30	20	150	3	-	2	4

Module I

Computer Basics and CPU: Von Newman model, various subsystems, CPU, Memory, I/O, System Bus, CPU and Memory registers, Program Counter, Accumulator, Instruction register, Micro operations, Register Transfer Language, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formatsand addressing modes of basic computer.

Module II

Control Module Organization: Hardwired control Module , Micro programmed control Module Control Memory, Address Sequencing, Micro Instruction formats, Micro program sequencer, Microprogramming, Arithmetic and Logic Module: Arithmetic Processor, Addition, subtraction, multiplicationanddivision,FloatingpointanddecimalarithmeticandarithmeticModules,designof arithmetic Module.

Module III

System Organization: Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor Multiprocessors: Pipeline and Vector processing, Instruction and arithmetic pipelines, Vector and array processors,Interconnection structure and inter-processor communication.

Module IV

Memory organization: Memory Maps, Memory Hierarchy, Cache Memory - Organizationand mappings. Associative memory, Virtual memory, Memory Management Hardware.
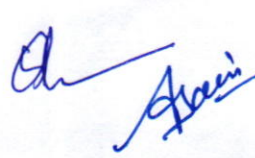
Module V
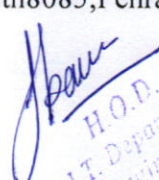
Introduction to Microprocessor: 8085 architecture and organization, instruction set , counters and timing delays, stacks and subroutines , 8085 I/O structure, Interrupts , basic Interfacing concept , memory mapped and I/Omapped I/O, basic programming.

Text Books:

1. MorrisMano:Computer SystemArchitecture,PHI.
2. Gaonkar:MicroprocessorArchitecture,Programming,Applicationswith8085;PenramInt.

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List of Experiments :

1. REVERSING AN ARRAY A block of 16 bytes are residing at locations standing from BLOCK1 WAP to transfer the block in reverse order at locations starting form BLOCK. 2.

2. SORTING IN ASCENDING ORDER: A block (16 bytes are residing at locations starting from DATA: write a program to arrange the word in the same location in ascending order.
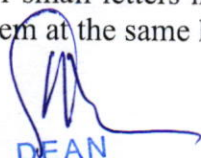
3. BINARY ADDITION: 16 bytes are residing at location starting from DATA WAP: to add all bytes and store the result location SUM and SUM+1.

4. BCD ADDITION: 16 BCD NUMBER are residing at location starting from DATA WAP: to add all bytes and store the result location SUM and SUM+1

5. MULTIPLICATION: Two bytes are residing at location DATA 1 and DATA 2. Write a program to multiply the two bytes and store the result at location PROD 1 and PROD 2.

6. BINARY TO BCD: A binary number is residing at location BIN > WAP to convert the binary number into its equivalent BCD and store the result at BCD and BCD + 1

7. BCD TO BINARY: A BCD number is residing at location BCD; write a program to convert the BCD number into its equivalent binary and store the result at BIN.

8. MULTIBYTE ADDITION: Two 10 bytes are residing at location starting from DATA 1 and DATA 2 respectively. Write a program to add them up and store the result at location starting from RESULT (result space 11 bytes)

9. MULTIBYTE BCD ADDITION: Two 6 digit BCD numbers are residing at location starting from DATA 1 and DATA 2 respectively. Write a program to add them up and store the result at locations starting from RESULT (Result space 7 bytes.).

10. RST 6.5: A block of 16 bytes is residing at location starting from DATA reverse the block and store the bytes at REVERSE whenever the RST 6.5 key is pressed.

11. EDITING OF ASCII STRING: A string of ASCII characters is residing at locations starting from READ which contain "IS BE $ AN $ ENGINEER". Edit string in such a way that it should contain "1 $ will $ be $ Engineer" keep the edited string in the same locations. Product the string from further editing. ($ stands for a blank).

12. SIGNED BINARY ADDITION: A block of 16 signed binary numbers is residing at location NUMBERS. Add them up and store the result (in signed binary) at locations from RESULT.

13. ASCII CODE CONVERSION: A string of 16 ASCII characters are residing at locations starting from DATA. The string consists of codes for capital letters, small letters and BCD digits (0-9) Convert the ASCII characters in such a way that the codes for capital letters be converted into corresponding codes for small letters, codes for small letters into that of capital letters and codes for BCD digits into that of BCD number and store them at the same locations.

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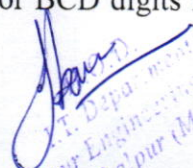**Bachelor of Technology (B.Tech.) IV Semester (Information Technology)**
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14. PARITY CHECK: A block of 32 bytes is residing at DATA count the number (BCD) of times even and odd PARITY bytes are appearing consecutive memory locations. Keep the count at MATCH.

15. SERIES GENERATION: Two BCD number a and b are residing at locations DATA 1 and DATA 2 respectively. Write a program to form a series in BCD with the elements of a. a + 2b, a + 4b, a+ 6b, Stop the generation of the series whenever any element of the series in BCD with the elements of the series exceeds (99). Store the result at locations starting from RESULT. Count the number (BCD) of elements in the series and store it a NUMBER.

Course Outcomes:

CO 1. To give overview of computer basics, organization and subsystems.

CO 2. To familiarize with different control generation techniques and design of A.L.U.

CO 3. To familiarize with data transfer modes and processing techniques.

CO 4.To compare various memory management techniques and mapping.

CO 5. To introduce with the microprocessor 8085 architecture and its instruction set.

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		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT44	PRINCIPLES OF COMMUNICATION	70	20	10	30	20	150	3	-	2	4

Module I
Data and signal-Analog and digital signals, Time and frequency domain, Composite signals, Bandwidth, bit rate, bit length, Baseband and broadband transmission, Attenuation, distortion, noise, Nyquist bit rate ,Shannon capacity, Throughout, delay ,Jitter, Bandwidth delay product.

Module II
Sampling theorem, quantization, PCM, Delta modulation, Adaptive delta modulation, DPCM, bandwidth of PCM and delta modulation. ASK, BPSK, QPSK, DPSK, BFSK.

Module III
Data transmission – Parallel and serial transmission, synchronous, and Asynchronous transmission, Simplex, half duplex and full duplex , unipolar and polar line codes, Non return to zero codes, return to zero codes, bipolar line codes, bauds , modem, Line configurations Point to point and point to multipoint configuration. Multiplexer:TDM, FDM, WDM. Data compression devices, Inverse multiplexer.

Module IV
Digital interface standards: RS-232 standard, hand shaking, connecting a DTE in RS-232 C, RS 449, RS-422A andRS-423A standards. High-speed desktop serial interfaces. Remote digital transmission carrier ISDN, Packet data network, Modems, multispeed modems, high speed modems, Error Correcting modems, data compression in modems. Short-wave modems.

Module V
Data Integrity, sources of error control approaches. Implementation of error control Echo checking parity checkingand cyclical purity, Hammering code, checksums, Cyclical Redundancy check. Security and security measures. Transmission media-Guided and unguided media, twisted pair, Unshielded twisted pair and Shielded twisted pair, coaxial cable.

Text Book:
1. Data & Computer Communication, William Stallings – Pearson Education

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Subject Code	Subject Name and Title	Maximum Marks Allotted					Total	Hours/Week			Total Credits
		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT51A	Automata And Compiler Design	70	20	10	-	-	100	3	1	-	4

Module I

Introduction: Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)- Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), Equivalence of NFA and DFA, Minimization of Finite Automata, Regular expression, Regular Grammar, Regular languages, closure properties of Regular languages.

Module II

Context free grammars, Properties of context free languages. Pushdown Automata: Non deterministic push down automata: Definition of a push down automata, the language accepted by a push down automata, Push down automata for context free languages, CFG's for PDA, Deterministic Push down automata and Deterministic Context free languages.
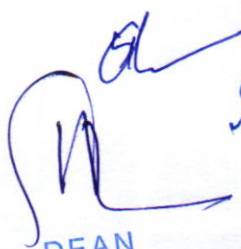
Module III

Compiler Structure: Compilers and Translators, Various Phases of Compiler. Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Implementation of Lexical Analyzer. The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG. Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Bottom- up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR).
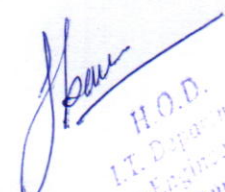
Module IV

Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.

Module V

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management. Code Optimization and Code Generation: Local optimization, Loop optimization, Peephole optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.

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References Books :

1. Louden, "Compiler construction", Cengage learning .
2. Alfred V Aho, Jeffrey D. Ullman, "Principles of Compiler Design", Narosa.
3. A.V. Aho, R. Sethi and J.D Ullman, "Compiler: principle, Techniques and Tools", AW.
4. Michal Sipser, "Theory of Computation", Cengage learning.
5. H.C. Holub, "Compiler Design in C", Prentice Hall Inc.

Course Outcomes:

CO 1. Illustrate the concept of Automata and Compiler Design and minimization of finite Automata.

CO 2. Formulate using CFC's for PDA and NPDA concept also define push down Automata.

CO 3. To understand compiler structure and basic parsing techniques.

CO 4. Classify intermediate Code Generation Techniques.

CO 5. Explain Run time memory management and data flow analyzer machine model.

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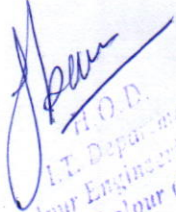**Bachelor of Technology (B.Tech.) V Semester (Information Technology)**
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COURSE CONTENT

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		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT51B	Computer Graphics and Multimedia	70	20	10	-	-	100	3	1	-	4

Module I

Fundamentals: Introduction to Raster Scan displays, Pixels, Frame buffer, Vector & Character generation, Random Scan systems, Display devices, Scan Conversion techniques, Line Drawing: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms: Midpoint Circle drawing and Bresenham's Algorithm, Polygon fill algorithm: Boundary-fill and Flood-frll algorithms.

Module II

2-D Transformation: -1 Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous coordinate - system, Matrices Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping & Polygon Clipping Algorithms.

Module III

3-D Transformations: Translation, Rotation and Scaling. Parallel & Perspective Projection: Types of Parallel & Perspective Projection, Hidden Surface elimination: Depth comparison, Back face detection algorithm, Painter's Algorithm, Z-Buffer Algorithm.

Module IV

Curve Generation and color model: Curve generation, Bezier and Bspline methods. Basic Illumination Model: Diffuse reflection, specular reflection, Phong Shading, Guard shading, Ray Tracing, Color models like RGB, YIQ, CMY, HSV.

Module V
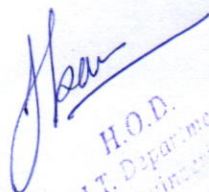
Multimedia & Animation: Text -Types, Unicode Standard , text Compression, Text file formats, Audio file formats, Image file formats, Digital Video processing, Video file formats. Compression techniques. Animation: Principles of Animation, Computer based animation, 2D and 3D Animation, Animation file formats, Animation software.

Reference Books:

1. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill.
2. Donald Hearri and M.P. Bgcker "Computer Graphics" Pearson Pub.
3. Parekh "Principles of Multimedia" Tata McGraw Hill .

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Course Outcomes:

CO 1. Calculate and determine various scan conversion algorithms.

CO 2. Compare various clipping and windowing techniques.

CO 3. Understanding to identify basic illumination models.

CO 4. Understanding various Curve Generation Techniques and color models.

CO 5. Familiarizing with various multimedia formats.

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		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT51C	Management Information System	70	20	10	-	-	100	3	1	-	4

Module I

Information System and Organization: Matching the Information System Plan to the Organizational Strategic Plan – Identifying. Key Organizational Objective and Processes and Developing an Information System. Development – User role in Systems Development Process – Maintainability and Recoverability in System Design.

Module II

Representation And Analysis Of System Structure: Models for Representing Systems- Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) Information Flow, Process Flow Methods and Heuristics, Decomposition and Aggregation , Information Architecture, Application of System Representation to Case Studies.
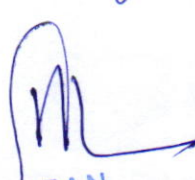
Module III

Systems, Information And Decision Theory: Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty – Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making. Decision Support Systems for Business Intelligence, Case Study- Business Intelligence tools i.e. IBM Cognos, Microsoft Business Intelligence tools.

Module IV

Information System Application Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning – Other use of Information Technology: Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism.

Module V

Development And Maintenance Of Information Systems: Systems analysis and design – System development life cycle – Limitation – End User Development – Managing End Users– off– the shelf software packages – Outsourcing – Comparison of different methodologies.

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Text Books:

1. Laudon K.C, Laudon J.P, Brabston M.E, "Management Information Systems - Managing the digital firm", Pearon Education, 2004.

References Books:

1. Turban E.F, Potter R.E, "Introduction to Information Technology"; Wiley, 2004.

2. Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, "Modern Systems Analysis andDesign", Third Edition, Prentice Hall, 2002.

Course Outcomes:

CO 1. Identify key organizational objectives and processes for developing an Information syste

CO 2. Analyze the models for the representing systems.

CO 3. Determine and identify information needed to support decision making.

CO 4. Understanding Transaction Processing Applications based MIS.

CO 5. Development and maintenance of information systems.

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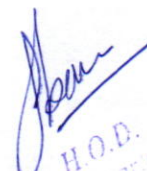### Bachelor of Technology (B.Tech.) V Semester (Information Technology)

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		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT52	Computer Network	70	20	10	30	20	150	3	-	2	4

Module I

Importance of computer networks, broadcast and point to point networks, Local area networks and Wide area networks , Introduction to ISO-OSI reference model, TCP/IP reference model function of each layer, interfaces and services, Protocol data Module, connection oriented and connectionless services, service primitives, comparison of TCP/IP and ISO-OSI reference model, Novel Netware, Arpanet, X.25.

Module II

Data-Link layer: - Data link layer design issues, framing , flow & error control , physical addressing, Stop & Wait protocol ,Go back N ARQ ,selective repeat ARQ, piggybacking and pipelining ,HDLC LAN Protocol stack-Logical link control and Media Access Control sub layer, IEEE 802.2 LLC Frame format Data link layer in the internet, Serial line IP and Pont to point protocol.

Module III

MAC layer Protocols- , static and dynamic allocation , Pure and slotted ALOH A protocols, Carrier sense multiple access, Persistent and non persistent CSMA, IEEE standard 802.3 and Ethernet,802.3cabling, IEEE 802.4, IEEE 802.5, FDDI Wireless LAN , Comparisonof wired and wireless LAN, WIMAX.

Module IV

The Network layer- logical addressing, class full & classless addressing , address mapping, packet delivery & forwarding. unicast routing protocols , multicast routing protocols, Routing algorithm- Least Cost, Dijkstra's, Bellman-ford, congestion control algorithms, Internetworking devices, Introduction to Internet protocol IPv4.
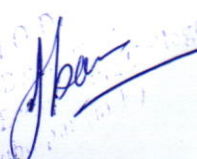
Module V

Transport layer-Transport services , Process to process delivery, UDP ,TCP ,congestioncontrol , quality of service , Integrated services, Differentiated services LAN-WAN Design and implementation-Configuring TCP/IP, using IP configure, ping command , study of structured LAN , study of internetworking devices an d their configuration– switches, hubs, Bridges, routers and Gateways.

Reference Books:

1. "Local area networks ", Forouzan, TMH, 1st edition
2. "Computer Networks" - Tanenblaum ,PHI Learning.
3. "Computer Networks" ,N Olifer and V Olifer ,Wiley publication
4. "Computer Communications & Networking Technologies"-Michael A. Gallo & William M. Hancock -Cengage pearsen publications.
5. "Computer Networks: Protocols, Standards and Interfaces"- By Black, PHI learning publ

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List of Experiment :

1. Establishment and configuration of LAN.
2. Color coding standard of CAT 5, 6, 7 and crimping of cable in RJ-45.
3. Study of WAN.
4. Case study of STOP AND WAIT Protocols.
5. Study of sliding window protocol.
6. Study of IEEE 802.3, 802.4,802.5.
7. Study of FDDI.
8. Study of basic networking commands like ping, ipconfig, etc.
9. Case study of various Routing Strategies.
10. Case studies of various Network Topologies.
11. Establishing & studying the various parameters of a home LAN Network.
12. Study of IOS of routers.
13. Configuring routers, bridges and switches and gateways.

Course Outcomes:

CO 1. Infer the importance of computer networks and ISO-OSI reference model.

CO 2. Compare various logical link control protocols.

CO 3. Outline standard, 802.3 and Ethernet technology.

CO 4. To classify logical addressing mode and routing methods.

CO 5. Illustrate TCP, UDP protocols with configuration of internetworking devices.

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COURSE CONTENT

Subject Code	Subject Name and Title	Maximum Marks Allotted					Total	Hours/Week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT53	Operating system	70	20	10	30	20	150	3	-	2	4

Module I

Introduction to Operating System: Evolution of Operating System Types of Operating system Batch Processing, Real Time, Multitasking & Multiprogramming, time-sharing system. Operating system services, Operating system structure, System Call & System Boots, Operating system design & Implementations, System protection, Buffering & Spooling.

Module II

Process Management: Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling. Process concept, operations on processes, threads, inter process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling.

Module III

Memory Management: Concepts of memory management, logical and physical address space, swapping, Fixed and Dynamic Partitions, Best-Fit, First-Fit and Worst Fit Allocation. Virtual Memory Management-paging, segmentation, and paging combined with segmentation. Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation.

Module IV

File Management: File systems: What is a file, user view of files, file types and file operations, file types in Unix and Microsoft, file operation commands, file access rights, file storage management, Inode or FAT structure, file control blocks, root file system, directory and file paths, blocks, impact of block size selection, contiguous allocation, chained and indexed allocations, Impact of allocation policy on fragmentation, mapping file blocks on the disk platter,cylinder, disk access control and scheduling

Module V

Input Output management & Security: Issues in human centric, device centric and computer centric IO management, input output modes, programmed IO, polling, interrupt mode of IO, various types of interrupts, interrupt servicing, priority interrupts, interrupt vectors, direct memory access (DMA) mode of transfer, setting up DMAs, device drivers, interrupt handling using device drivers, buffer management, device scheduling, disk scheduling algorithms and policies. Role of Operating System in Security, Security Breaches, System Protection, and Password Management

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Text Books:

1. Tanenbaum " Modern Operating System" PHI Lea rning.

Reference Books:
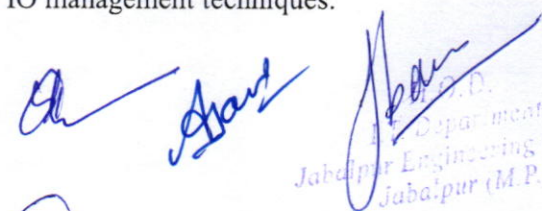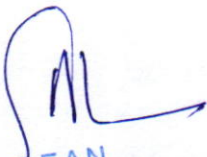
1. M. Flynn " Operating Systems". Cengage Learning.
2. Silberschatz ,"Operating system", Willey Pub
3. Dhamdhere, "System Programming and Operating System",TMH.
4. Stuart,"Operating System Principles, Design & Applications", Cengage Learning
5. Operating System : Principle and Design by Pabitra Pal Choudhury, PHI Learnin.
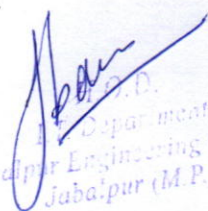
List of Experiments:

1. Program to implement FCFS CPU scheduling algorithm.
2. Program to implement SJF CPU scheduling algorithm.
3. Program to implement Priority CPU Scheduling algorithm.
4. Program to implement Round Robin CPU scheduling algorithm.
5. Program to implement classical inter process communication problem (producer consumer).
6. Program to implement classical inter process communication problem (Reader Writers).
7. Program to implement classical inter process communication problem (Dining Philosophers).
8. Program to implement FIFO page replacement algorithm.
9. Program to implement LRU page replacement algorithm.
10. Program to implement LFU page replacement.
11. Program to implement Optimal page replacement.

Course Outcomes:

CO 1. To introduce various types of OS and its services.

CO 2. To analyze and discuss various CPU scheduling algorithms.

CO 3. To give overview of deadlock prevention, avoidance and detection techniques.

CO 4. To compare various memory management techniques.

CO 5. To understand the file system and various IO management techniques.

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		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT54	DATA BASE MANAGEMENTSYSTEM	70	20	10	30	20	150	3	-	2	4

Module 1

Basic Concepts: DBMS Concepts and architecture Introduction, Database approach v/s Traditional tile accessing approach, Advantages of database systems, Data models, Schemas and instances, Data independence, database users and DBA.

Module II

Data models and their Comparison, Entities and attributes, Entity Sets, Relationships, Extended E-R, Features Defining the E-R diagram of database Relational Data models: Domains, Tuples, Attributes, Relations, and Integrity constraints. Key (super key, candidate key, primary key, foreign key, and referential key).

Module III

Structured Query Language , Relational Query languages: Relational algebra, Relational algebra operations like select, Project, Join, Division, outer union. SQL: DDl, DML and their commands, Aggregate function, nested subquery, views in SQL, join Data retrieval queries, accessing SQL from programming language.

Module IV

Database Design Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, multi-valued dependencies.

Module V

Transaction Processing Concepts: - Transaction System, Testing of Serializability, Serializabilityof schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: - Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction. Introduction to Distributed databases, data mining, data warehousing.

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Text Books:

1) Database System Concepts, Silberschatz, Korth and Sudarshan

2) Fundamental of database system by Elmasri / Navathe the Benjamin / Cunnings Publishing companyinc.

Reference Books:
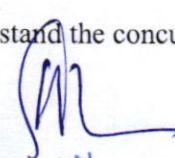
3) Data Base Management System by C.J. Date

4) Data Base Management System by Ullman

5) Data base design by Gio Wiederhold. McGraw Hill

6) Fundamental of Data Base Management System by Leon & Leon, Vikas Publishing House Pvt. Ltd.

7) Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press,TMH.
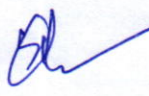
List of Experiments :
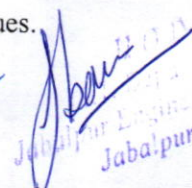
1. Introduction to SQL.

2. Write a programme of SQL queries like create- table, drop-table, truncate-table, insert - into, update-table and delete- table.

3. Program of SQL SELECT query with various Clauses and Study of various SQL queries for inserting deleting, updating a table (full or partial).

4. Program of Set operations (SQL).

5. Program of Join (SQL).

6. Program of SQL Primary key, Foreign key, View and index.

7. Program of SQL Functions.

8. Basic Structure of PL/SQL.

Write a PL/SQL CODE block that will accept an account number from the user, check if the users balance is less than the minimum balance ,only than deduct Rs 100/-from the balance. The process is fired on the ACCT_MSTR table.

10. Create a loop such that a message is displayed when a loop exceeds a particular value.

Course Outcomes:

CO 1. Fundamentals of Database management system.

CO 2. Understand the various data models and relational data model.

CO 3. Understanding relational algebra and query language to apply different operations over the relations using various queries.

CO 4. Obtaining the normalized relation by using different normal forms.

CO 4. Recognize and understand the concurrency and transaction control techniques.

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		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT55	INTERNET AND WEB TECHNOLOGY	70	20	10	-	-	100	3	1	-	4

Module I
An Introduction to Web Engineering, History of web Development, Time line, Motivation, Categoriesof Web Applications, Characteristics of Web Applications. Evolution and Need for Web Engineering, Web Engineering Models, Software Engineering v/s Web Engineering. Introduction to Browser and search engines, Search fundamentals, Search strategies, Directories search engines and Meta search engines, Working of the search engines, Miscellaneous Web Browser details.

Module II
Introduction to Web Servers: Features of web servers, caching, case study-IIS, Apache, Configuring web servers.
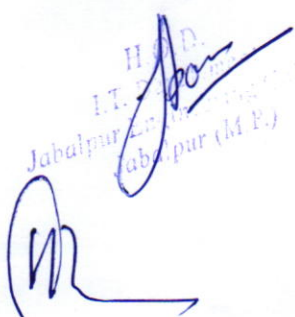
Module III
Technologies for Web Applications: HTML and DHTML, HTML Basic Concepts, Static and dynamic HTML, Structure of HTML documents, HTML Elements, Linking in HTML, Anchor Attributes,Image Maps, Meta Information, Image Preliminaries, Layouts, Backgrounds, Colors and Text, Fonts, Tables, Frames and layers. Database integration, CSS, Positioning with Style sheets. Introduction to JAVA SCRIPT, CookiesCreating and Reading Cookies. Technologies for Web Applications: Introduction of XML, Validation of XML documents, DTD, Ways to useXML, XML for data files, HTML Vs XML, Embedding XML into HTML documents, Converting XML to HTML for Display, Displaying XML using CSS and XSL, Rewriting HTML as XML.

Module IV
Creating Cohesive Websites: Conceptual Overview of website Development, Website Designissues, Conceptual Design, High-Level Design, Indexing the Right Stuff, Grouping Content. Architectural Page Mockups, Design Sketches, Navigation Systems. Searching Systems Good & bad web design, Process of Web Publishing. Phases of Web Site development, enhancing your web-site, submission of website to search engines. Web security issues, security audit of websites, Web effort estimation, Productivity, Measurement, Quality usability and reliability.

Module V
Requirements Engineering for Web Applications: Introduction, Fundamentals, Requirement Source, Type, Notations Tools. Principles Requirements Engineering Activities, Adapting RE Methods to Web Application. Introduction to http and https, http vs. https, Dynamic Web Content, Introduction of ASP.Net, PHP, Database connectivity (MySQL/Oracle).

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Reference Books:

1. Roger S.Pressman, David Lowe, "Web Engineering", Tata Mcgraw Hill Publication, 2007
2. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
3. Gopalan N P, Akilandeswari "Web Technology: A Developer s Perspective" , PHI
4. NEIL GRAY "Web server Programming" WIley
5. CHRIS BATES Web Programming: Building Internet applications Wiley
6. Moller, "An Introduction to XML and Web Technologies" , Pearson Education New Delhi, 2009
7. Beginning XML 4th Edition Hnter, Refter, Fawset Wiley India
8. Internet & World Wide Web How to Program, Pearson education, 3rd edition, by: H.M. Deitel, P.J. Deitel, A.B.Goldberg.
9. C. Xavier, "Web Technology & Design ", Tata McGraw Hill. 10 Ivan Bay Ross, "HTML, DHTML, Javascript,Perl CGI", BPB
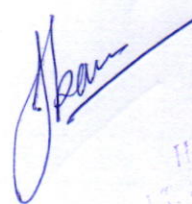
List of Experiments:

1. Introduction to major internet protocol- HTTP, FTP, SMTP.
2. Study of Web Browser- Microsoft Internet Explorer and Netscape Navigator.
3. Their Network options, security features, Cookies, file cashing, temporary files etc.
4. HTML-Basics of HTML., text, image, other MIME types, lists, tables.
5. HTTP methods, forms.
6. Multimedia on the Web- Embedding audio and video files in HTML.
7. Java Script- Introduction to Java Script for client side validation.
8. Serves side scripting - Introduction to fundamentals concepts of ASP or JSP or PHP (any one platform depending on instructor).
9. Basics of CGI scripting using Perl or C.
10. Simple examples of request/ response objects.
11. Basic introduction to web solutions architecture.

Course Outcomes:

CO 1. To have introduction to Web Engineering importance .

CO 2. To understand Web Servers .

CO 3. To have command on Web Applications technologies.

CO 4. To have knowledge of wesite development methods with quality measures.

CO 5. To understand Web engineering concepts.

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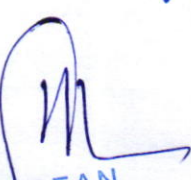### w.e.f. July 2023

COURSE CONTENT

Subject Code	Subject Name and Title	Maximum Marks Allotted					Total	Hours/Week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT61A	Information Theory & Coding	70	20	10	-	-	100	3	1	-	4

Module I

Introductory Concepts Information Theory: Entropy and Uncertainty; Information Content; Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding Joint and conditional entropies, Mutual information - Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.

Module II

Compression Algorithms Optimal Compression; Compression Algorithms; Huffinan Coding; Adaptive Huffinan Compression; Statistical Modelling; Dictionary Based Compression; Sliding Window Compression; Speech Compression; LZW, RLE; Lossy Compression schemes; Image Compression using DCT.

Module III
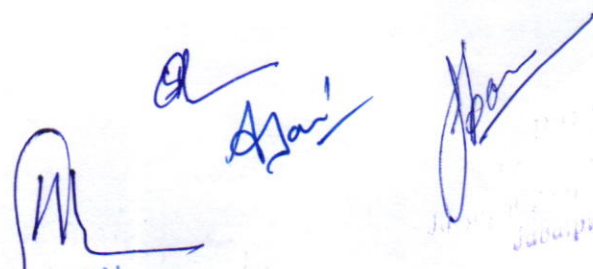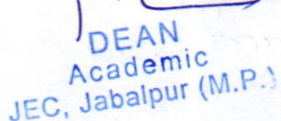
Error Control Coding Coding for reliable digital transmission and storage; Types of codes; Error Checking codes; Error Correcting Codes; Coding Schemes; Linear Block Codes; Cyclic Codes; Error Trapping; Decoding for cyclic codes; Convolution codes. Run length encoding, CCIIT group 31-D compression, CCITT group 3 2D compression, CCITI group 4 2D compression.

Module IV

Video Image Compression: Requirement of full motion video compression. CITT H 261 Video coding algorithm, MPEG compression methodology. MPEG-2 compression, Audio (speech) compression.

Module V

Cryptography: Encryption, Decryption, Cryptogram (hypertext). Concept of cipher, Crypto analysis. Keys: Single key (secret key) cryptography, two-key (public-key) cryptography. Single key cryptography Ciphers: Block cipher codes, Stream ciphers, Requirement for secrecy, The Data Encryption Standard Public Key Cryptography: Diffle-Hellman public key distribution, The Rivest-ShamirAdelman (R-S-A) system for public key cryptography. Digital signature.

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Reference Books:

1. Error correcting codes by W.W Peterson and E.J. Welton, The Mit Press (1978) ISBN0262160390
2. Multimedia System Design by P.K. Andleigh & Kiran Thapar, Prentice Hall PTRUpper Saddle River,NJC (1996)
3. Bruce Schneier, Applied Cryptography: Protocol Algorithms & Source Code inC, John Wiley &sons, NY, 1994
4. Network Security by Stalking, PHI
5. Communication Systems, 3/e by Simon Haykin, John Wiley & sons (1995)

Course Outcome :

CO1: Understand need of information coding.

CO2: Understand the different coding algorithm.

CO3: Understand different error correction and checking methods.

CO4: Understand video compression technique.

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		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT61B	E-Commerce and E-Governance	70	20	10	-	-	100	3	1	-	4

Unit I: Introduction to e-commerce: History of e-commerce, e-business models B2B, B2C, C2C, C2B, legal; environment of e-commerce, ethical issues, electronic data interchange, value chain and supply chain, advantages and disadvantages of e-commerce.

Unit II: Electronic Payment Systems: Credit cards, debit cards, smart cards, e-credit accounts, e-money, Marketing on the web, marketing strategies, advertising on the web, customer service and support, introduction to m-commerce, case study: e-commerce in passenger air transport.

Unit III: E-Government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of e-governance, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

Unit IV: E-readiness, e-government readiness, E- Framework, step & issues, application of data warehousing and data mining in e-government, Case studies: NICNET-role of nation wide networking in egovernance, e- seva.

Unit V: E-Government systems security: Challenges and approach to e-government security, security concern in e-commerce, security for server computers, communication channel security, security for client computers.
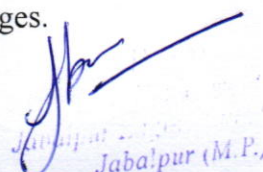
References Books:-
1. Gary P. Schneider, "E-commerce", Cengage Learning India.
2. C.S.R. Prabhu, "E-governance: concept and case study", PHI Learning Private Limited.
3. V. Rajaraman, "Essentials of E-Commerce Technology", PHI Learning Private Limited.
4. David Whiteley, "E-commerce study , technology and applications", TMH.
5. J. Satyanarayan, "E-government: The science of the possible", PHI Learning Private Limited.
6. P.T. Joseph, "E-Commerce An Indian Perspective", PHI Learning Private Limited.
7. Hanson and Kalyanam, "E-Commerce and Web Marketing", Cengage Learning India.

Course Outcomes:
CO 1. Familiarize with e-commerce terms and e-business models. +

CO2. Distingue in among various electronic payment systems.

CO 3. Compare various e-governance models and their benefits.

CO 4. To provide approaches to various e-government security challenges.

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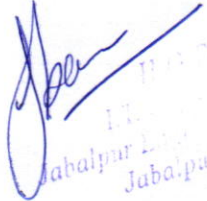JEC. Jabalpur (M.P.)

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Subject Code	Subject Name and Title	Maximum Marks Allotted					Total	Hours/Week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	EndSem	Lab Work					
IT61C	Artificial Intelligence	70	20	10	-	-	100	3	1	-	4

Unit I:
Meaning and definition of artificial intelligence, Various types of production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithms etc, and various types of control strategies.

Unit II:
Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and nonmonotonic reasoning.

Unit III:
Probabilistic reasoning, Baye's theorem, semantic networks, scripts, schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning.

Unit IV:
Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block worldproblem in robotics, Introduction to understanding and natural languages processing.

Unit V:
Introduction to learning, Various techniques used in learning, introduction to neural networks, applicationsof neural networks, common sense, reasoning, some example of expert systems.
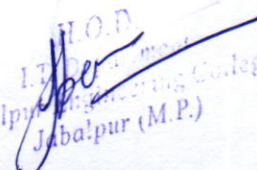
References Books:-

- Rich E and Knight K, "Artificial Intelligence", TMH, New Delhi.
- Nelsson N.J., "Principles of Artificial Intelligence", Springer Verlag, Berlin.

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Course Outcomes:

CO 1. To discuss and compare various search techniques in AI.

CO2. Formulation of various knowledge representation schemes.

CO3. Learn and differentiate among various game playing techniques.

CO 4. Apply AI learning techniques in the design of expert system.

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Subject Code	Subject Name and Title	Maximum Marks Allotted						Hours/Week			Total Credits
		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	EndSem	Lab Work					
IT62A	Microprocessor And Interfacing Coding	70	20	10	-	-	100	3	1	-	4

Module I

Intel 8086 Microprocessor: Introduction to 16-bit microprocessors, 8086 pin functions, Minimum and maximum mode operations. 8086 Architecture, register organization, addressing Modes, 8086 Memory banks and Memory organization, 8086 Instruction set and Assembly language programming.

Module II

Advanced microprocessors: Salient features of advanced microprocessors. Review of evolution of advanced microprocessors: 186 / 286 / 386 / 486 / Pentium. Super scalar architecture of Pentium. 80286/386 Memory segmentation with descriptor tables, Privilege levels, Changing privilege levels, Paging including address translation, Page level protection, MMU, cache memory, Virtual memory.

Module III

I/O INTERFACING: Introduction to the interfacing chips 8255. Interfacing keyboards, printers, LEDSwith Intel 8086 Microprocessor. Interfacing of 8254 programmable interval timer, 8259A Programmable interrupt controller & 8257 DMA controller with Intel 8086 Microprocessor.

Module IV

Memory Interfacing: Interfacing of RAM and ROM with Intel 8086 Microprocessor.Serial communication interface: RS 232C standards, Interfacing of USART chip 8251 with Intel 8086 Microprocessor.

Module V

Microcontroller: Introduction to micro controller 8051, its architecture, Register set, operational features, pin description, I/O configuration, interrupts, addressing modes, an overview of 8051 instruction set.

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Reference Books:

1. B.B. Brey (PHI), "The Intel Microprocessors, Architecture, Programming and Interfacing".
2. A Triebel & Avtar Singh (PHI), "The 8088 & 8086 Microprocessor".
3. D. Hall (Mc-Graw Hill), "Advanced Microprocessor and Interfacing".
4. A. Pal (TME), "Microprocessors Principles & Applications".
5. A.P. Mathur (TMA), "Introduction to Microprocessors".
6. Intel Corporation MicroprocessorsDatamanuals.
7. Microprocessor Training Inc., "Microprocessor Fundamentals & Applications (Handson)".

Course Outcomes:

CO1: To understand the architecture of 8086.

CO2: To understand the advantages of micro processor.

CO3: Compare the different interfacing chips.

CO4: Understand the memory interfacing.

CO5: Understand the micro controllers.

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		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT62B	Intellectual propertyRights-Governance	70	20	10	-	-	100	3	1	-	4

Module I

OVERVIEW OF INTELLECTUAL PROPERTY: Introduction and the need for intellectual property right (IPR) IPR in India-Genesis and Development IPR in abroad Some important examples of IPR PATENTS: Macro economic impact of the patent system, Patent and kind of inventions protected by a patent, Patent document, How to protect your inventions, Granting of patent Rights of a patent, how extensive is patent protection, why protect inventions by patents, Searching a patent, Drafting of a patent, Filing of a patent, The different layers of the international patent system (national, regional and International options). Utility models, Differences between a utility model and a patent, Trade secrets and know-how agreements.

Module II

COPYRIGHT: What is copyright, what is covered by copyright, how long does copyright last, why protect, copyright RELATED RIGHTS: What are related rights, Distinction between related rights and copyright, Rights covered by copyright. TRADEMARKS: What is a trademark, Rights of trademark, What kind of signs can be used as trademarks, types of trademark, function does a trademark perform, How is a trademark protected, How is a trademark registered. How long is a registered trademark protected for, How extensive is trademark protection, What are well-known marks and how are they protected, Domain name and how does it relate to trademarks.

Module III

GEOGRAPHICAL INDICATIONS: What is a geographical Indication, How is a geographical indication protectedWhy protect geographical indications.INDUSTRIAL DESIGNS: What is an industrial design, How can Industrial designs be protected. What kind of protection is provided by industrial designs, How long does the protection last, Why protect industrial designs. NEW PLANT VARIETIES: Why protect new varieties of plants, How can new plants be protected, What protection does the breeder get, How long do the breeder's rights last, How extensive is plant variety protection. UNFAIR COMPETITION: What is unfair competition, relationship between unfair competition and intellectual property laws.

Module IV

ENFORCEMENT OF INTELLECTUAL PROPERTY RIGHTS: Infringement of intellectual property rights;Enforcement Measures, EMERGING ISSUES IN INTELLECTUAL PROPERTY: Overview of Biotechnology and Intellectual Property, Biotechnology Research and Intellectual Property Rights Management, Licensing andEnforcing Intellectual Property, Commercializing Biotechnology Invention, Case studies of Biotechnology, Case studies of patents in other areas.
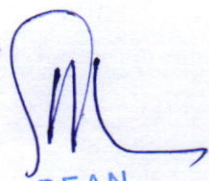
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Module V

IT ethics: Theoretical basis of Computer Ethics, defining Computer Ethics, computer professional's behavior, and social conduct, ease of misuse, do and don'ts with proprietary data, Understanding computercrime, Social Networking. Understanding Software Compliance, Software Piracy, Software/OS licensing Policies, Understanding Professional Responsibility, IT act provisions.

TEXT BOOKS
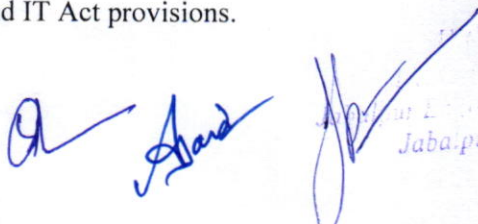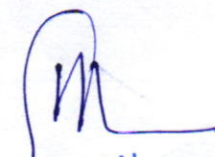
- T. M Murray and MJ. Mehlman, Encyclopedia of Ethical, Legal and Policy issues in Biotechnology. John Wiley& Sons 2000

References Books:

1. P.N. Cheremisinoff, R.P. Ouellette and R.M. Bartholomew, Biotechnology Applications and Research,Technomic Publishing Co., Inc. USA, 1985 , Concepts in
2. D.Balasubramaniam, C.F.A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman Biotechnology, UniversityPress (Orient Longman Ltd.), 2002.
3. Bourgagaize, Jewell and Buiser, Biotechnology: Demystifying the Concepts, Wesley Longman, USA, 2000.
4. Ajit Parulekar and Sarita D'Souza, Indian Patents Law - Legal & Business Implications; Macmillan India ltd,2006
5. B.L.Wadehra; Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications;Universal law Publishing Pvt. Ltd., India 2000
6. P. Narayanan; Law of Copyright and Industrial Designs;Eastern law House, Delhi, 2010,

Course Outcomes:

CO 1. To understand the need of Intellectual Property Rights.

CO 2. To recommend patent systems to protect inventions.

CO3. Compare copyrights, trademarks and related terms.

C04. To relate unfair competition and IPR.

C05. Understand the computer crime and IT Act provisions.

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IT62C	Digital Signal & Image Processing	70	20	10	-	-	100	3	1	-	4

Module I

Introduction and Fundamentals : Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization. Image Enhancement in Spatial Domain : Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening –The Laplacian.

Module II

Image Enhancement in Frequency Domain : Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering. Image Restoration : A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

Module III

Color Image Processing : Color Fundamentals, Color Models, Converting Colors to differentmodels, Color Transformation, Smoothing and Sharpening, Color Segmentation. Morphological Image Processing : Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

Module IV

Registration : Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging– Algorithms to Establish Correspondence, Algorithms to Recover Depth Segmentation. Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

Module V

Feature Extraction: Representation, Topological Attributes, Geometric Attributes
Description: Boundary-based Description, Region-based Description, Relationship. Object Recognition : Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

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Reference Books:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalk off. Published by: John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.
4. Digital Image Processing by A.K. Jain, 1995,-PHI

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		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT65	CLOUD COMPUTING	70	20	10	30	20	150	3	-	2	4

Module I

Cloud Introduction Cloud Computing Fundamentals Cloud Computing definition, Types of Cloud, Cloud services: Benefits and challenges of cloud computing, usage scenarios and Applications, Business models around Cloud - Major players in Cloud Computing-Issues in Cloud- Eucalyptus Nimbus{pen Nebula,Cloudsim. Challenges in Cloud Computing: Migration, Integration, Proprietary VS Open Sources.

Module II

Cloud Services And File System BIGDATA : Introduction; Types of Cloud services: Software as a Service- Platform as a Service- Infrastructure as a Service- Database as a Service - Monitoring as a Service - Communication as services, Service providers -Google App Engine, Amazon EC2.Introuduction to MapReduce, HDFS, Hadoop Framework.

Module III

Virtualization For Cloud Need for Virtualization -pros and cons of Virtualization -Types of Virtualization- System Vm, Process VM, Virtual Machine monitor- Virtual machine properties - Interpretation and binary translation, HLL VM-Hypervisors -Xen, KVM, VMW are Virtual Box, Hyper-V

Module IV

Collaborating with Cloud Collaborating on Calendars, Schedules and Task Management-Collaborating on Event Management, Contact Management , project Management - Collaborating on word processing, Databases- Storing and Sharing Files- Collaborating via Web- Based Communication Tools Evaluating Web Mail Services- Collaborating via Social Networks-Collaborating via Blogs and Wikis.

Module V

Security, Standards, And Applications Security in Clouds: Cloud security challenges- Software as a Service Security, Common Standards: The Open Cloud Consortium- The Distributed management Task Force-Standards for application Developers - Standards for Messaging - Standards for Security. End user access to cloud computing, Mobile Internet devices and the cloud.
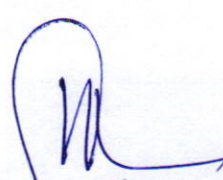
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Reference Books:

1. Cloud Computing "A Practical Approach" Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGraw Hill. Kai Hwang, Geoffrey C Fox, Jack G Dongarra,
2. "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation,Management, and Security", CRC Press, 2010.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
5. Kumar Saurabh, "Cloud Computing - insights into New -Era Infrastructure", Wiley India, 2011.
6. Ronald L. Krutz, Russell Dean Vines, "Cloud Security - A comprehensive Guide to Secure Cloud Computing", Wiley - India,

Experiment List:

1. Study and do the Configuration of CLoudSim. Also execute & check the performance of existing algorithms.
a) Install a Cloud Analyst and Integrate with Eclipse/Netbeans. Monitor the performance of an Existing Algorithms.
b) Modify or propose a new load balancing algorithm compatible with Cloud Analyst.
2. Integrating Google App Engine API's in Eclipse and develop an application in Java/Python on the top of Google Cloud.
3. Make the registration groupwise on Google and register your application by using google application-ID
4. Private cloud configuration (Eucalyptus/OpenNebula)
5. Building an application on cloud
6. Amazon instance (Demo Version) Exploring
7. Utlizing the instance by deploying some application 8. Demonstration of Cloud Monitoring tool
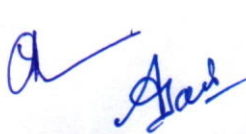9. Exploring Open Stack.

Course Outcomes:
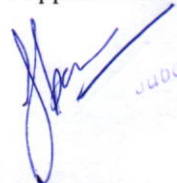
CO1: To understand the benefits and the challenges of cloud computing.

CO2: To understand the types of cloud services.

CO3: To outline about the need and types of virtualization.

CO4: To discuss collaborating with the cloud.

CO5: To analyze the security challenges and standards for security and application.

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Subject Code	Subject Title	Maximum Marks allotted						Hours/week			Total Credits
		Theory			Practical		Total Marks	L	T	P	
		End Sem	Mid Sem MST	Quiz Assignment	End Sem	Lab Work					
IT702M	Information Retrieval	70	20	10	30	20	150	3	-	2	4

Module I

Introduction to Information retrieval - Information retrieval process, Indexing, Information retrieval model, Boolean retrieval model

Dictionary and Postings - Tokenization, Stop words, Stemming, Inverted index, Skip pointers, Phrase queries

Module II

Tolerant Retrieval - Wild card queries, Permuterm index, Bigram index, Spelling correction, Edit distance, Jaccard coefficient, Soundex

Term Weighting and Vector Space Model - Wild card queries, Permuterm index, Bigram index, Spelling correction, Edit distance, Jaccard coefficient, Soundex

Module III

Evaluation - Precision, Recall, F-measure, E-measure, Normalized recall, Evaluation problems Latent Semantic Indexing - Eigen Vectors, Singular value decomposition, Low rank approximation, Problems with Lexical Semantics

Module IV
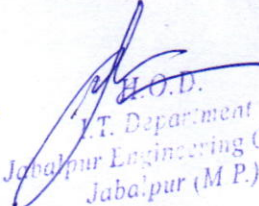
Query Expansion - Relevance feedback, Rocchio algorithm, Probabilistic relevance feedback, Query Expansion and its types, Query drift

Probabilistic Information Retrieval - Probabilistic relevance feedback, Probability ranking principle, Binary Independence Model, Bayesian network for text retrieval

Module V

XML Indexing and Search - Data vs. Text-centric XML, Text-Centric XML retrieval, Structural terms Content Based Image Retrieval - Introduction to content Based Image retrieval, Challenges in Image retrieval, Image representation, Indexing and retrieving images, Relevance feedback

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Course Outcomes:

CO1: To familiarize with Information Retrieval and dictionary and postings.

C02: To understand Tolerant Retrieval Term Weighting and various models.

C03: To perform various evaluation measures and semantic indexing.
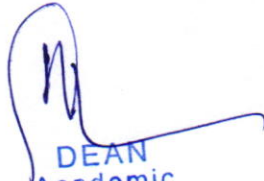
C04: To get exposure to query processing in IR and probabilistic IR introduction.

CO5: To understand XML and content based IR.

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		End Sem	Mid Sem MST	Quiz Assignment	End Sem	Lab Work					
IT703M	Machine Learning	70	20	10	30	20	150	3	-	2	4

Module I

Mathematical foundations of machine learning, random variables and probabilities, probability distributions, high-dimensional spaces, overview of machine learning, supervised, semi-supervised, unsupervised learning, inductive and transductive frameworks

Module II

Classification:-Introduction, Decision Tree, The Tree Induction Algorithm, Split Algorithms Based on Information Theory, Split Algorithm Based on the Gini Index,Overfitting and Pruning, Decision Trees Rules..Cluster Analysis:- Introduction, Desired Features of Cluster Analysis, Types of Cluster Analysis Methods:- Partitional Methods, Hierarchical Methods, Density-Based Methods,. Quality and Validity of Cluster Analysis Methods. Classification algorithms: linear and non-linear algorithms, perceptrons, logistic regression, naive Bayes, decision trees, neural networks, support vector machines, regression algorithms, least squares linear regression, neural networks, relevance vector machines

Module III

kernel methods, dual representations, RBF networks, graphical models, Bayesian networks, Markov random fields, inference, ensemble methods, bagging, boosting, random forests

Module IV

practical aspects in machine learning, data preprocessing, overfitting, accuracy estimation, parameter and model selection.

Module V

special topics, PAC learning, sample selection bias, learning from graph data, learning from sequential data

Reference Books:

- Machine Learning: A Multistrategy Approach by Ryszard Spencer Michalski, Ryszard Stanislaw Michalski, George Tecuci.

- Introduction to Machine Learning by Ethem Alpaydin.

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Experiment List

1. Design implementation and evaluation of algorithms for semi supervised learning

2 Study of perceptron update rules and perceptron conversion.

3 Study kernel regression & linear Regression.

4. Study of Bayesian Network.

5. Design of neural network using classification approach.

6 Study of Decision tree.

7. Study of split algorithm based on the Gini/index.

8. Study of practical aspect of machine learning.

9. Study of PAC learning algorithm.

10. Study of logistic regression.

Course Outcomes:

CO1: To introduce with the mathematical foundation of machine learning.

C02: To understand and outline various machine learning algorithms and their classification.

C03: To give insights of the practical aspects in machine learning, data processing and accuracy establishment.

C04: To discuss about some special topics PAC objects.

C05:To learn from graphical data and sequential data.

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Subject Code	Subject Name and Title	Maximum Marks Allotted					Hours/Week			Total Credits
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		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT71A	SIMULATION AND MODELING	70	20	10	-	-	100	3	1	-	4

Module I

Introduction to Modeling and Simulation: Nature of Simulation, Systems , Models and Simulation, Continuous and Discrete Systems, system modeling, Principles used in modeling, Static and Dynamic physical models, Static and Dynamic Mathematical models, concept of simulation, Components of a simulation study. Introduction to Static and Dynamic System simulation, continuous and discrete time simulation. Advantages, Disadvantages and pitfalls of Simulation.

Module II

Probability Concepts in Simulation: Stochastic variables, discrete and continuous probability functions, Distributed Random numbers, generation of random numbers-Uniform and Non Uniform Random numbers, variance reduction techniques-Introduction, Common Random numbers- Rationale, Applicability and Synchronization.

Module III

Introduction to Queuing Theory: Characteristics of queuing system, Poisson's formula, berth- death system, equilibrium of queuing system, Queuing Disciplines, Simulation of single and two server queue. Analysis of M/M/1 queues. Application of queuing theory in computer system like operating systems,computer networks etc.

Module IV

Discrete-Event Simulation: Components and Organization of a Discrete-Event Simulation Model, Determining the Events and Variables, approaches for time advance. Generation of arrival patterns, Simulation programming tasks, Gathering statistics, Measuring occupancy and Utilization , Recording Distributions and Transit times.

Module V

Introduction to Simulation languages: GPSS: Action times, Succession of events, Choice of paths, Conditional transfers, program control statements. SIMSCRIPT: Organization of SIMSCRIPT Program, Names & Labels, SIMSCRIPT statements.

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Reference Books:

1. Gorden G., System simulation, Printice Hall.
2. Law .,Simulation Modeling And Analysis, McGraw Hill
3. Payer T., Introduction to system simulation, McGraw Hill.
4. Spriet, Computer Aided Modeling and Simulation, W.I.A.
5. Sushil, System Dynamics, Wiley Eastern Ltd.
6. Shannon R.E., System simulation, Prentice Hall.

Course Outcomes:

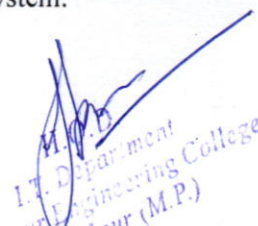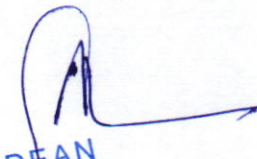CO1: To understand the principles used in modeling.

CO2: To understand the probability concepts used in simulation.

CO3: To give overview of discrete event simulation.

CO4: To introduce simulation languages GPSS, SIMSCRIPT.

CO5: To discuss queuing theory and its applications in computer system.

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		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT 71B	Advance Computer architecture	70	20	10	-	-	100	3	1	-	4

Module I

Evolution of Computer Architecture, System Attributes to performance, Multiprocessor and Multi computers, Data and resource dependencies, Hardware & Software Parallelism, Program Partitioning and scheduling, Grain sizes and latency, Grain packing & Scheduling, Static Multiprocessor scheduling, Program flow Mechanisms, Control flow and Data flow, Demand-driven mechanism, Back plane Bus systems, Bus specification, Arbitration, Transaction and interrupt, IEEE future bus + Standards.

Module II

Cache Memory organization, Cache performance issues, Interleaved Memory organizations, Bandwidth and fault tolerance, Memory allocation Schemes. Linear pipeline processors, asynchronous and synchronous Nudels, Speedup, Efficiency and through put. Non- linear pipeline processors, Reservation and latency analysis, Collision free scheduling. Braches handling and Hazard avoidance, Dynamic instruction scheduling, Arithmetic pipeline design, super scalar and super pipeline design.

Module III

Vector computers, Vector instruction types, Vector access Memory schemes, Multi vector Multi processors, Compound vector processing, Static and dynamic Interconnection networks. Cache coherence, Snoopy bus protocols, Directory protocols, Hardware synchronization mechanisms, Message passing mechanisms, Message routing schemes, Deadlock and Virtual channels, Flow control strategies, Multicast reacting algorithms.

Module IV

Principles of scalable performance, Performance metrics and measures, Parallelism profile in programs, Harmonic mean performance, Efficiency, Utilization and quality, Standardperformance measures, Application models of parallel computers. Speedup performance laws, Amdahls law for fixed workload, Memory bounded speedup model, Scalability analysis and approaches, Scalability matrix and goals.

Module V

Introduction to parallel programming and parallel programming models, Parallel languages and compilers, dependence analysis of data arrays, Code optimization and scheduling,Loop parallization and pipelining, Parallel program development and environments, Synchronization, Shared variable program structures.

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Reference Books :

- Kai Hwang, Advance Computer Architecture, McGraw Hill.

Course Outcomes:

CO1: To familiarize with Evolution of Computer Architecture and Program Partitioning.

CO2: To understand Cache Memory organization and Linear pipeline processors.

CO3: To understand Vector computers.

CO4: To get exposure to Principles of scalable performance, metrics and measures.

CO5: To Introduce parallel programming and parallel programming models.

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Jabalpur Engineering College, Jabalpur
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(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VII Semester (Information Technology)
w.e.f. July 2023

COURSE CONTENT

SubjectCode	Subject Name and Title	Maximum Marks Allotted						Hours/Week			Total Credits
		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT 71C	Real Time OperatingSystems	70	20	10	-	-	100	3	1	-	4

Module I
Introduction Introduction to IINIX/LINUX, Overview of Commands, File UO, (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

Module II
Real Time Operating Systems Brief History of OS, Defining RTOS, The Scheduler, Objects, Services,Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use.

Module III
Objects, Services and UO Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic VO Concepts, VO Subsystem.

Module IV
Exceptions,Interrupts and Timers Exceptions, Intemrpts, Applications, Processing of Exceptions and Spurious lntemrpts, Real Time Clocks, Programmable Timers, Timer Intemrpt Service Routines (ISR), Soft Timers, Operations.

Module V
Case Studies of RTOS RT Linux, MicroC/OS-[, VxWorks, Embedded Linux, and Tiny OS. Textbook RealTime Conceptsfor Embedded Systems - Qing Li, Elsevier, 2011

Reference Books:

1. Embedded Systems- Architecture, Programming and Design by Rajkamal,z0}7, TMH.

2. Advanced WIX Programming, Richard Stevens

Course Outcomes:

CO1: To Introduce UNIX/LINUX.

CO2: To understand Real Time Operating Systems.

CO3: To understand Objects, Services and I/O in RTS.

CO4: To understand exceptions, Interrupts and Timers in RTS.

CO5: To analyze Case Studies of RTOS

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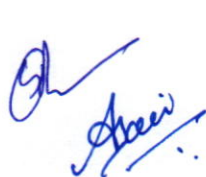
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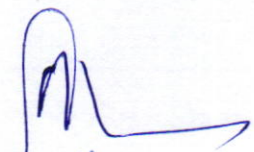**w.e.f. July 2023**

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		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT72A	WIRELESS & MOBILE COMMUNICATION	70	20	10	-	-	100	3	1	-	4

Module I

Introduction of Wireless Networks, Different Generations of Wireless Networks. Characteristics of the Wireless Medium: Radio Propagation Mechanisms, Path Loss Modelling and Signal Coverage, Effect of Multipathand Doppler, Channel Measurement and Modelling Techniques.

Module II

Introduction to cellular mobile system A basic cellular system, performance criteria, Uniqueness ofMobile Radio Environment, Operation of cellular systems, Planning and cellular system, Analog and digital cellular systems. Elements of cellular radio system design: General description of the problem, Concept of frequency channels, Co channel interface reduction factor, Cell splitting, Consideration of the components of cellular systems.

Module III

Cell coverage for signal and traffic: General introduction, obtaining the mobile point-to-point mode propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point-to- point prediction model-characteristics, cell site, antenna heights and signal coverage cells, mobile-to-mobile propagation.

Module IV

Introduction to Wireless LAN, Evolution of WLAN, Wireless Home Networking, Technologies for Home Area Network (HAN), Overview of IEEE 802.11, Reference Architecture, PHY and MAC Layer, Wireless ATM, HIPERLAN.

Module V

IEEE 802.15 WPAN, HomeRF, Bluetooth, Interference between Bluetooth and 802.11, Adhoc Networks,Introduction to 2.5 G and 3 G Networks.

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Reference Books :

1. Kaveh Pahlavan, Prashant Krishnamurthy "principles of Wireless Networks", PHI.
2. Qing- An Zeng, Dharma Prakash Agrawal "Introduction to Wireless and Mobile Systems"CENGAGE Learning.
3. Sumit Kasera, Nishit Narang, A P Priyanka "2.5 G Mobile Networks: GPRS and EDGE", TMH
4. Dr. KAMILO FEHER "Wireless Digital Communications" , PHI
5. Jochen Schiller " Mobile Communications", PEARSON

Course Outcomes:

CO1 : To compare various wireless systems.

CO2: To understand the cellular mobile system and its problems and its solution.
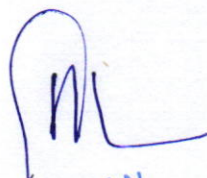
CO3: To outline the cell coverage for various control Modules.

CO4: To give overview of IEEE reference architecture.

CO5: To discuss various generations of mobile wireless technology.

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IT72B	Embedded Systems	70	20	10	-	-	100	3	1	-	4

Module I

Introduction to Embedded System, Categories, Requirements, Applications, Challenges and Issues. Core of Embedded system, Memory, Sensors and Actuators, communication interface, embedded firmware, system components.

Module II

Architecture of 8051 microcontroller, memory organization, registers, interrupts, addressing modes, instruction sets. Interfacing methods parallel I/O interface, Parallel Port interfaces, Memory Interfacing, High Speed I/o Interfacing, Interrupts, interrupt service routing, features of interrupts, Interrupt vector and Priority, timing generation and measurements,

Module III

Fundamental issues of hardware software co-design, computational models in embedded design. Embedded firmware design approaches- Embedded firmware development languages-Assembly language based, high level language based, mixed. Programming in embedded C.

Module IV

Embedded System Development Environment: KEIL Integrated Development Environment (IDE), Types of files Generated on Cross-Compilation, Disassembler/Decompiler, Simulators, Emulators and Debugging

Module V

Real Time Operating Systems: Task and Task States, tasks and data, semaphores andshared Data Operating system Services, Message queues, Timer Function, Events, Memory Management, Interrupt Routines in an RTOS environment, Basic design using RTOS.

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Reference Books :

1. Shibu K V, "Introduction to Embedded System", TMH.
2. David E Simon, "An Embedded Software Primer", Pearson education Asia, 2001
3. Steven F. Barett, Daniel J. Pack, "Embedded Systems" Pearson education, First Impression 2008.
4. Vahid Frank, Tony Givargis, "Embedded System Design", John Wiley and Sons, Inc.
5. Dream Tech Software Team, "Programming for Embedded Systems" Wiley Publishing houseInc.

Course Outcomes:

CO1: To familiarize with Embedded System, Categories, Requirements, Applications

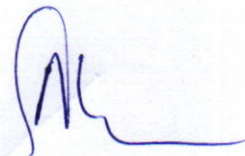CO2: To understand Architecture of 8051 microcontroller

CO3: To understand Embedded firmware design approaches.

CO4: To get exposure to Embedded System Development Environment

CO5: To study Real Time Operating systems.

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		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT72C	Distributed Systems	70	20	10	-	-	100	3	1	-	4

Module I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems,Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutualexclusion algorithms.

Module II

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Module III
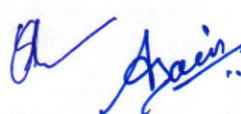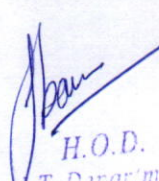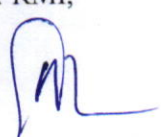
Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent. Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

Module IV

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault tolerant services, highly available services, Transactions with replicated data

Module V

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

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Reference Books:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design",Pearson Ed.
3. Ramakrishna,Gehrke," Database Management Systems", Mc Grawhill
4. Tenanuanbaum, Steen," Distributed Systems", PHI
5. Gerald Tel, "Distributed Algorithms", Cambridge University Pres Gerald Tel,"Distributed Algorithms", Cambridge University Press

Course Outcomes:

CO1: To familiarize with Characterization of Distributed Systems, System Models and Theoretical Foundation for Distributed System.

CO2: To understand Distributed Deadlock Detection, Distributed Mutual Exclusion and Agreement Protocols.

CO3: To understand Distributed Objects and Remote Invocation, Security and Distributed File Systems.

CO4: To get exposure to Transactions and Concurrency Control in Distributed Transactions.

CO5: To understand Distributed Algorithms and CORBA.

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IT73	Information & CyberSecurity	70	20	10	30	20	150	3	-	2	4

Module I

Basic of Cryptography, secret key cryptography, Types of attack, Substitution ciphers, Transposition ciphers, block ciphers and steam ciphers, Confusion and Diffusion, Data encryption standard, round function, modes of operation, cryptanalysis, brute force attack, Security Goals (Confidentiality, Integrity, Availability).

Module II

Public key Cryptography, Modulo arithmetic, Greatest common divisor, Euclidean algorithm, RSA algorithm, hash function, attack on collision resistance, Diffie hellman key exchange, Digital signature standard, elliptic curve cryptography.

Module III

Authentication: One way Authentication, password based, certificate based, Mutual Authentication ,shared secret based, Asymmetric based, Authentication and key agreement, centralized Authentication, eavesdropping, Kerberos, IP security overview:- security association & Encapsulating security payload ,tunnel and transfer modes, internet key exchange protocol, Secure Socket Layer(SSL), Transport Layer Security (TLS).

Module IV

Software vulnerabilities:Phishing Attacks, buffer overflow vulnerability, Format String attack, Cross Site Scripting, SQL injection Attacks, Email security:- Security services of E- mail ,Establishing keys, Privacy ,Authentication of the source, Message integrity ,Non-Repudiation, Viruses, Worms, Malware.

Module V

Web Issue: Introduction, Uniform Resource Locator/uniform resource identify, HTTP, Cookies, Web security problem, Penetration Testing, Firewalls:- functionality, Polices and Access Control, Packet filters, Application level gateway, Encrypted tunnel, Security architecture, Introduction to intrusion detection system.

References Books:

- Bernard Menezes, " Network Security and Cryptography", CENGAGE Learning.
- Charlie Kaufman, " Network Security", PHI.
- Forouzan, "Cryptography & Network Security",
- TMH Randy Weaver, " Network Infrastructure Security", Cengage Learning.
- Atual Kahate, " Cryptography and Network Security", TMH.
- William Stalling, " Cryptography and Network security", Pearson.

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List of Experiments:

1. Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.
2. System threat attacks - Denial of Services.
3. Sniffing and Spoofing.
4. Web Based Password Capturing.
5. Virus and Trojans.
6. Anti-Intrusion Technique - Honey pot.
7. Symmetric Encryption Scheme - RC4.
8. Block Cipher-S-DES, 3-DES.
9. Asymmetric Encryption Scheme - RSA.
10. IP based Authentication.

Course Outcomes:

CO1: To give overview of cryptography and DES.
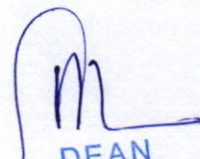
CO2: To understand various cryptography algorithms.

CO3: To familiarize with the different authentication techniques.

CO4: To introduce various software vulnerabilities.

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IT64	DATA MINING	70	20	10	30	20	150	3	-	2	4

Module I
DATA WAREHOUSING: 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.

Module II
BUSINESS ANALYSIS: Reporting and Query tools and Applications ,Tool Categories,
The Need for Applications , Cognos Impromptu, Online Analytical Processing (OLAP) ,Need, Multidimensional Data Model ,OLAP Guidelines, Multidimensional versus Multirelational OLAP , Categories of Tools, OLAP Tools and the Internet.
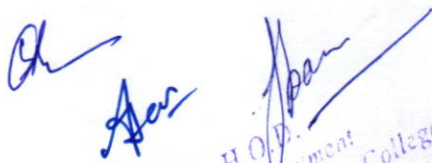
Module III
DATA MINING: Introduction, Data, Types of Data, Data Mining Functionalities, Interestingness of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives,
Integration of a Data Mining System with a Data Warehouse , Issues Data Preprocessing.

Module IV
ASSOCIATION RULE MINING AND CLASSIFICATION: Mining Frequent
Patterns, Associations and Correlations , Mining Methods , Mining Various Kinds of Association Rules , Correlation Analysis , Constraint Based Association Mining , Classification and Prediction - Basic Concepts, Decision Tree Induction , Bayesian Classification , Rule Based Classification, Classification by Backpropagation , Support Vector Machines , Associative Classification , Lazy Learners , Other Classification Methods, Prediction

Module V
CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING:
Cluster Analysis , Types of Data , Categorization of Major Clustering Methods , Kmeans , Partitioning Methods , Hierarchical Methods , Density-Based Methods ,Grid Based Methods , Model Based Clustering Methods , Clustering High Dimensional Data , Constraint, Based Cluster Analysis , Outlier Analysis , Data Mining Applications.

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Text Books:

1. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata McGraw –Hill Edition, Tenth Reprint 2007.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Elsevier, 2007.

Reference Books:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction To Data Mining", Person Education, 2007.K.P.
2. Soman, Shyam Diwakar and V. Ajay ", Insight into Data miningTheory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, " Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

Course Outcomes:

CO1: To introduce with data warehousing components.

CO2: To familiarize with data mining and integration with a data warehousing.
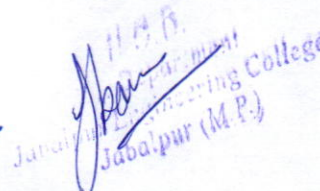
CO3: To understand association rules and its classifications.
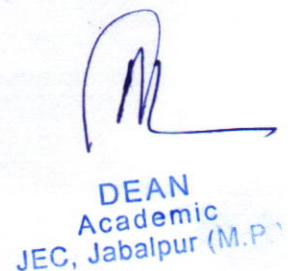
CO4: To introduce various software vulnerabilities.

Experiment List

1. Evolution of data management technologies, introduction to data warehousing concepts.
2. Develop an application to implement defining subject area, design of fact dimension table, data mart.
3. Develop an application to implement OLAP, roll up, drill down, slice and dice operation
4. Develop an application to construct a multidimensional data.
5. Develop an application to implement data generalization and summarization technique.
6. Develop an application to extract association rule of data mining.
7. Develop an application for classification of data.
8. Develop an application for one clustering technique
9. Develop an application for Naïve Bayes classifier.
10. Develop an application for decision tree.

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IT63	Network Management	70	20	10	30	20	150	3	-	2	4

Module I

Protocols and architecture, Protocols, Characteristics, Functions, Need for multiple protocols, Conceptual layers of multiple protocol software, Protocol layering principles, Multiplexing and Demultiplexing.

Module II

Internet Protocol , Virtual network , Internet architecture and philosophy , Purpose of the internet protocol , Internet diagram , Routing in an internet , table driven IP internet , IP routing algorithm , Internet control message protocols (ICMP) , Internet protocol version 6 , Features , Format , Source routing , Options , address space assignment , User data gram protocol , Format of UDP messages , UDP encapsulation and protocol layering.

Module III
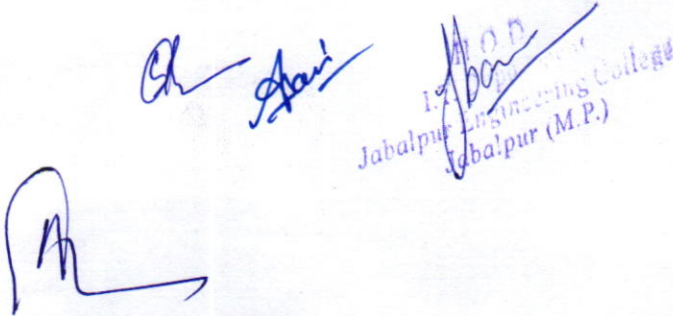
Introduction, layering, OSI Layering, TCP/IP Layering, Protocols & Standards, Internet standards, Internet administration, Internet Addresses, Internet protocol: introduction, IP header, IP routing, subnet addressing, subnet mask, special case of IP addresses, Comparative Study of IPV4 & IPV6, port numbers Address Resolution Protocol, ARP packet format, Proxy ARP, ARP command, ARP Example, Reverse Address Resolution Protocol (RARP): Introduction, RARP Packet format, RARP Examples, RARP server design

Module IV

Delivery and Routing of IP Packets, Routing Methods, Static versus Dynamic Routing, Routing table and Routing Module, Classless Addressing: CIDR. Internet Protocol (IP), Datagram, Fragmentation, Options, IP Package. Interior and Exterior Routing, Routing information protocol (RIP), Open shortest path first protocol (OSPF), BGP, GGP. Private Networks. Virtual Private Network (VPN), Network Address Translation (NAT).

Module V

Configuration management, Configuration management functions, Inventory managements, Network topology services, Order processing and provisioning, Charge management directory services. Fault management, Processes and procedure, Fault management functions, Performance management, Security management, accuracy management, Network capacity planning.

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Reference Books:

1. Forouzan, TCP/IP," Protocol Suite ",4th edition, TMH
2. J.Richard Burkey," Network Management Concept and Practice", PHI
3. Stevens," TCP/IP Illustrated Volume-I", Pearson
4. Tittel: TCP/IP, Cenage Learning
5. Uyless Black, "TCP/IP and related protocols," McGraw Hill.
6. Doughals E. Comer," Internetworking with TCP/IP Vol. I, Principles,Protocols, and Architecture", PHI, India

Course Outcomes:

CO1: To discuss protocol layering principle and various standard architectures.

CO2: To understand TCP/IP supportive various protocols.

CO3: To compare various routing methods.

CO4: To give overview of configuration management, performance management, accuracy and security management.

List of experiments (please expand it):

1. To implement date and time display from local host to server using TCP
2. To write a client-server application for chat using TCP
3. To implementation of echo client server using TCP/IP
4. To write a C program to develop a DNS client server to resolve the given Hostname.
5. To write a client-server application for chat using UDP
6. To implement programs using raw sockets (like packet capturing and filtering)
7. To write a C program to perform sliding window.
8. To get the MAC or Physical address of the system using Address Resolution Protocol.
9. To simulate the Implementing Routing Protocols using border gateway protocol(BGP)
10. To simulate the OPEN SHORTEST PATH FIRST routing protocol based On the cost assigned to the path.

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		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT81B	Natural Language Processing	70	20	10	-	-	100	3	1	-	4

Module I

Introduction: Origins and challenges of NLP - Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata - English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

Module II

Word Level Analysis: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff - Word Classes. Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Midden-Markov and Maximum Entropy models.

Module III

Context-Free Grammars: Grammar rules for English, Treebanks, Normal Forms for grammar - Dependency Grammar - Syntactic Parsing, Ambiguity, .Dynamic Programming parsing - Shallow parsing - Probabilistic CFG, Probabilistic CYK, Probabilistic LexicaJired CFGs - Feature structures, Unification of feature structures.

Module IV

Semantics and Pragmatics : Requirements for representation, First-Order Logic, Description Logics - Syntax-Driven Semantic analysis, Semantic attachments - Word Senses, Relations between Senses, Thematic Roles, selectional restrictions.- Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods - Word Similarity using Thesaurus and Distributional methods.

Module V

Application of NLP: intelligent work processors: Machine translation, user interfaces. Man-Machine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP.

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Reference Books:

1. Breck.Baldwin, -Language Processing with Java and LingPipe Cookbook, Atlamie Publisher, 2015.
2. Richard M Reese, -Natural Language Processing with Java, OReiliy Media, 2015.
3. Nitin Indurkhya and Fred J. Damerau, -Handbook of Natural Language Processing, second Edition, chapman and Hall/cRC press, zol0.
4. Tanveer Siddiqui, U.S. Tiwary. -Natural Language Processing and Information Retrieval, Oxford University press, 2 00 g.

Course Outcomes:

CO1: To familiarize with Origins and challenges of NLP, English Morphology and Edit Distance.

CO2: To understand Word Level Analysis Markov models and Part-of-Speech Tagging.

CO3: To understand Context-Free Grammars Syntactic Parsing and CFG.

CO4: To get exposure to Semantics and pragmatics inNl.p.

CO5: To understand application of NLP like intelligent work processors: Machine translation.

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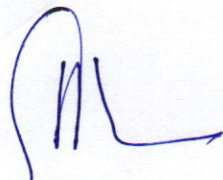
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Subject Code	Subject Name and Title	Maximum Marks Allotted					Total	Hours/Week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT81C	Sensor Networks	70	20	10	-	-	100	3	1	-	4

Module I
Basics of Wireless Sensors and Applications, The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, clustering of Sensors, Applications

Module II
Data Retrieval in Sensor Networks, Classification of WSNs, MAC Layer, Routing Layer, High Level Application Layer Support, Adapting to the Inherent Dynamic Nature of WSNs.

Module III
Sensor Network Platforms and Tools, Sensor Network Hardware, Sensor Network Programming Challenges, Node-Level Software Platforms.

Module IV
Operating System: TinyOS, Imperative Language: nesC, Dataflow Style Language: TinyGALS, Node-Level Simulators, ns-2 and its Sensor Network Extension, TOSSIM.

Module V
Sensor Network Databases: Challenges, Query Interfaces, High level Database Organization, In-Network Aggregation, Data-centric Storage, Temporal Data

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Text Books :

1. Wireless SensorNetworks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science Imprint, Morgan Kauffrnan Publishers, 2005,rp2009.

Reference Books:
1. Adhoc Wireless Networks: Architectures and Protocols, C.Siva Ram Murthy, B.S.Murthy, Pearson Education, 2004
2. Wireless Sensor Networks: Principles and Practice, Fei Hu, Xiaojun Cao, An Auerbach Book, CRC Press, Taylor & Francis Group, 2010
3. Wireless Ad hoc Mobile Wireless Networks: Principles, Protocols and Applications, Subir Kumar Sarkar et al., Auerbach Publications, Taylor & Francis Group, 2008.
4. Wireless Sensor Networks: Signal Processing and Communications Perspectives, Ananthram Swami et al., Wiley India, 2007,rp2009.

Course Outcomes:

CO1: To familiarize with Basics of Wireless Sensors, clustering and Applications.

CO2 To understand Data Retrieval in Sensor Networks and classification.

CO3: To Sensor Network Platforms and Tools .

CO4: To get exposure to query Operating systems and Dataflow Style Language.

CO5: To understand Sensor Network Databases

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		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT75	Internet of Things	70	20	10	30	20	150	3	-	2	4

Module I
Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view,Physical design of IOT, Logical design of IOT, Application of IOT.

Module II
Machine-to-machine (M2M), SDN (software defined networking) and NFV(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.

Module III
Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, [P addressing in IOT,Media Access control.

Module IV
Sensor Technology , Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, Wireless Sensor Network Technology.

Module V
IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions, Raspberry Pi & arduino devices. IOT Case studies: smartcity streetlights control & monitoring.

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Reference Books:

1. Rajkamal,"Intemet of Things",Tata McGraw Hill publication
2. Vrjay Madisetti and Arshdeep Bahga, "Intemet of things(A-Hand-on-Approach)" ist Edition ,UniversalPress.
3. Hakima Chaouchi "The Intemet of Things: Connecting Objects", Wiley publication.
4. Charless Bell "MySQL for the Intemet of things", Apress publications.
5. Francis dacosta "Rethinking the Intemet ofthings:A scalable Approach to connecting everything", 1stedition, Apress publications 2013 '
6. Donald Norris"The Intemet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi andBeagleBone Black", McGraw Hill publication.

List of Experiments:

1. Excercise on Eclipse IoT Project.
2. Experiments on few Eclipse IoT Projects.
3. Any Experiment on architecture of lot Toolkit.
4. Exercise on smart object API Gateway service reference implementation in IoT Toolkit.
5. Experiment on HTTP-to-CoAP semantic mapping Proxy in IoT Toolkit.
6. Experiment o nent on Gate way as a service deployment in IoT Toolkit.
7. Experiment on application framework and embedded software agents for IoT Toolkit.
8. Excercise on working principle of Rasberry Pi.
9. Experiment on connectivity of Rasberry Pi with existing system components.

Course Outcomes:

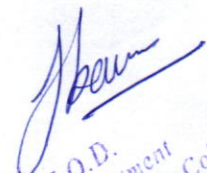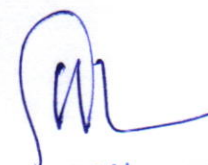CO1: To familiarize with Internet of things and their applications.

CO2: To understand M2M, SDN and NFV along with cloud based IOT models.

CO3: To understand various design principles like SOAP, REST.

CO4: To get exposure to sensor technology.

CO5: To understand IOT design methodology and IOT case studies.

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		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT82B	Image Processing and GIS	70	20	10	-	-	100	3	1	-	4

Module I

Introduction and fundamentals Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.Image Enhancement in Spatial Domain Introduction; Basic Gray Level Functions - Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations - Image Subtraction, image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening - The Laplacian.

Module II

Image Enhancement in Frequency Domain Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters - Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters - Gaussian Low-pass Filters; Sharpening Frequency Domain Filters - Gaussian High-pass Filters; Homomorphic Filtering.
Image Restoration A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering - Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters - Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering - Bandpass Filters; Minimum Mean-square Error Restoration.

Module III

Color Image Processing Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.
Morphological Image Processing Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms - Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening.

Module IV

Registration Introduction, Geometric Transformation - Plane to Plane transformation, Mapping, Stereo Imaging- Algorithms to Establish Correspondence, Algorithms to Recover Depth
Segmentation, Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Threshotding, Edge Detector Performance, Line Detection, Corner Detection.

Module V

Feature Extraction Representation, Topological Attributes, Geometric Attributes Description, Boundary-based Description, Region-based Description, Relationship.Object recognition Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

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Reference Books:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
2. 2-.DigitalImage Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
3. 3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.
4. 4.Digital Image Processing by A.K. Jain, 1995,-PHI

Course Outcomes:

CO1: To Introduce fundamentals of IP, applications and components of Image Processing

System along with Image Enhancement in Spatial Domain

CO2: Image Enhancement in Frequency Domain and Image Restoration process and models.

CO3: To understand Color Image Processing and Morphological Image Processing

CO4: To get exposure to Geometric Transformation, Segmentation and

CO5: To understand Feature Extraction and Description, Object Recognition.

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		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT82C	Computer Vision	70	20	10	-	-	100	3	1	-	4

Module I

Introduction to computer vision Human vision linage Formation and understanding, pixel- and color transform, classical filtering operations, histogram operations, thresholding techniques, edge detection, techniques, .o-", and interest point, Introduction to computer vision.

Module II

Feature Detection and matching: Introduction to Feature Representation, color histogram analysis, color moments, texture analysis, Harris detector, Feature descriptors, SIFT, image Matching, Feature distance, euclidean distance feature and dimensionality reduction, principal component analysis.

Module III

Shape and Region Analysis: Binary shape analysis, connectedness, object labeling and counting, size filtering, skeletons and thinning, deformable shape analysis, boundary tracking procedures, shape models and shape recognition, boundary length measures, boundary descriptors, chain codes, Fourier descriptors, region descriptors.

Module IV

Image Retrieval: Introduction to Classification and learning techniques, k nearest neighbor, support vector machines, use in Image Retrieval for applications. Accuracy Measurements (Precision, Recall, Sensitivity and Specificity) and Cross Validation Models. Introduction to 3D Vision and Motion.

Module V

Application and Research in Computer Vision: Object Detection, Photo album, Face detection, Face recognition, Eigen faces, Active appearance and 3D shape models of faces Application: Surveillance, foreground-background separation, particle filters, combining views from multiple cameras, human gait, analysis Application : In-vehicle vision system: locating road way road marking - identifying road signs - locating pedestrians.

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Reference Books:

1. Simon J. D. Prince, "Computer Vision: Models, Leaming, ffid Inference", Cambridge University press, 2012.
2. MarkNixon and Alberto S. Aquado, "Feature Extraction & Image Processing for Computer Vision", Third Edition, Academic press, 2012.
3. D. L. Baggio et al "Mastering OpenCV with Practical Computer Vision Projects", Packt publishing, 2012.
4. Jan Erik Solem, "Programming Computer Vision with Python: Tools and algorithms for analyzing images", O'Reilly Media, 2012.

Course Outcomes:

CO1: To introduce Computer vision similarity with Human Vision.

CO2: To understand Feature Detection andMatching.

CO3: To understand Shape and Region Analysis.

CO4: To get exposure to Image Retrieval.

CO5: To understand application and Research in Computer Vision

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