



TULSIRAMJI GAIKWAD-PATIL
College of Engineering & Technology

Mohgaon, Wardha Road, Nagpur - 441 108



DEPARTMENT OF INFORMATION TECHNOLOGY

Teaching Scheme & Syllabus

From

Academic Year 2023-24

Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

SCHEME OF INSTRUCTION & SYLLABI

Programme: Information Technology

Scheme of Instructions: Third Year B.Tech. Information Technology

Semester – V

Sr. No.	Course Category	CourseCode	Course Title	L	T	P	Contact Hrs./Wk	Credits	EXAM SCHEME				
									CT1	CT2	TA/CA	ESE	TOTAL
1	PCC	BIT3501	System Programming	3	-	-	3	3	15	15	10	60	100
2	PCC	BIT3502	Computer Graphics	3	-	-	3	3	15	15	10	60	100
3	PCC	BIT3503	Theory of Computation	3	-	-	3	3	15	15	10	60	100
4	PCC	BIT3504	Computer Graphics Lab	-	-	2	2	1	-	-	25	25	50
5	PCC	BIT3505	Computer Lab-II (Mobile Application Development with Python Lab)	-	-	2	2	1	-	-	25	25	50
6	PROJ	BIT3506	Micro Project	-	-	2	2	1			25	25	50
7	PEC	BIT3507-10*	Program Elective-I	3	-	-	3	3	15	15	10	60	100
8	PEC	BIT3511-14*	Program Elective-II	3	-	-	3	3	15	15	10	60	100
9	OEC	B\$\$\$XX01-16#	Open Elective-I	4	-	-	4	4	15	15	10	60	100
10	MCC	BAU3505	Heritage	2	-	-	2	Audit	-	-	-	-	-
Total				21	-	6	27	22	90	90	135	435	750

L- Lecture T-Tutorial P-Practical CT1- Class Test 1 CT2- Class Test 2 TA/CA- Teacher Assessment/Continuous Assessment
ESE- End Semester Examination (For Laboratory End Semester performance)


* Indicates out of the four course codes each student has to select any one PEC from the list provided at the end of structure.

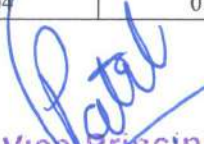
Indicates out of the 16 course codes each student has to select any one OEC except BITXX03 & BITXX04 from the list provided at the end of structure.


Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	Project / Seminar / Industrial Training	MCC (Mandatory Courses)
Credits	--	--	-	11	06	04	01	Yes
Cumulative Sum	9	25	23	33	06	04	01	--

PROGRESSIVE TOTAL CREDITS :79+22 =101


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Program: Information Technology
**List of Electives offered by Information
 Technology Department**

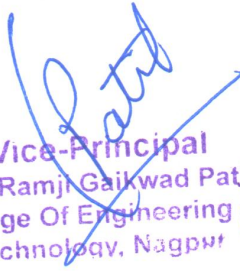
Semester-V			
Course Code	Program Elective- I	Course Code	Program Elective- II
BIT3507	TCP/IP	BIT3511	Computer Architecture and Digital Systems
BIT3508	Distributed and Object Oriented Databases	BIT3512	Fuzzy System and Neural Network
BIT3509	Data Science	BIT3513	Distributed Operating Systems
BIT3510	Enterprise Resource Planning	BIT3514	Computer Vision


List of Open Electives Offered




Sr. No.	Name of Host Programme	Open Elective Course Code	Title of the Course
1.	Computer Science & Engineering	BCSXX01	Cyber Law and Ethics
2.	Computer Science & Engineering	BCSXX02	Blockchain Technology
3.	Information Technology	BITXX03	Cyber Security
4.	Information Technology	BITXX04	Artificial Intelligence
5.	Electronics and Communication Engineering	BECXX05	Internet of Things
6.	Electronics and Communication Engineering	BECXX06	Embedded Systems
7.	Civil Engineering	BCEXX07	Introduction to Art and Aesthetics
8.	Civil Engineering	BCEXX08	Metro Systems and Engineering
9.	Mechanical Engineering	BMEXX09	Nanotechnology and Surface Engineering
10.	Mechanical Engineering	BMEXX10	Automobile Engineering
11.	Electrical Engineering	BEEXX11	Power Plant Engineering
12.	Electrical Engineering	BEEXX12	Electrical Materials
13.	Aeronautical Engineering	BAEXX13	Avionics
14.	Aeronautical Engineering	BAEXX14	Unmanned Aerial Vehicles
15.	Biotechnology	BBTXX15	Biomaterials
16.	Biotechnology	BBTXX16	Food and Nutrition Technology


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Program: B. Tech. Information Technology								
Semester		Course Code	Name of Course	L	T	P	Credits	
V		BIT3501	System Programming	3	-	-	3	
Teaching Scheme						Examination Scheme		
Theory	3 Hrs/week	CT-I				15 Marks		
Tutorial	-	CT-II				15 Marks		
Total Credits	3	CA				10 Marks		
Duration of ESE: 3Hrs		ESE				60 Marks		
Pre-Requisites: Data structure , Operating Systems								
Course Contents								

Unit I	Evolution of components of programming system, Overview, Functions and Facilities, Goals of System software, Views of System Software, Virtual machine. General machine structure IBM 360/370, Machine Language Assembly language
Unit II	Design of Pass-I and Pass-II Assemblers, Table Processing, Searching and Sorting, Problems based on symbol table, Base table and Literal table generation, Machine code generation and Searching and sorting.
Unit III	Macro instruction, Features of Macro facility, Implementation of 1-Pass, 2-Pass Macro processor, Macro calls within macro, macro definition within macros.
Unit IV	Different Loading Schemes, Binders, Overlays, Linking loaders, Design of absolute loaders, Design of Direct Linking loaders
Unit V	Phases of Compiler, Cross Compiler, Bootstrapping, Errors in each phases, Compiler writing tools, Lex and YACC, Databases used in Compilation process. Introduction to Device drivers, Driver installation with example,.

Text Books


T.1	J. J. Donovan; System Programming; TMH, 2012
T.2	D.M. Dhamdhare; System Programming; THM; 2011 George Pajari; Eriting Unix Device Drivers; Pearson Education; 2011

Reference Books

R.1	Leland Beck, D. Manjula; System Software; An Introduction to System Programming; Pearson Education; 2013
R.2	Alfred Aho, J. Ullman; Principles of Compiler Design; Narosa Pub. 2010

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3501.1	Demonstrate to understand system software, operating system and IBM 360 Machine in detail.	3	9	-
BIT3501.2	Design of assembler, searching and sorting concepts.	6	9	-
BIT3501.3	Determine various Macro Language and Macro Processor along with its features and implementation.	5	9	-
BIT3501.4	Categorize different loading schemes along with the design and details of linkers.	4	9	-
BIT3501.5	Differentiate different phases of compiler and the concepts related to compiler like cross Compiler, bootstrapping, lex and YACC, Databases used in Compilation process.	3	9	-


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Program: B. Tech. Information Technology

Semester		Course Code	Name of Course	L	T	P	Credits
V		BIT3502	Computer Graphics	3	-	-	3
Teaching Scheme					Examination Scheme		
Theory	3 Hrs/week	CT-I			15 Marks		
Tutorial	-	CT-II			15 Marks		
Total Credits	3	CA			10 Marks		
Duration of ESE: 3Hrs		ESE			60 Marks		
Pre-Requisites: Data Structure, Mathematics							
Course Contents							


Unit I	Geometry and line generation: points, lines, planes, pixels and frames buffers, types of display devices and its architecture DDA and Bresenham's algorithms for line generation, Bresenham's algorithm for circle generation, aliasing, anti-aliasing and its techniques.
Unit II	Display files, algorithms for polygon generation, polygon filling algorithms, NDC (normalized device co-ordinates), 2D transformations: scaling, rotation, translation, rotation about arbitrary point, reflections, shearing.
Unit III	Review of 3D vector algebra - parallel and perspective projections and transformation - hidden line/ surface elimination - shading and rendering - ray tracing techniques. Hidden surfaces and line removal: Painter's, Z-buffer, Warnock's, Back-face Removal algorithm
Unit IV	Segment tables: Operations on segments, data structures for segments and display files, Windowing and clipping: window, viewport, viewing transformations, clipping, line and Polygon clipping.
Unit V	Curve generation - cubic splines, Beziers, blending of curves- other interpolation techniques, Displaying Curves and Surfaces, Shape description requirement, parametric function.

Text Books



T.1	Procedural elements for computer graphics by David F. Rogers, Mc-Graw Hill.
T.2	Computer Graphics 'C' Version, Second Edition By Donald Hearn and M.Pauline Baker, Pearson publication
T.3	Computer Graphics A Mathematical Approach, Publisher: Sai Jyoti Publication
Reference Books	
R.1	Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition, Pearson Education, 2004.
R.2	F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3502.1	Demonstrate the concepts of Geometry and line generation	3	9	2
BIT3502.2	Determine Graphics primitives and 2D transformations	4	9	2
BIT3502.3	Understanding the concepts of Segment tables and Windowing and clipping	2	9	2
BIT3502.4	Produce 3D Graphics, Hidden surfaces and line removal	2	9	2
BIT3502.5	Illustrate the concepts of Curves, surfaces and surface rendering methods	5	9	2


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Program: B. Tech. Information Technology								
Semester		Course Code	Name of Course	L	T	P	Credits	
V		BIT3503	Theory of Computation	3	-	-	3	
Teaching Scheme						Examination Scheme		
Theory	3 Hrs/week	CT-I				15 Marks		
Tutorial	-	CT-II				15 Marks		
Total Credits	3	CA				10 Marks		
Duration of ESE: 3Hrs		ESE				60 Marks		
Pre-Requisites: Discrete Mathematics, Data Structure, Algorithm								
Course Contents								

Unit I	Introduction: String, Alphabet, Symbols, Sets, Language, Finite Automata: Design of Finite Automata, Acceptance of strings and languages, Deterministic Finite Automation , Non-Deterministic Finite Automation, Equivalence between NFA and DFA , NFA with ϵ - transition, Minimization of FA, Equivalence between two FSM's Moore and Mealy machines, Chomsky hierarchy.
Unit II	Regular sets, Regular expressions, Manipulation of regular expressions, Equivalence between RE and FA. Pumping Lemma for regular languages, closure properties of regular sets, properties of regular languages, Chomsky hierarchy of languages, Regular grammars, Right linear and left linear regular grammars, Equivalence between regular grammar and FA, Inter conversion between RE and RG.
Unit III	Context free grammar, Derivation trees (Parse tree), Syntax tree , Ambiguous Grammar, Context Free Language (CFL), Closure properties of CFL, Simplification of CFG, Normal Forms of grammar: Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Push down automata, definition and model, acceptance of CFL by empty Stack and by final state, Introduction of DCFL and DPDA.
Unit IV	Turing machine, Definition, Model of TM, Design of Turing Machine, Computable functions, Recursive enumerable language, Recursive Language, Properties of Recursive enumerable language, Variants of Turing machines, non-deterministic TMs and equivalence with deterministic TMs, context sensitive language (CSG), Linear bounded automata.
Unit V	Decidability and Undecidability of problems, Properties of recursive & recursively enumerable languages, Halting problems, Post correspondence problem, Ackerman function, and Church's hypothesis. Recursive function.



Text Books	
T.1	Introduction to Automata Theory, Languages and computation, 2nd edition, 2000 by John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Pearson Education Asia.
T.2	Introduction to Languages and the theory of Automata by John Martin, Third Edition (TMH)
Reference Books	
R.1	Theory of Computer Science, Automata, Languages and Computation by K. L. P. Mishra and N. Chandrasekaran, Third Edition, PHI Learning.
R.2	Theory of Computation, edition 2008, O.G. Kakde, USP

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3503.1	Apply basic properties of formal languages to construct Finite automata.	3	9	-
BIT3503.2	Design Finite Automata's for different Regular Expressions and Languages.	5	9	-
BIT3503.3	Compare different types of grammar & Test the equivalence of pushdown automata and CFL.	5	9	-
BIT3503.4	Create a computational model using Turing machine for the given problem.	6	9	-
BIT3503.5	Demonstrate basic concept of undecidability, post Correspondence problem & Recursive enumerable language	3	9	-


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Program: B. Tech Information Technology

Semester	Course Code	Name of Course	L	T	P	Credits
V	BIT3504	Computer Graphics Lab	-	-	2	1
Teaching Scheme					Examination Scheme	
Practical	2 Hrs/week				CT-I	-
Tutorial	-				CT-II	-
Total Credits	1				CA	25 Marks
					ESE	25 Marks

Pre-Requisites: Data Structure, Mathematics

Sr. No.	List of Experiment
1	Design an application program to draw circle, rectangle, ellipse and line using simple graphics concept
2	Implement application program to draw the line using digital differential Analyzer
3	Write an application program to draw a line using Bresenham's Line drawing algorithm.
4	Generate an application program to implement Scan Fill algorithm for Polygon Filling
5	Write a program for 2-D Transformation [Translation, Rotation, and Scaling].
6	Demonstrate a program using 3D translation transformation
7	Show and Implement an algorithm for character generation
8	Design a program to draw a home using simple graphics concept
9	Write a program to draw a smiling face which appear random position on screen.
10	Write a program to draw a smiling face which appear random position on screen.

Text Books

1	Computer graphics principles and practice in C by Foley, Vandam, Feiner and Huges (Pearson)
2	Computer Graphics 'C' Version, Second Edition By Donald Hearn and M.Pauline Baker, Pearson

Reference Books

1	Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition, Pearson Education, 2004.
2	F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003

	Course Outcomes	CL	Lab Sessions
BIT3504.1	Demonstrate the concepts of Geometry and line generation	3	2
BIT3504.2	Determine Graphics primitives and 2D transformations	4	2
BIT3504.3	Understanding the concepts of Segment tables and Windowing and clipping	2	2
BIT3504.4	Produce 3D Graphics, Hidden surfaces and line removal	2	2
BIT3504.5	Illustrate the concepts of Curves, surfaces and surface rendering methods	5	2





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Program: B. Tech Information Technology

Semester	Course Code	Name of Course	L	T	P	Credits
V	BIT3505	Computer Lab-II (Mobile Application Development with Python Lab)	-	-	2	1
Teaching Scheme					Examination Scheme	
Practical	2 Hrs/week				CT-I	-
Tutorial	-				CT-II	-
Total Credits	1				CA	25 Marks
					ESE	25 Marks

Pre-Requisites: Operating System and Internet programming

Sr. No.	List of Experiment
1	Develop an application that uses GUI components, Font and Colours
2	Develop an application that uses Layout Managers and event listeners
3	Develop a native calculator application.
4	Write an application that draws basic graphical primitives on the screen.
5	Develop an application that makes use of database
6	Develop an application that makes use of RSS Feed.
7	Implement an application that implements Multi threading
8	Develop a native application that uses GPS location information.
9	Implement an application that writes data to the SD card.
10	Implement an application that creates an alert upon receiving a message.

Text Books

1	Morris Mano : " An approach to digital Design", Pearson Publications.
2	Xamarin Mobile Application Development: Cross-Platform C# and Xamarin.Forms Fundamentals 1st

Reference Books

1	Mobile Applications Development: with Python in Kivy Framework (de Gruyter Stem)
2	Learn Java for Android Development: Migrating Java SE Programming Skills to Mobile Development 4th



	Course Outcomes	CL	Lab Sessions
BIT2306.1	Show the components and structure of mobile application development frameworks for Android and windows OS based mobiles	3	2
BIT2306.2	Understand how to work with various mobile application development frameworks.	2	2
BIT2306.3	Learn the basic and important design concepts and issues of development of mobile applications.	3	2
BIT2306.4	Examine the concept of RS and multi-threading	4	2
BIT2306.5	Integrate the architecture and use of microprocessor for basic operations and Simulate using simulation software.	4	2



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Program: B. Tech. Information Technology							
Semester	Course Code	Name of Course	L	T	P	Credits	
V	BIT3507	TCP/IP(Program Elective-I)	3	-	-	3	
Teaching Scheme			Examination Scheme				
Theory	3 Hrs/week				CT-I	15 Marks	
Tutorial	-				CT-II	15 Marks	
Total Credits	3				CA	10 Marks	
Duration of ESE: 3Hrs					ESE	60 Marks	
Pre-Requisites: Computer Network							
Course Contents							

Unit I	Network Models: Layered Tasks, The OSI Model, Layers in OSI Model, TCP/IP protocol suite, Addressing, Connecting devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three Layer Switches, Gateway, Backbone Networks.
Unit II	Internetworking Concepts: Principles of Internetworking, Connectionless Interconnection, Application Level Interconnection, Network Level Interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Routers TCP, UDP & IP: TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control, Process to Process Communication, IP Addressing.
Unit III	Congestion and Quality of Service: Data Traffic, Congestion, Congestion Control, Congestion Control in TCP, Congestion Control in Frame Relay, Source Based Congestion Avoidance, DEC Bit Scheme, Quality of Service, Techniques to Improve QOS: Scheduling, Traffic Shaping, Admission Control, Resource Reservation, Integrated Services and Differentiated Services.
Unit IV	Queue Management: Concepts of Buffer Management, Drop Tail, Drop Front, Random Drop, Passive Buffer Management Schemes, Drawbacks of PQM, Active Queue Management: Early Random Drop, RED Algorithm.
Unit V	Stream Control Transmission Protocol: SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, Congestion Control. Mobile Network Layer: Entities and Terminology, IP Packet Delivery, Agents, Addressing, Agent Discovery, Registration; Tunneling and Encapsulating, Inefficiency in Mobile IP. Mobile Transport Layer : Classical TCP Improvements, Indirect TCP, Snooping TCP, Mobile TCP.

Text Books	
T.1	Behrouz A Forouzan, "TCP/IP Protocol Suite", TMH, 3rd Edition
T.2	B.A. Forouzan, "Data communication & Networking", TMH, 4th Edition.
Reference Books	
R.1	MahbubHasan& Raj Jain, " High performance TCP/IP Networking", PHI -2005
R.2	Douglas. E.Comer, "Internetworking with TCP/IP ", Volume I PHI
R.3	JochenSchiiler, "Mobile Communications", Pearson, 2nd Edition.

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3507.1	Implement the Network Models	3	9	-
BIT3507.2	Analyze the internetworking concepts with the use of TCP and UDP.	4	9	-
BIT3507.3	Evaluate the congestion and quality of service.	5	9	-
BIT3507.4	Apply the Queue Management.	3	9	-
BIT3507.5	Analyze the Stream Control Transmission Protocol.	4	9	-





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Semester	Course Code	Name of Course	L	T	P	Credits
V	BIT3508	Distributed and Object-Oriented Databases (Program Elective-I)	3	-	-	3

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	CT-I	15 Marks
Tutorial	-	CT-II	15 Marks
Total Credits	3	CA	10 Marks
Duration of ESE: 3Hrs		ESE	60 Marks

Pre-Requisites: Database management systems, Operating Systems

Course Contents

Unit I	Introduction to Distributed Database, Distributed Database Architectures, Distributed Database Design
Unit II	Distributed Query Processing, Distributed Transaction Management, Distributed Concurrency Control, Reliability of Distributed DBMS and Recovery
Unit III	Data types and Object, Evolution of Object Oriented Concepts, Characteristics of Object Oriented Data Model. Object Hierarchies - Generalization, Specialization, Aggregation. Object Schema. Inter-object Relationships, Similarities and difference between Object Oriented Database model and Other Data models.
Unit IV	The Extended Relational Model Approach. Semantic Database Approach, Object Oriented Programming Language Extension Approach, DBMS Generator Approach, the Object Definition Language and the Object Query Language.
Unit V	The Object Oriented DBMS Architecture, Performance Issue in Object Oriented DBMS, Application Selection for Object Oriented DBMS, the Database Design for an Object Relational DBMS. The Structured Typed and ADTs, Object identity, Extending the ER Model, Storage and Access Methods, Query Processing Query Optimization, Distributed Computing Concept in COM, COBRA.


Text Books

T.1	Principles of Distributed Database Systems; Ozsu, M. Tamer and Patrick Valduriez. Pearson Education.
T.2	Silberschatz, Abraham, Henry F. Korth and S. Sudarshan: Database System Concepts; McGrawHill International Edition
T.3	Peter Rob, Carlos Coronel: Database Systems – Design, Implementation and Management; Course Technology.



Reference Books	
R.1	Object Oriented Database System – Approaches and Architectures ; C.S.R.Prabhu, PHI
R.2	Gerald V. Post: Database Management System – McGraw Hill International Edition.
R.3	R.Cattel: "Object Data management", (1993), Addison-Wesley.

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3508.1	Analyze the fundamental concept and implementation of object oriented	4	9	-
BIT3508.2	Design distributed database systems with focus on data distribution	6	9	-
BIT3508.3	Analyze the query processing	4	9	-
BIT3508.4	Implement the transaction processing	5	9	-
BIT3508.5	Apply the concurrency control and recovery	3	9	-


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Program: B. Tech. Information Technology								
Semester		Course Code	Name of Course		L	T	P	Credits
V		BIT3509	Data Science (Program Elective-I)		3	-	-	3
Teaching Scheme						Examination Scheme		
Theory	3 Hrs/week	CT-I				15 Marks		
Tutorial	-	CT-II				15 Marks		
Total Credits	3	CA				10 Marks		
Duration of ESE: 3Hrs		ESE				60 Marks		
Pre-Requisites: Problem Solving, Data Structures, Mathematics								
Course Contents								

Unit I	Introduction to Data Science: Applications - Data Science Process , Exploratory Data analysis ,Collection of data , Graphical presentation of data , Classification of data ,Storage and retrieval of data ,Big data ,Web Data , Evolution of Analytic Scalability , Analytic Processes and Tools, Analysis vs Reporting ,Modern Data Analytic Tools Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.
Unit II	Data Analysis: Correlation , Regression ,Probability, Conditional Probability, Random Variables , Analysis using Mean, Median, Mode, Standard Deviation, Skewness, Kurtosis-Regression Modeling - Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics
Unit III	Data Mining Techniques: Rule Induction ,Neural Networks: Learning and Generalization , Competitive Learning ,Principal Component Analysis and Neural Networks , Fuzzy Logic: Extracting Fuzzy Models from Data , Fuzzy Decision Trees ,Stochastic Search Methods, Neuro-Fuzzy Modelling, Association rule mining , Clustering , Outlier Analysis ,Sequential Pattern Mining ,Temporal mining ,Spatial mining ,Web mining.
Unit IV	Mining Data Streams: Introduction To Streams Concepts, Stream Data Model and Architecture ,Stream Computing ,Sampling Data in a Stream ,Filtering Streams ,Counting Distinct Elements in a Stream ,Estimating Moments , Counting Oneness in a Window ,Decaying Window ,Real time Analytics Platform(RTAP)
Unit V	Frameworks And Visualization: Map Reduce ,Hadoop, Hive, MapR, ,Sharding ,NoSQL Databases , Cloud databases ,S3 - Hadoop Distributed File Systems ,Visualizations , Visual Data Analysis Techniques , Interaction Techniques ,Social Network Analysis , Collective Inferencing , Egonets , Systems and Applications.

Text Books	
T.1	"Doing Data Science, Straight Talk From The Frontline": Cathy O'neil And Rachel Schutt.. O'reilly. 2014
T.2	"Mining Of Massive Datasets", Anand Rajaraman And Jeff Ullman.
Reference Books	
R.1	"Data Mining And Analysis: Fundamental Concepts And Algorithms.", : Mohammed J. Zaki And Wagner Miera Jr. Cambridge University Press. 2014
R.2	"Data Mining: Concepts And Techniques", : Jiawei Han, Micheline Kamber And Jian Pei. Third Edition. Isbn 0123814790. 2011.
R.3	Data Science From Scratch: First Principles of Python by Joel Grus by O'Reilly, 2019.

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3509.1	Analyze the knowledge and skills in computer science	4	9	-
BIT3509.2	Apply ethical practices in everyday business activities and make well-reasoned ethical business and data management decisions.	3	9	-
BIT3509.3	Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.	3	9	-
BIT3509.4	Apply principles of Data Science to the analysis of business problems.	3	9	-
BIT3509.5	Use data mining software to solve real-world problems and Employ cutting edge tools and technologies to analyze Big Data.	4	9	-





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Program: B. Tech. Information Technology							
Semester	Course Code	Name of Course	L	T	P	Credits	
V	BIT3511	Computer Architecture and Digital System (Program Elective-II)	3	-	-	3	
Teaching Scheme			Examination Scheme				
Theory	3 Hrs/week		CT-I		15 Marks		
Tutorial	-		CT-II		15 Marks		
Total Credits	3		CA		10 Marks		
Duration of ESE: 3Hrs			ESE		60 Marks		
Pre-Requisites: Digital Logic , Operating Systems							
Course Contents							
Unit I	Basic Structure of Computers: Functional Units, Basic Operational Concepts, Bus Structures, Software, Multiprocessors and Multicomputer. Machine Instructions: Memory Locations and Addresses, Memory Operations, Machine program sequencing, addressing modes and encoding of information, Assembly Language ,Stacks, Queues and Subroutine. .						
Unit II	Instruction Sets: Instruction Format, limitations of Short word- length machines, High level language Considerations, Motorola 68000 architecture. Processing Unit: Some fundamental concepts, Execution of a complete instruction, Single, two, three bus organization, Sequencing of control Signals.						
Unit III	Micro-programmed Control: Microinstructions, grouping of control signals, Micro program sequencing, Micro Instructions with next Address field, Perfecting microinstruction, Emulation, Bit Slices, Introduction to Microprogramming, Macro Processor.						
Unit IV	Arithmetic: Number Representation, Addition of Positive numbers, Logic Design for fast adders, Addition and Subtraction, Arithmetic and Branching conditions, Multiplications of positive numbers, Signed Operand multiplication, fast Multiplication, Booth's Algorithm, Integer Division, Floating point numbers and operations.						
Unit V	The Memory System: Some Basic Concepts, Semiconductor RAM Memories, Memory system consideration, Semiconductor ROM Memories, Memory interleaving, Cache Memory, Mapping techniques, Virtual memory, Memory Management requirements. Introduction to RISC & CISC Processors, Introduction to Pipelining.						

Text Books	
T.1	Computer Organization 4 th Edition, 2001 V. Carl Hamacher Mc GrawHill.
T.2	Computer Organization and Design (The Hardware/Software Interfaces) 4th Edition David A. Patterson & John L. Hennessy Morgan Kaufmann.
Reference Books	
R.1	Computer Architecture & Organization : J.P.Hayes, 3rd Edition MGH
R.2	Computer Organization and Architecture: Designing for Performance, William Stallings, 8th

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3511.1	Identify the basic function ,units, various buses and addressing modes	2	9	-
BIT3511.2	Apply fundamental concept for executions and sequencing of control signals	3	9	-
BIT3511.3	Compare Hardwired and Micro Programmed control unit and write the control steps of microprogramming	4	9	-
BIT3511.4	Apply the knowledge of computer arithmetic algorithm and solve the problems	3	9	-
BIT3511.5	Design and implement various memory IC's, evaluation the main memory address.	5	9	-



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Program: B. Tech. Information Technology

Semester	Course Code	Name of Course	L	T	P	Credits
V	BIT3510	Enterprise Resource Planning(Program Elective-I)	3	-	-	3

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	CT-I	15 Marks
Tutorial	-	CT-II	15 Marks
Total Credits	3	CA	10 Marks
Duration of ESE: 3Hrs		ESE	60 Marks

Pre-Requisites: Database Management Systems

Course Contents

Unit I	Introduction to ERP: ERP: An Overview, Enterprise – An Overview, ERP architecture, ERP 2 tier and 3 tier Architecture, Benefits of ERP, Risks of ERP, ERP and Related Technologies, Business Process Reengineering (BPR).
Unit II	Data Warehousing, Data Mining, OLAP, SCM, CRM, ERP Implementation Lifecycle, Implementation Methodology, ERP project Teams, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees,
Unit III	Project Management and Monitoring, Success and Failure Factors of an ERP Implementation, ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, the Changing ERP Market.
Unit IV	ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications.
Unit V	The Business Module: Business Modules of an ERP package, Finance, Manufacturing Human Resources, Plant maintenance, Materials Management, Quality management Sales and Distribution, Case study for Architecture and integration of SAP ERP, ERP PRESENT AND FUTURE :-ERP and e-Commerce, ERP Internet and WWW, ERP and E-Business

Text Books	
T.1	E-business and E-commerce management strategy, implementation and practice, 5th Edition, Dave Chaffey, Pearson Education
T.2	Enterprise Resource Planning by Parag Diwan and Sunil Sharma (Pentagon Press.)
Reference Books	
R.1	Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003
R.2	The Architecture of SAP ERP: Understand how successful software works by Jochen Boeder, Bernhard Groene

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3510.1	Develop model for ERP for large projects.	6	9	-
BIT3510.2	Evaluate organizational opportunities and challenges in the design system within a business scenario.	5	9	-
BIT3510.3	Demonstrate a working knowledge of how data and transactions are integrated in an ERP system to manage the sales order process, production process, and procurement process.	3	9	-
BIT3510.4	Design the basic use of Enterprise software, and its role in integrating business functions.	6	9	-
BIT3510.5	Describe the business module & ERP Packages for the management of information across the functional areas of a business.	2	9	-





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Program: B. Tech. Information Technology								
Semester		Course Code	Name of Course		L	T	P	Credits
V		BIT3512	Fuzzy Systems and Neural Networks(Program Elective-II)		3	-	-	3
Teaching Scheme						Examination Scheme		
Theory	3 Hrs/week	CT-I				15 Marks		
Tutorial	-	CT-II				15 Marks		
Total Credits	3	CA				10 Marks		
Duration of ESE: 3Hrs		ESE				60 Marks		
Pre-Requisites: Basics of Programming, Cyber Crime								
Course Contents								

Unit I	Fuzzy set theory- basic concept of crisp sets and fuzzy sets- complements- union intersection- combination of operation- general aggregation operations- fuzzy relations- compatibility relations-orderings- morphisms- fuzzy relational equations-fuzzy set and systems
Unit II	Architectures: motivation for the development of natural networks-artificial neural networks-biological neural networks-area of applications-typical Architecture-setting weights-common activations functions Basic learning rules- Mcculloch-Pitts neuron- Architecture, algorithm, applications-single layer net for pattern classification- Biases and thresholds, linear separability - Hebb's rule- algorithm -perceptron - Convergence theorem-Delta rule
Unit III	Back propagation neural network standard back propagation-architecture algorithm-derivation of learning rules number of hidden layers--associative and other neural networks- hetro associative memory neural net, auto associative net- Bidirectional associative memory- applications-Hopfield nets-Boltzman machine
Unit IV	Neural network based on competition: fixed weight competitive nets- Kohonenself organizing maps and applications-learning vector quantization-counter propagation nets and applications adaptive resonance theory: basic architecture and operation-architecture, algorithm, application and analysis of ART1 & ART2
Unit V	Cognitron and Neocognitron - Architecture, training algorithm and application-fuzzy associate memories, fuzzy system architecture- comparison of fuzzy and neural systems.


Text Books

T.1	T1. Kliryan- Fuzzy System & Fuzzy logic Prentice Hall of India, First Edition.
T.2	Lawrence Fussett- fundamental of Neural network Prentice Hall , First Edition.



Reference Books	
R.1	Bart Kosko, —Neural network and Fuzzy Systeml - Prentice Hall-1994
R.2	J.Klin and T.A.Folger, —Fuzzy setsl University and information- Prentice Hall -1996.
R.3	J.M.Zurada, —Introduction to artificial neural systemsl-Jaico Publication house, Delhi 1994.

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3512.1	Classify the fuzzy logic and artificial neural networks	2	9	-
BIT3512.2	Design the various intelligent control systems	5	9	-
BIT3512.3	Apply the principle of competitive neural networks and Adaptive resonance theory	3	9	-
BIT3512.4	Analyze various techniques in feedback and feed forward Neural networks.	4	9	-
BIT3512.5	Implement Cognitron and Neocognitron architectures along with neural systems	5	9	-


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Program: B. Tech. Information Technology							
Semester		Course Code	Name of Course	L	T	P	Credits
V		BIT3513	Distributed Operating Systems	3	-	-	3
Teaching Scheme					Examination Scheme		
Theory	3 Hrs/week	CT-I			15 Marks		
Tutorial	-	CT-II			15 Marks		
Total Credits	3	CA			10 Marks		
Duration of ESE: 3Hrs		ESE			60 Marks		
Pre-Requisites: Discrete Mathematics, Data Structure, Algorithm							
Course Contents							

Unit I	Modes of communication, System Process, Interrupt Handling, Handling Systems calls, Protection of resources & Resources Management Micro-Kernel Operating System.
Unit II	Review of Network Operating System and Distributed Operating System, Issue in the design of Distributed Operating System, Overview of Computer Networks. Inter process communication, Linux, IPC Mechanism, Remote Procedure calls, RPC exception handling, Security issues, RPC in Heterogeneous Environment (case study Linux RPC)
Unit III	Clock Synchronization, Logical clocks, Physical clocks, clock synchronization algorithms, Mutual Exclusion, Election Algorithms, Dead locks in Distributed Systems. Thrashing, Heterogeneous DSM, Resource Management (Load Balancing approach, Load Sharing approach), Process Management: process Migration, Thread.
Unit IV	Overview of shared memory, consistency model, Page based Distributed Shared Memory, Shared –variable Distributed Memory, Object -based Distributed Memory.
Unit V	File models; File access, File sharing, file-caching, File Replication, fault Tolerance, Network File System, (Case study, 8NFS on Linux Directory Services, Security in Distributed File system).

Text Books	
T.1	M. Beck et al,” Linux Kernel Programming”,3rd edition, 2002..
T.2	B.W. Kernighan and R Pide, “The Unix Programming Environment “, Prentice Hall of India-2000.
Reference Books	
R.1	Silberschatz ,P.B. Garvin , Gagne,” Operating System Concepts”, 2009.
R.2	https://www.cs.columbia.edu/~smb/classes/s06-4118/126.pdf

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3513.1	Summarize hardware and software issues in modern distributed systems.	2	9	-
BIT3513.2	Discriminate knowledge in distributed architecture, naming, synchronization, consistency, replication, fault tolerance, security, and distributed file systems	5	9	-
BIT3513.3	Analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.	4	9	-
BIT3513.4	Illustrate about Shared Memory Techniques.	3	9	-
BIT3513.5	Acquire Sufficient knowledge about file access.	2	9	-





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Program: B. Tech. Information Technology							
Semester	Course Code	Name of Course	L	T	P	Credits	
V	BIT3514	Computer Vision (Program Elective-II)	3	-	-	3	
Teaching Scheme			Examination Scheme				
Theory	3 Hrs/week		CT-I		15 Marks		
Tutorial	-		CT-II		15 Marks		
Total Credits	3		CA		10 Marks		
Duration of ESE: 3Hrs			ESE		60 Marks		
Pre-Requisites: Introduction to Image Processing							
Course Contents							

Unit I	Recognition Methodology: Conditioning, Labeling, Grouping, Extracting, Matching. Morphological Image Processing: Introduction, Dilation, Erosion, Opening, Closing, Hit-or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on gray-scale images, Thinning, Thickening, Region growing, region shrinking. Image Representation and Description: Representation schemes, Boundary descriptors, Region descriptors
Unit II	Thresholding, Segmentation, connected component labeling, Hierarchical segmentation, Spatial clustering, Split & merge, Rule-based Segmentation, Motion-based segmentation, Area Extraction: Concepts, Data-structures, Edge, Line-Linking, Hough transform, Line fitting, Curve fitting (Least-square fitting). Region Analysis: Region properties, External points, Spatial moments, Mixed spatial gray-level moments, Boundary analysis.
Unit III	Facet Model Recognition: Labeling lines, understanding line drawings, Classification of shapes by labeling of edges, Recognition of shapes, Consistent labeling problem, Back-tracking Algorithm Perspective Projective geometry, Inverse perspective Projection, Photogrammetry - from 2D to 3D, Image matching: Intensity matching of ID signals, Matching of 2D image, Hierarchical image matching.
Unit IV	2D representation, Global vs. Local features General Frame Works, For Matching: Distance relational approach, Ordered structural matching, View class matching, Models database organization. General Frame Works: Distance -relational approach, Ordered - Structural matching, View class matching, Models database organization.
Unit V	Knowledge Based Vision: Knowledge representation, Control- strategies, Information Integration. Object recognition, Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis, Shape priors for recognition

Text Books	
T.1	Robert Haralick and Linda Shapiro, "Computer and Robot Vision", Vol I, II, Addison- Wesley, 1993
T.2	David A. Forsyth, Jean Ponce, "Computer Vision: A Modern Approach
Reference Books	
R.1	Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision" Thomson Learning

	Course Outcomes	CL	Class Sessions	Lab Sessions
BIT3514.1	Understand the computer vision algorithms, methods and concepts	2	9	-
BIT3514.2	Apply the computer vision systems with emphasis on applications and problem solving	3	9	-
BIT3514.3	Analyze the Binary Machine Vision	4	9	-
BIT3514.4	Design the Object Models & Matching	6	9	-
BIT3514.5	Evaluate the Object Recognition	5	9	-





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Program: B. Tech. Information Technology								
Semester		Course Code	Name of Course	L	T	P	Credits	
V		BITXX03	Cyber Security (Open Elective)	4	-	-	4	
Teaching Scheme						Examination Scheme		
Theory	4 Hrs/week	CT-I				15 Marks		
Tutorial	-	CT-II				15 Marks		
Total Credits	3	CA				10 Marks		
Duration of ESE: 3Hrs		ESE				60 Marks		
Pre-Requisites: Computer Network , Operating Systems								
Course Contents								

Unit I	Introduction to Cyber Security, introduction to cybercrime ,Reasons of cybercrime, History of cybercrime ,Types of cyber crime
Unit II	Cyber security components – OSI Layer ,Zero day attacks, Types of network attacks, Application security, end point security ,Mobile security, data security, Infrastructure security
Unit III	Fighting cyber-attacks-Authentication ,cryptography, firewall, Data loss prevention ,Web browsers ,Data backup, Cybercrime- Mobile and wireless device
Unit IV	Tools and methods used in cyber crime-,password cracking , key loggers and spywares ,DoS and DDoS attacks , SQL injections ,Attacks on wireless networks, Phishing and identity thefts.
Unit V	Security issues in Hardware ,Security polices and standards



Text Books	
T.1	FUNDAMENTAL OF CYBER SECURITY: Principles, Theory and Practices By Mayank Bhusan , Rajkumar Singh Rathore, Aatif Jamshed
T.2	Introduction to Cyber Security: Guide to the World of Cyber Security, Anand Shinde
Reference Books	
R.1	Cyber security essentials by Charles J. Brooks, Christopher Grow, Philip A. Craig, Jr. · 2018

	Course Outcomes	CL	Class Sessions	Lab Sessions
BITXX03.1	Understand different types of cyber crimes	2	9	-
BITXX03.2	Identify various cyber security components	2	9	-
BITXX03.3	Analyze the security challenges presented by mobile devices and Information systems access in the cybercrime world.	4	9	-
BITXX03.4	Evaluate different tools and methods used in cyber crime	4	9	-
BITXX03.5	Deploy the different Security policies and standards	3	9	-


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Program: B. Tech. Information Technology							
Semester		Course Code	Name of Course	L	T	P	Credits
V		BITXX04	Artificial Intelligence	4	-	-	4
Teaching Scheme				Examination Scheme			
Theory	4 Hrs/week			CT-I		15 Marks	
Tutorial	-			CT-II		15 Marks	
Total Credits	3			CA		10 Marks	
Duration of ESE: 3Hrs				ESE		60 Marks	
Pre-Requisites: Knowledge of Computer and Mathematics							
Course Contents							

Unit I	Introduction: What is AI? History & Application, Artificial intelligences as representation & search, Production system, Basics of problem solving: problem representation paradigms defining problem as state space representation, Characteristics.
Unit II	Search Techniques Uniformed Search techniques, informed Heuristic based Search, Generate and test, Hill-climbing, Best-First Search, problem reduction, and Constraint Satisfaction.
Unit III	Knowledge representation : knowledge representation issues: first order logic ,Predicate logic, structured knowledge representation :Backward Chaining Backward Chaining, Resolution ,Semantic Nets Frames ,And Scripts, Ontology
Unit IV	Uncertainty : Handling uncertain knowledge , rational decisions basics of probability, axioms of probability , Baye's Rule and utility –based agents behavior and environment in which a Approximate inference in Bayesian Network Fuzzy Logic Intelligent Agents : Introduction to Intelligent Agents Rational Agent, their structure , reflex ,model-based ,goal-based and utility –based agents ,behavior and environment in which a particular agent operates.
Unit V	Learning : What is learning?, Knowledge and learning, Learning in problem Solving Learning from examples ,learning probabilistic Models Expert Systems : Fundamental blocks ,Knowledge engineering Knowledge Acquisition, Knowledge Based Systems ,Basic understanding of Natural language.

Text Books	
T.1	E. Rich and K. Knight ,Artificial intelligences ,Tata McGraw Hill ,2008
T.2	S .Russell and P. Norvig, Artificial Intelligences : A Modern Approach ,3 rd edition
T.3	Artificial Intelligences and soft computing for beginners by Anandita Das Bhattachargee, Shroff Publishers
T.4	Artificial intelligence - A practical Approach :Patterson , Tata McGraw Hill,3 rd Edition
Reference Books	
R.1	Introduction to artificial intelligences – Charniak (Person Education)

	Course Outcomes	CL	Class Sessions	Lab Sessions
BITXX04.1	Demonstrate knowledge of the building blocks of AI as present in terms of intelligent	3	9	-
BITXX04.2	Analyze and formalize the problem as a state space ,graph design heuristics and select amongst different search or game based techniques to solve them	4	9	-
BITXX04.3	Create an understanding of the basic issues of knowledge representation	6	9	-
BITXX04.4	Formulate and solve problems with uncertain information using Bayesian approaches	6	9	-
BITXX04.5	Attain the capability to represent various real life problem domains using logic based techniques	3	9	-


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	Third Year (Semester-V) B.Tech. Information Technology BAU3505: Heritage (Audit Course)		
Teaching Scheme		Examination Scheme	
Theory	2 Hrs/week	CA	-
Practical	-	ESE	-
Total Credit	-	Total	-
		Duration of ESE: -	
Activity			
Visit to museum, archaeology sites, cultural walks, tours, local traditions, food and clothing, festival and local games awareness,			
Process			
<p>The course will involve study of archeological sites, monuments and buildings, museums and local traditions. Preference should be given to local sites, monuments and traditions. Students can alternatively be asked to study such sites and traditions in their home regions. An institution can also adopt an archeological site / monument / custom in its area and involve students in its preservation and promote awareness about it among people at large. Students should be asked to identify an archeological site/monument/local custom and tradition/ artifacts in a museum, to conduct a research to gain information about various aspects related to them and to write project reports or to prepare short documentaries.</p> <p>Each locality/region our Indian sub-continent abounds in a rich variety of food-ways, fares and festivals, games and sports. Students should be asked to identify one of these traditions and study them in detail.</p>			

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