SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER VIII
EFFECTIVE FROM SESSION 2020-21

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT08TPC6X	ELECTIVE – VI	3	0	0	30	70	100	3
2	IT08TOE3X	OPEN ELECTIVE - III	3	0	0	30	70	100	3
3	IT08TOE4X	OPEN ELECTIVE - IV	3	0	0	30	70	100	3
PRACTICAL									
1	IT06PPC31	PROJECT-III	0	0	18	60	40	100	9
TOTAL CREDITS									**18**
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

LIST OF ELECTIVE – VI

1.	IT08TPE61	MACHINE LEARING
2.	IT08TPE62	OBJECT ORIENTED ANALYSIS & DESIGN
3.	IT08TPE63	SOFTWARE TESTING & QUALITY MANAGEMENT
4.	IT08TPE64	HUMAN COMPUTER INTERFACE

LIST OF OPEN ELECTIVE –III

1.	IT08TOE31	WIRELESS SENSOR NETWORK
2.	IT06TOE32	DIGITAL SIGNAL PROCESSING
3.	IT06TOE33	INFORMATION TECHNOLOGY FOR AUTOMATION
4.	IT06TOE34	REAL TIME SYSTEM

LIST OF OPEN ELECTIVE-IV

1.	IT08TOE41	ARTIFICIAL INTELIGENCE
2.	IT08TOE42	ECONOMIC POLICIESIN INDIA
3.	IT08TOE43	COMPUTER APPLICATION IN SOCIAL SCIENCE
4.	IT08TOE44	MANAGING INNOVATION & ENTERPRENEURSHIP

SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.) (A CENTRAL UNIVERSITY)
B. TECH. INFORMATION TECHNOLOGY

Programme Outcomes: Graduates will be able to:

PO1: Fundamentals: Apply knowledge of mathematics, science and engineering.

PO2: Problem analysis: Identify, formulate and solve real time engineering problems using first principles.

PO3: Design: Design engineering systems complying with public health, safety, cultural, societal and environmental considerations

PO4: Investigation: Investigate complex problems by analysis and interpreting the data to synthesize valid solution.

PO5: Tools: Predict and model by using creative techniques, skills and IT tools necessary for modern engineering practice.

PO6: Society: Apply the knowledge to assess societal, health, safety, legal and cultural issues for practicing engineering profession.

PO7: Environment: Understand the importance of the environment for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics, and responsibilities and norms of the engineering practice.

PO9: Teamwork: Function effectively as an individual and as a member or leader in diverse teams and multidisciplinary settings.

PO10: Communication: Communicate effectively by presentations and writing reports.

PO11: Management: Manage projects in multidisciplinary environments as member or a team leader.

PO12: Life-long learning: Engage in independent lifelong learning in the broadest context of technological change.

Programme Specific Outcomes:

PSO1: To apply knowledge of recent computing technologies, skills and current tools of Information Technology Engineering.

PSO2: To design software systems, components or processes to meet identified needs within economic, environmental and social constraints.

PSO3: To explore research gaps, analyze and carry out research in the specialized/emerging areas.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT08TPE61	3	0	0	3 HOURS	30	70	3

MACHINE LEARNING

Course Objectives:

1. Understand the concept of learning and candidate elimination algorithms.
2. Understand the concept of perception and explore on Genetic algorithms
3. Explore on computational learning methods
4. Explore on instance based and case based learning.
5. Explore inductive learning and Reinforcement Learning methods

UNIT I

INTRODUCTION Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II

NEURAL NETWORKS AND GENETIC ALGORITHMS Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III

BAYESIAN AND COMPUTATIONAL LEARNING Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV

INSTANT BASED LEARNING 9 K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V

ADVANCED LEARNING Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction –

Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

TEXT BOOK:

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

REFERENCES:

1. Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

Course Outcomes:

1. Demonstrate fundamental understanding of Machine learning
2. Understand the concept of perception and explore on Genetic algorithms
3. Understand and use Naïve Bayes Classifier and Bayesian Belief Network
4. Explore on instance based and case based learning.
5. Explore inductive learning and Reinforcement Learning methods

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3								3	3	3
CO2	3	3	3	3	3								3	3	3
CO3	3	3	3	3	3								3	3	3
CO4	3	3	3	3	3								3	3	3
CO5	3	3	3	2	2								3	2	2

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT08TPE62	3	0	0	3 HOURS	30	70	3

Course Objectives

- To have clear idea about traditional and modern SW development Methodologies.
- Discuss the overview of Object oriented methodologies
- To introduce the concept of Object-oriented system development lifecycle
- To identify objects, relationships, services and attributes.
- To develop robust object-based models for Systems

Object Oriented Analysis and Design

UNIT I OBJECT MODELING:

Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, candidates keys, constraints.

UNIT II DYNAMIC MODELING :

Events and states, operations, nested state diagrams and concurrency, advanceddynamic modeling concept, a sample dynamic model.

UNIT III FUNCTIONAL MODELING :

Data flow diagram, specifying operations, constraints, a sample functional model. OMT (Object modeling techniques) methodologies, SA/SD, JSD

UNIT IV UNIT I: Introduction to UML

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT V: Architectural Modeling

Architectural Modeling : Component, Deployment, Component diagrams and Deployment diagrams.

Text Books

1. James Rumbaugh et al " object Oriented Modeling and design" PHI
2. Herbert Schieldt " The complete Reference : Java" TMH
3. E. Balagurusamy " Programming in Java", TMH

Reference Books :

1. Booch Grady, " Object Oriented Analysis & design with application 3/e", Person

2. Bjarne Stroustrup " C++ Programming Language" Addison Wesley
3. E Balagurusami " Object Oriented Programming with C++, TMH

Course Outcomes

On completion of this course the students will be able to

- Explain and apply basic OOPS concepts.
- Explain and implement the SW development Methodologies.
- Ability to analyze and model software specifications.
- Ability to abstract object-based views for software systems.
- Ability to deliver robust software components.

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	2								3	3	2
CO2	2	3	3	3	2								3	3	2
CO3	3	3	3	3	2								3	3	2
CO4	3	2	3	2	3								3	3	2
CO5	3	2	3	3	2								3	3	2

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT08TPE63	3	0	0	3 HOURS	30	70	3

Course Objectives

- Study fundamental concepts of software testing and its application in various scenarios.
- Understand white box, block box and other testings.
- Understand the importance of software quality and assurance software systems development
- Understand the quality management, assurance, and quality standard to software.

SOFTWARE TESTING AND QUALITY MANAGEMENT

UNIT I

Software Quality: Ethical Basis for software Quality , Total quality Management Principles, Software Processes and Methodologies , Quality Standards , Practices & conventions, Top Down and Bottom Up Approach.

UNIT II

Software managementReviews and Audits, Enterprise Resource Planning Software, Measurement Theory , Software Quality Metrics, designing Software Measurement Programs , Organizational Learning.

UNIT III

Improving Quality with methodologies: Structured information Engineering , Object-Oriented Software , Reverse Engineering , Measuring Customer Satisfaction Defect Prevention , Reliability Models , Reliability Growth Models .

UNIT IV

Software Quality Engineering: Defining Quality Requirements Management, Complexity Metrics and Models, Management issues for software Quality, Project Tracking and Oversight, Use of CASE tool Technology, Role of Groupware, data Quality Control.

UNIT V

Project Configuration management: Configuration Management Concepts, Configuration Management Process, Document Control, Configuration Management plan of the WAR Project.

List of Books:

1. Stephan Kan, Metrics and Models in Software quality, Addison Wesley.

2. Mark Paulik, The capability Maturity Model-guidelines for improving the software Process, Addison Wesley.
3. Michael, Deutsch, Willis, Ronald r-Software Quality Engineering- A Total Technical and Management approach, Prentice Hall.
4. Ginac, Frank P, Customer Oriented Software Quality Insurance, Prentice Hall.
5. Wilson, Rodney C, Software RX secrets of Engineering Quality Software, Prentice Hall.
6. Pressman, Software Engineering-A practitioner's approach
7. Pankaj Jalote, CMM Project

Course Outcomes

After completion of this course, student will be able to

- Understand importance of testing techniques in software quality management and assurance.
- Identify various types of software risks and its impact on different software application.
- Create test case scenarios for different application software using various testing techniques.
- Apply different testing methodologies used in industries for software testing.
- Describe fundamental concepts of software quality assurance.

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2									3	3	2
CO2	3	3	3	3									3	3	2
CO3	3	2	3	3									3	3	2
CO4	3	3	3	3									3	3	2
CO5	3	3	3	2									3	3	2

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT08TPE64	3	0	0	3 HOURS	30	70	3

HUMAN COMPUTER INTERFACE

COURSE OBJECTIVES:

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface.

UNIT1: Introduction0 The human, The computer, The interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles, and Theories

UNIT2: Design Process- Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support

UNIT3: Models and Theories0 Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models,Task analysis, Dialogue notations and design, Models of the system, Modelling rich interaction

UNIT4: Interaction Styles- Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation

UNIT5: Design Issues- Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search, Information Visualization

Text Books:

1,"Human Computer Interaction" by Alan Dix, Janet Finlay , ISBN :9788131717035, Pearson Education (2004)
2."Designing the User Interface - Strategies for Effective Human Computer Interaction", by Ben Shneiderman
ISBN : 9788131732557, Pearson Education (2010).

Reference Books:

1.Usability Engineering: Scenario-Based Development of Human-Computer Interaction , by Rosson, M. and
Carroll, J. (2002)
2.T*he Essentials of Interaction Design, by Cooper, et al. , Wiley Publishing(2007)*

3.Usability Engineering, by Nielsen, J. Morgan Kaufmann, San Francisco, 1993. ISBN 0-12-518406-9
4.The Resonant Interface: HCI Foundations for Interaction Design , by Heim, S. , Addison-Wesley. (2007)
5.Usability engineering: scenario-based development of human-computer interaction, By Rosson, M.B &
Carroll, J.M. , Morgan Kaufman.(2002)

COURSE OUTCOMES:

Students will try to learn:
•Design effective dialog for HCI
•Design effective HCI for individuals and persons with disabilities.
•Assess the importance of user feedback.
• Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
• Develop meaningful user interface.

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	3	3	3							2	3	2
CO2	1	2	1	2	1	3							3	2	3
CO3	3	3	3	2	3	2							1	3	2
CO4	2	2	2	3	2	3							2	1	2
CO5	3	3	2	2	3	3							3	3	3

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION/WEEK	I A	ESE	CREDITS
IT06TOE31	3	0	0	3 hours	30	70	3

COURSE OBJECTIVES:

- To learn about Wireless Networks, architectures and technologies
- To understand Wireless sensor network platforms: Hardware and Software
- To learn WSN layers (MAC, Link, Routing)
- To understand & implement Energy management
- To perform Sensor data acquisition, processing and handling
- To simulate Signal processing, target localization and tracking, self-organization
- Case Study of Applications like (health, environmental monitoring, smart home)

Subject : WSN

UNIT I – FUNDAMENTALS OF SENSOR NETWORKS

Introduction to computer and wireless sensor networks , Motivation for a network of Wireless Sensor nodes- Sensing and sensors-challenges and constraints - node architecture-sensing subsystem, processor subsystem-communication interfaces- prototypes, Application of Wireless sensors

UNITII- COMMUNICATION CHARACTERISTICS AND DEPLOYMENT MECHANISMS Wireless Transmission Technology and systems-Radio Technology Primer-Available Wireless Technologies - Hardware- Telosb, Micaz motes- Time Synchronization- Clock and the Synchronization Problem - Basics of time synchronization-Time synchronization protocols - Localization-Ranging Techniques- Range based Localization-Range Free Localization- Event driven Localization

UNIT III- MAC LAYER Overview-Wireless Mac Protocols-Characteristics of MAC protocols in Sensor networks – Contention free MAC Protocols- characteristics- Traffic Adaptive Medium Access-Y-MAC, Low energy Adaptive Clustering - Contention based MAC Protocols- Power Aware Multi-Access with signalling

UNIT IV- ROUTING IN WIRELESS SENSOR NETWORKS

Design Issues in WSN routing- Data Dissemination and Gathering- Routing Challenges in WSN - Flooding-Flat Based Routing – SAR, Directed Diffusion, Hierarchical Routing- LEACH, PEGASIS - Query Based Routing- Negotiation Based Routing- Geographical Based Routing- Transport layer- Transport protocol Design issues- Performance of Transport Control Protocols.

UNIT V - MIDDLEWARE AND SECURITY ISSUES WSN middleware principles-Middleware architecture-Existing middleware - operating systems for wireless sensor networks-performance and traffic management - Fundamentals of network security-challenges and attacks - Protocols and mechanisms for security.

PROGRAMME OBJECTIVES:

- Able to adapt the wireless sensor network with sensor nodes which have limitations in power consumption, processing power and bandwidth.
- Able to specify the requirements for the hardware and software solutions for energy-efficient sensor network for new applications.
- Able to apply appropriate algorithms to improve existing or to develop new wireless sensor network applications.
- Able on a profound level to evaluate software for wireless sensor networks.
- To evaluate the significance of scientific studies in wireless sensor networks.

REFERENCES

1. Waltenegus Dargie, Christian Poellabauer , "Fundamentals of Wireless Sensor Networks, Theory and Practice", Wiley Series on wireless Communication and Mobile Computing, 2011

2. Kazem Sohraby, Daniel manoli , "Wireless Sensor networks-Technology, Protocols and Applications", Wiley InterScience Publications 2010.

3. Bhaskar Krishnamachari , " Networking Wireless Sensors", Cambridge University Press, 2005

4. C.S Raghavendra, Krishna M.Sivalingam, Taiebznati , "Wireless Sensor Networks", Springer Science 2004.

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	3	3							2	3	3
CO2	3	2	3	3	2	3							3	2	3
CO3	2	3	3	3	3	3							3	3	3
CO4	3	2	3	3	3	3							3	2	3
CO5															

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT06TOE32	3	0	0	3 hours	30	70	3

Digital Signal Processing

Course Objectives:

Objective of the course are to make Students will able:

1. To summarize and analyze the concepts of signals, systems in time and frequency domain with corresponding transformations
2. To introduce the diverse structures for realizing digital filters.
3. To develop the understanding the concept of design and implementation of digital filters.
4. To develop basic idea of multi rate filter bank design.
5. To utilise the appropriate tools for design and realization of signal processing modules

UNIT I

Analysis of Discrete Time Signals and Systems: Discrete Fourier analysis, Classification, Discrete Time Fourier Transform (DTFT) & its properties, Inverse DTFT. Discrete Fourier Transform (DFT) & its Properties, Inverse DFT. Fast Fourier Transform, Properties, Types of FFT, N-point Radix-2 FFT, Inverse FFT. Discrete Linear Convolution, Circular Convolution, Fast Convolution, Frequency Response of LTI system using Discrete Fourier Analysis. Discrete Cosine Transform.

UNIT II

Implementation of Discrete-time Systems: Structures for the Realization of discrete-time systems, Structures for FIR systems: Direct, Cascade, Frequency Sampling & Lattice structures. Structures for IIR systems: Direct, Signal Flow Graphs & Transposed, Cascade, Parallel, Lattice & Lattice-Ladder structures. State space system analysis and structures.

UNIT III

FIR Filter Design: Symmetric and Anti-symmetric FIR filters, FIR Filter design by window method (Rectangular, Bartlett, Hamming, Hanning, Blackman and Kaiser window), Frequency Sampling method, Optimum approximation of FIR filters, Design of FIR differentiators, Design of Hilbert transformers.

UNIT IV

IIR Filter Design: Design of Discrete-time IIR filters from Continuous-time Filters: Filter design by Impulse invariant and bilinear transformation method: Butterworth, Chebyshev& Elliptic approximation Filter, Frequency transformation.

UNIT V

Multirate Digital Signal Processing: Introduction, Decimation, Interpolation, Sampling rate conversion by rational factor, Filter design and implementation for sampling rate conversion: Direct form FIR digital filter structure, Polyphase filter structure, Time varying digital filter structure, Sampling rate conversion by an arbitrary factor.

Name of Text Books:

1.Discrete Time Signal Processing by A.V. Oppenheim, R. W. Schafer, & John R. Buck, , 2nd Edition, Prentice Hall, 1999. (Unit I, Unit II, Unit III, Unit IV)
2.Digital Signal Processing: Principles, Algorithms and Applications by John G. Proakis& D.G. Manolakis, Prentice Hall, 1997. (Unit II, Unit III, Unit IV, Unit V)
3.Digital Signal Processing by S. K. Mitra, 3rd edition, McGraw-Hill, 2007. (Unit V)

Name of Reference Books:

1. Signals and Systems by A. V. Oppenheim, A. S. Willsky& S. H. NAWAB, 2nd edition, Prentice Hall, 1996.
2. Digital Signal Processing by S. Salivahanan, A. Vallavaraj, C. Gnanapriya, Tata McGraw-Hill, 2000.
3. Digital Signal Processing by A. Anand Kumar, PHI Learning Pvt. Ltd, 2012.

Course Outcomes:

At the end of this course, students will demonstrate the ability to
1. Represent signals mathematically in discrete-time, and in the frequency domain.
2. Realize digital filters by use of systematic structure to simplify the complexity of the system.
3. Design and develop digital filters for various applications.
4. Analyze different signals using multi-rate systems.
5. Apply digital signal processing modules for the analysis of real-life signals.

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO1	PSO1
CO1	3	3	3	1	1							3	3	3	2
CO2	3	3	2	3	1							3	3	3	2
CO3	3	3	2	1	1							3	3	3	2
CO4	3	3	3	1	1							3	3	3	2
CO5	3	3	3	1	1							3	3	3	2

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT06TOE33	3	0	0	3 hours	30	70	3

INFORMATION TECHNOLOGY FOR AUTOMATION

COURSE OBJECTIVES:

- Introduction to Information Technology.
- Introduce the student to advanced networking concepts.
- To introduce the process automation, design of a distributed architecture for the information processing industrial automation.
- Design and development of a centralized and distributed architecture in different administrative sectors of an organization.
- To understand challenges and applications and tools.

UNIT I
Basic concepts: Information science technology and automation principles

UNIT II
Computerization and networking: Basic computer communication and interconnection mechanism. Network topology. Networking protocols.

UNIT III
Industrial automation: Flexible manufacturing systems. .Process automation, Design of a distributed architecture for the information processing in different units, plants and factories in an industrial set up

UNIT IV
Office automation: Design and development of a centralized and distributed architecture in different administrative sectors of an organization (University, enterprises and Air traffic system)

UNIT V
Hospital information System: design of different inter connected modules for registration, medical consultancy, ward management, patient care and staff management in a hospital. Tele medicine: web based system for distant medical care.

List of Books:
1. Modern Industrial Automation Software design: Principles and Real-World Applications- By Ling Feng
Wong, Kay Chen Tan Publisher John Wiley and sons.
2. Software for automation: Architecture, Integration, and Security, By Jonas Berge, ISA

COURSE OUTCOMES:

Students will try to learn:

- Students will familiar with the concepts of Information Technology.
- Students will familiar with networking concept.
- Students will ready to Analyze design of a distributed architecture for the information processing industrial automation.
- Students will be capable to design applications in different domain and be able to analyze their performance.
- Capable to implement basic applications on embedded platform

	PO												PSO		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1							1	2	2
CO2	2	3	3	3	3	3							2	2	3
CO3	3	2	2	2	2	3							3	3	2
CO4	3	3	3	2	3	3							2	3	3
CO5	2	3	3	2	2	2							3	3	3

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT06TOE34	3	0	0	3 hours	30	70	3

REAL TIME SYSTEMS

COURSE OBJECTIVES:

- To apply the terminology, and list applications, of real time systems.
- Be able to explain the purpose and structure of a real time operating system.
- To illustration of key OS analysis and optimization
- To understand purpose, structure and functions of operating systems
- General understanding of structure of modern computers

Unit-I

Basic Real- Time Concepts, Computer Hardware, Language Issues: Basic component Architecture, terminology, Real Time Design Issues, CPU, Memories, Input- Output, Other Devices Language Features, Survey of Commonly Used Programming Languages, Code Generation

Unit-II

Software life cycle, Real Time Specification and Design Techniques, Real Time Kernels: Phases of software life cycle, Non-temporal Transition in the software life cycle, Spiral model, Natural languages, Mathematical Specification, Flow Charts, Structure Charts, Pseudocode and programmable Design Languages, Finite state Automata, Data Flow Diagrams, Petrinets, Statecharts, Polled Loop Systems, phase/State Driven Code, Coroutines, Interrupt Driven System, Foreground/Background Systems Full Featured Real Time OS

Unit-III

Intertask Communication and Synchronization, Real Time memory Management, System Performance Analysis and Optimization: Buffering Data, Mail boxes Critical Region, Semaphores, Event Flags and Signals, Deadlock, Process Stack Management, Dynamic Allocation, Static Schemes, Response Time Calculation, Interuupt Latency, Time Loading and its Measurement, Scheduling NP Complete, Relocating Response Times And time Loading, Analysis of Memory Requirements, Reducing Memory Loading, I/O Performance.

Unit-IV

Queuing Models, Reliability, Testing, And Fault Tolerance, Multiprocessing Systems: Basic Buffer size Calculation, Classical Queuing Theory, Little's Law, Faults, Failures ,bugs AND effects. Reliability, Testing, Fault Tolerence, Classification of Architectures, Distributed Systems, Non Von Neumann Architectures.

Unit-V

Hardware/ Software Integration, Real Time Applications: Goals of Real Time System Integration, Tools, Methodology, The Software HesisenbergUncertainity Principle, Real Time Systems As Complex System, First Real Time Application Real Time Databases, Real time Image Processing Real Time UNIX, building Real Time Applications with Real Time Programming Languages.

Text Books :

1. Real Time System, Jane W.S.Liu 2. Real Time Systems Design and Analysis by Phillip A. Laplante,PHI

Reference Books:

1 Hard Real Time Computing Systems Predictable Scheduling Algorithms and applications by Giorgio C. Buttazzo

2 Real Time Design Patterns: Robust Scalable Architecture for Real Time System by BrucePowel Douglass 3. Real Time System: Scheduling, Analysis and Verification by Albert M.K. Change

COURSE OUTCOMES:

Students will try to learn:

- Describe the general architecture of computers and operating system .
- Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.
- Describe the foundation for programming languages developed for real time programming.
- Use real time system programming languages and real time operating systems for real time applications.
- Analyze real time systems with regard to keeping time and resource restrictions.

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	2	1	2							1	2	2
CO2	3	3	3	3	2	2							3	3	3
CO3	2	2	2	2	2	3							2	2	2
CO4	3	2	2	3	2	2							3	2	2
CO5	3	3	3	3	2	3							3	3	3

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT08TOE41	3	0	0	3 hours	30	70	3

ARTIFICIAL INTELLIGENCE

Course Objectives:

1. To introduce the fundamentals of Artificial Intelligence and its subfields, including problem-solving, knowledge representation, handling uncertainty and learning, natural language processing, and planning.
2. To familiarize students with various search techniques, including blind search, informed search, and constraint satisfaction, used in solving AI problems.
3. To enable students to understand the importance of knowledge representation and its various techniques, including rule-based systems and semantic nets, in building AI systems.
4. To introduce students to the concepts of uncertainty and learning in AI, including probabilistic inference, fuzzy logic, and machine learning, and their applications in real-world problems.
5. To equip students with the ability to design and develop simple expert systems using AI languages such as Prolog and Lisp.

UNIT I Overview & Search Techniques:
Introduction to AI, Problem Solving, State space search, Blind search: Depth first search, Breadth first search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Constraint satisfaction. Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.

UNIT II Knowledge Representation (KR):
Introduction to KR, Knowledge agent, Predicate logic, WFF, Inference rule & theorem proving forward chaining, backward chaining, resolution; Propositional knowledge, Boolean circuit agents. Rule Based Systems, Forward reasoning: Conflict resolution, backward reasoning: Use of Back tracking, Structured KR: Semantic Net - slots, inheritance, Frames- exceptions and defaults attached predicates, Conceptual Dependency formalism and other knowledge representations.

UNIT III Handling uncertainty & Learning:
Source of uncertainty, Probabilistic inference, Bayes' theorem, Limitation of naïve Bayesian system, Bayesian Belief Network (BBN), Inference with BBN, Dempster-Shafer Theory, Fuzzy Logic, Fuzzy function, Fuzzy measure, Non monotonic reasoning: Dependency directed backtracking, Truth maintenance systems. Learning: Concept of learning, Learning model, learning decision tree, Paradigms of machine learning, Supervised & Unsupervised learning, Example of learning, Learning by induction, Learning using Neural Networks.

UNIT IV Natural Language Processing (NLP) & Planning:

Overview of NLP tasks, Parsing, Machine translation, Components of Planning System, Planning agent, State-Goal & Action Representation, Forward planning, backward chaining, Planning example: partial-order planner, Block world.

UNIT V Expert System & AI languages:
Need & Justification for expert systems- cognitive problems, Expert System Architectures, Rule based systems, Non production system, knowledge acquisition, Case studies of expert system. Ai language: Prolog syntax, Programming with prolog, backtracking in prolog, Lisp syntax, Lisp programming.

Text Books:-
1. Artificial Intelligence by Elaine Rich and Kevin Knight, Tata MeGraw Hill. 2. Introduction to Artificial Intelligence and Expert Systems by Dan W.Patterson, Prentice Hall of India.
Reference Books:-
1. Principles of Artificial Intelligence by Nils J.Nilsson, Narosa Publishing house.
2. Programming in PROLOG by Clocksin& C.S. Melish, Narosa Publishing house. 3. Rule based Expert Systems-A practical Introduction by M. Sasikumar, S.Ramani, et. al., Narosa Publishing House.

Course Outcome:

1. Students will be able to understand the fundamentals of Artificial Intelligence and its subfields, including their applications in real-world problems.
2. Students will be able to apply various search techniques to solve AI problems and evaluate their effectiveness.
3. Students will be able to design and develop AI systems using knowledge representation techniques, including rule-based systems and semantic nets.
4. Students will be able to understand and apply the concepts of uncertainty and learning in AI, including probabilistic inference, fuzzy logic, and machine learning, in solving real-world problems.
5. Students will be able to design and develop simple expert systems using AI languages such as Prolog and Lisp.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	2							2	3	2	3
CO2	3	3	2	3	2							3	2	2	3
CO3	2	3	3	2	2							2	3	2	2
CO4	3	3	2	3	2							3	2	2	3
CO5	2	2	3	2	2							2	3	2	2

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT08TOE43	3	0	0	3 hours	30	70	3

COMPUTER APPLICATION IN SOCIAL SCIENCES

Course Objectives:

1. The use of computer applications in research work.
2. To understand basic concept about operating systems.
3. To understand basic concept about management information systems
4. To understand basic concept about E governance
5. To understand basic concept about system analysis.

Unit I: Information technology - definition, need, qualities, values freedom of information, information management, right to information - information society, globalization of communication, new frontiers of information technology Computer - Fundamentals of Computer Importance of Computer, Architecture of Computers Input output Devices, Central Processing Unit, hardware and software, applications of computers, classification of computer, classification of computer languages.

Unit – II: Computer Operating System: MS-DOS, Windows up to the latest versions, MS-Word, MS-Excel.

Unit-III: System Analysis : Preliminary survey, analysis of problems and laying down specifications, design development, testing and debugging, system analysis methods, data flow diagrams, structure chart, programme/system development process Internet - understanding internet, internet management, uses of internet - website, e-mail, information retrieval, security of data on internet.

Unit –IV: E-governance - meaning, growth, scope, problems, E-commerce - meaning, nature, processes, scope, problems and barriers, cyber crimes, satellite communication, video conferencing.

Unit V: MIS - meaning, nature, process - office automation: means and Uses - uses of information technology in public administration – planning and monitoring, improving services, transparency, empowering citizens by access to information, grievance redressal, training through computers.

Texts/references

1. E. Garrison Walters, The Essential Guide to Computing: The Story of Information Technology, Indian Edition (New Delhi: Prentice Hall, 2000)
2. Brian Williams and Stacy Sawyer, Using Information Technology, 9th Edition (New York: Career Edition, 2010)
3. Lawrence Snyder, Fluency with Information Technology: Skills, Concepts and Capabilities, 4th Indian Edition (New Delhi: Prentice Hall, 2010)
4. Jon Piot and Nicholas Carr, The Executive's Guide to Information Technology (New York: Wiley, 2007)
5. Carl V. Brown and others, Managing Information Technology, 7th Indian Edition (New Delhi: Prentice Hall, 2011)

Course Outcomes :

At the end of the course the student should be able to:

1. Students will be able to know about operating systems.
2. Students will be able to know about meaning and scope of e-governance
3. Students will be able to know about analysis of system
4. Students will be able to know about process of information management.

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	3	2	3								3	3	3
CO2	1	2	2	2	3								3	3	3
CO3	2	2	3	2	1								3	3	3
CO4	2	1	2	2	3								3	3	3
CO5	3	2	2	2	3								3	3	3

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT08TOE44	3	0	0	3 hours	30	70	3

MANAGING INNOVATION AND ENTREPRENEURSHIP

Objectives of the Course

1. A familiarity with current topics in strategic innovation management, such as innovation networks, idea brokering, open innovation;
2. A familiarity with innovation processes and structures such as R&D team and incentive design, R&D portfolio management, idea generation processes, the pros and cons of various R&D organizational structures, and the challenges of innovation in large and small firms;
3. An understanding of the strategies most effective for exploiting innovations;
4. The ability to apply these concepts directly to real world situations;
5. Skills to identify, evaluate, and resolve a variety of issues relating to poor innovative performance in large firms as well as entrepreneurial firms.

Course Outcome

1. Key concepts underpinning the Entrepreneurship
2. Its application in the recognition and exploitation of product/ service/ process opportunities
3. Key concepts underpinning innovation and the issues associated with developing and sustaining innovation within organisations
4. How to design creative strategies for pursuing, exploiting and further developing new opportunities
5. Issues associated with securing and managing financial resources in new and established organisations

UNIT 1: Introduction to Entrepreneurship: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies. Entrepreneurial growth and development.

UNIT 2: Creativity and Innovation: Creativity and Innovation: Concepts Shifting Composition of the Economy Purposeful Innovation & the 7 Sources of Innovative Opportunity The Innovation Process. Innovative Strategies : Strategies that aim at introducing an innovation. Innovation & entrepreneurship: Can they work together? Planning incompatible with Innovation & entrepreneurship.

UNIT 3: Entrepreneurial Motivation: Need for continuous learning & relearning Acquiring Technological Innovation Entrepreneurial motivation (nAch story) Achievement Motivation in Real life.. Case Study.

UNIT 4: International Entrepreneurship: Concepts and Nature of International Entrepreneurship. The changing International environment. Ethics and International Entrepreneurship. Strategic Issues in International Entrepreneurship.

UNIT 5: Problem Identification and Problem Solving: Problem Identification. Problem solving. Innovation and Diversification.

Text/Reference Books:

1. Martin, M.J., 1994, "Managing Innovation and Entrepreneurship in Technology based Firm", John Wiley.
2. Ettlie, J.E., 2000, "Managing Technology Innovation", John Wiley & Sons.
3. Drucker, P. F. (2000), "The Discipline of Innovation," Harvard Business Review, May, (originally published
1985, May-June, 63(3), 67-72.1
4. Christensen, C. M. and Raynor, M. E. (2003), The Innovator"s Solution: Creating and Sustaining Successful
Growth, Boston, MA: Harvard Business School Press.
5. Drucker, P. F. (1985), Innovation and Entrepreneurship, New York: Harper.
6. Harvard Business Review on Innovation (Collection of articles), Harvard Business School Press (2001).
6. Harvard Business Review on Entrepreneurship (Collection of articles), Harvard Business School Press (1999)
8. Rogers, E.M. (2003), Diffusion of Innovations, 5th ed., New York: Simon and Schuster.

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO1	PSO1
CO1	1	2	1	2	1	3	-	-	2	1	2	2	1	1	1
CO2	2	3	1	2	1	3	-	-	2	1	2	2	1	2	1
CO3	2	3	2	3	2	3	-	-	2	1	3	2	1	3	2
CO4	2	3	2	3	3	3	-	2	3	1	3	-	1	3	2
CO5	2	3	3	3	2	3	-	2	3	1	3	-	1	3	2

Weightage: 1-Sightly, 2-Moderately, 3-Strongly