

ANNEXURE - I

R19 THIRD YEAR

| THIRD YEAR SEMESTER – I | | | | | | | | | | | | |
|-------------------------|---|----------|-----------|----------|-----------|----------|-----------|-----------|-----------------|----------------|-------------|-----------|
| Code | Course | Category | L | T | P | E | O | Total | Sessional Marks | External Marks | Total Marks | Credits |
| IT311 | Open Elective-1 | OE | 3 | 0 | 0 | 1 | 2 | 6 | 40 | 60 | 100 | 3 |
| IT312 | Computer Networks | PC | 3 | 0 | 0 | 1 | 2 | 6 | 40 | 60 | 100 | 3 |
| IT313 | Automata Theory and Compiler Design | PC | 3 | 1 | 0 | 1 | 3 | 8 | 40 | 60 | 100 | 3 |
| IT314 | Software Engineering | PC | 3 | 0 | 0 | 1 | 2 | 6 | 40 | 60 | 100 | 3 |
| IT315 | Artificial Intelligence | PC | 2 | 1 | 0 | 1 | 3 | 7 | 40 | 60 | 100 | 3 |
| IT316 | QA-1 & VA-1 | HS | 0 | 0 | 3 | 1 | 3 | 7 | 100 | - | 100 | 1.5 |
| IT317 | UML & Testing Lab | PC | 0 | 0 | 3 | 0 | 0 | 3 | 50 | 50 | 100 | 1.5 |
| IT318 | Computer Networks lab | SC | 0 | 0 | 3 | 0 | 1 | 4 | 50 | 50 | 100 | 1.5 |
| IT319 | Web Technologies Lab | PC | 0 | 0 | 3 | 0 | 3 | 6 | 50 | 50 | 100 | 1.5 |
| IT320 | Internship in Industry-I | PR | - | - | - | 0 | 2 | 2 | 100 | - | 100 | 2 |
| IT | Constitution of Indian & - Intellectual Property Rights | MC | 3 | 0 | 0 | 0 | 1 | 4 | 50 | 0 | 50 | |
| TOTAL | | | 17 | 2 | 12 | 6 | 22 | 59 | 600 | 450 | 1050 | 23 |

| THIRD YEAR SEMESTER – II | | | | | | | | | | | | |
|--------------------------|-----------------------------------|----------|-----------|----------|-----------|----------|-----------|-----------|-----------------|----------------|-------------|-----------|
| Code | Course | Category | L | T | P | E | O | Total | Sessional Marks | External Marks | Total Marks | Credits |
| IT321 | Open Elective - 2 | OE | 3 | 0 | 0 | 1 | 2 | 6 | 40 | 60 | 100 | 3 |
| IT322 | Professional Elective – 1 | PE | 3 | 0 | 0 | 1 | 2 | 6 | 40 | 60 | 100 | 3 |
| IT323 | Professional Elective – 2 | PE | 3 | 0 | 0 | 1 | 2 | 6 | 40 | 60 | 100 | 3 |
| IT324 | Design and Analysis of Algorithms | PC | 3 | 0 | 0 | 1 | 3 | 7 | 40 | 60 | 100 | 3 |
| IT325 | Design Thinking | HS | 3 | 0 | 0 | 1 | 2 | 6 | 40 | 60 | 100 | 3 |
| IT326 | QA-2 & Soft Skills | HS | 0 | 0 | 3 | 2 | 3 | 8 | 100 | | 100 | 1.5 |
| IT327 | Elective Lab -1 | SC | 0 | 1 | 3 | 0 | 3 | 7 | 50 | 50 | 100 | 2.5 |
| IT328 | Internet of Things Lab | PC | 0 | 0 | 3 | 0 | 3 | 6 | 50 | 50 | 100 | 1.5 |
| IT329 | Graphics and Multimedia Lab | PC | 0 | 0 | 3 | 0 | 1 | 4 | 50 | 50 | 100 | 1.5 |
| TOTAL | | | 15 | 1 | 12 | 7 | 21 | 56 | 450 | 450 | 900 | 22 |

Proposed Electives

| YEAR - SEM | III/IV SEM 2 |
|---------------------------------|----------------------------------|
| ELECTIVE-STREAM | Professional Elective - 1 |
| Stream 1 : Networks | Unix Network Programming |
| Stream 2: Data Engineering | Data Warehousing and Data Mining |
| Stream 3 : Management | Business Automation |
| Stream 4 : Security & Embedded | Embedded Systems |
| Stream 5 : Software Engineering | Management Information Systems |
| ELECTIVE-STREAM | Professional Elective - 2 |
| Stream 1 : Networks | Distributed Operating Systems |
| Stream 2: Data Engineering | Machine Learning |
| Stream 3 : Management | Operation Research |
| Stream 4 : Security & Embedded | Internet Of Things |
| Stream 5 : Software Engineering | User Experience(Ux) |
| YEAR - SEM | III/IV SEM 2 |
| | Elective lab 1 |
| | ETL Tools |
| | DEVOpps |
| | ADV.Java |

SEMESTER-I

COMPUTER NETWORKS

IT312

L T P E O

3 0 0 1 2

CREDITS 3

Sessional Marks : 40

End Exam Marks: 60

End Exam: 3 Hours

Prerequisite(s): Data communication

Course Objectives

The main emphasis of this course is on the organization and management of local area networks (LANs).

1. Developing an understanding of computer networking basics.
2. learning about computer network organization and implementation, obtaining a theoretical understanding of computer networks and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems
3. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.
4. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Be able to analyze different architectural standards and design in an Ethernet network

CO-2: Evaluate data communication link considering elementary concepts of data link layer protocols for error detection and correction.

CO-3: Apply various network layer techniques for designing LANs and analyze packet flow on basis of routing protocols.

CO-4: Estimate the congestion control mechanism to improve quality of service in transporting data through different protocols such as TCP, UDP and SCTP.

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|--------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO1 | 3 | | | | 3 | | | | | | | | 3 | 3 |
| CO2 | 3 | 1 | 1 | | 3 | | | | 2 | 1 | 2 | 2 | 3 | 3 |
| CO3 | 3 | 1 | 3 | 2 | 3 | | | | 2 | 1 | 2 | 2 | 3 | 3 |
| CO4 | 3 | 2 | 2 | 2 | 3 | | | | 2 | 1 | 2 | 2 | 3 | 3 |

SYLLABUS

UNIT I: Introduction to networks

(7 Periods)

Introduction to networks: Types of networks, LAN Topologies. Wired lans: Ethernet-IEEE standards, standard Ethernet,changes in standard, Fast Ethernet, Gigabit Ethernet. Wireless LANs-IEEE 802.11, Bluetooth. Connecting LANS, Backbone Networks, Virtual LAN- connecting devices, backbone networks, virtual LANs. Wireless WANS: cellular telephone and satellite networks-cellular telephony, satellite networks.

Learning outcomes: At the end of the unit the students are able to

- Independently understand basic computer network technology and design of LANs both wired and wireless in an Ethernet network.
- Identify the different types of network devices and their functions within a network

UNIT II: Data link layer

(8 Periods)

Error detection and correction – Introduction, Block Coding, linear block codes, cyclic codes, checksum. Data link control- framing, flow and error control, noiseless channels, noisy channels, HDLC, Point –to- point protocols. Multiple access- Random access, controlled access, channelization.

Learning outcomes: At the end of the unit the students are able to

- Classify and apply appropriate error detection and correction algorithms for integrity of data
- Understand the working of data link layer protocols in providing a shared resource in data transfer

UNIT III: Network layer

(10 Periods)

Network layer: Logical addressing –IPv4 Addressing, IPv6 Addressing.Internet protocol: Internetworking,IPv4,IPv6, Transition from IPv4 to IPV6. Address mapping, Error reporting and multicasting-Address mapping,ICMP, IGMP.Delivery, forwarding and routing – Delivery,forwarding,unicast routing protocols,multicast routing protocols

Learning outcomes: At the end of the unit the students are able to

- Understand and building the skills of subnetting and routing mechanisms
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
- Classify the routing protocols and analyze how to assign the IP addresses for the given network

UNIT IV: Transport layer

(10 Periods)

Process to process delivery: UDP, TCP and SCTP-process to process delivery,user datagram protocol (UDP),TCP, SCTP. congestion control and quality of service-Data traffic, congestion,congestion control,two examples,quality of service, techniques to improve QoS, integrated services,differentiated services,QoS in switched networks.

Learning outcomes: At the end of the unit the students are able to

- Understand the building principals of end to end communication
- Able to distinguish protocols used in several real time applications and choose appropriate protocol in application design.
- Able to trouble suite congestion issues in a network by providing best QoS.

UNIT V: Application layer

(7 Periods)

Domain name system-name space, Domain name space,distribution of name space,DNS in internet,Resolution,DNS messages,types of records,registrars ,DDNS.Remote login: Electronic Mail and file transfer-remote logging,electronic mail,file transfer.WWW and HTTP- Architecture, Web documents,HTTP.

Learning outcomes: At the end of the unit the students are able to

- Understand the building principals of several application layer protocols such as DNS, Email and HTTP.
- Able to innumerate the design principals of protocols in designing an application

Text Book:

Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan,TMH.

Reference Books:

1. Computer Networks, A.S.Tanenbaum,4th edition, Pearson education.
2. Introduction to Data communications and Networking, W.Tomasi,Pearson education.
3. Data and Computer Communications, G.S.Hura and M.Singhal, CRC Press, Taylor and Francis Group.

CHANGE OF SYLLABUS:

Change of text book.

Note: This course is related to Employability/Skill development.

AUTOMATA THEORY & COMPILER DESIGN

IT313

L T P E O

3 1 0 1 s2

CREDITS: 3

Sessional Marks :40

End Exam Marks :60

End Exam : 3 Hours

Prerequisites

1. Course on—Computer Organization and Architecture
2. A course on—Computer Programming and Data Structures

Course Objectives

1. To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
2. To introduce the fundamental concepts of formal languages, grammars and automata theory.
3. Classify machines by their power to recognize languages.
4. Employ finite state machines to solve problems in computing.
5. To understand deterministic and non-deterministic machines.
6. Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
7. Topics include phases of compiler, parsing, code optimization techniques, intermediate code generation, code generation.

Course Outcomes

After completion of the course, the students will be able to:

CO-1: Able to employ finite state machines, context free grammars for modeling and solving computing problems.

CO-2: Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.

CO-3: Design and implement Top down and Bottom-Up parsers

CO-4: Analyze techniques to do intermediate code generation and optimization in order to improve the performance.

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 2 | 1 | 3 | 2 | | 1 | | 1 | 1 | 1 | | 2 | 2 | 2 |
| CO2 | 2 | 3 | 3 | 2 | 2 | 1 | | 1 | 1 | 1 | | 2 | 2 | 2 |
| CO3 | 2 | 3 | 3 | 2 | 2 | 1 | | 1 | 1 | 1 | | 2 | 2 | 2 |
| CO4 | 2 | 2 | 3 | 2 | 2 | 1 | | 1 | 1 | 1 | | 2 | 2 | 2 |

UNIT-I

12 Periods

Introduction to Finite Automata: Alphabets, Strings, Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ϵ -moves, Mealy and Moore Machines

Regular Expressions: Finite Automata and Regular Expressions, Closure Properties of Regular Sets, Pumping Lemma for Regular Sets, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Learning outcomes: At the end of this unit, the students will be able to

1. construct finite automata using Regular languages and expressions based on Chomsky hierarchy. Convert Non deterministic finite automata to Deterministic finite automata using Transition diagram or transition table.
2. Convert NFA with ϵ to NFA without ϵ for a given Transition diagram or table of finite automata. Convert Moore Machine to Mealy machine for a given machine vice versa.
3. For a given language predict the grammar is regular or not using pumping lemma.

UNIT-II

12 Periods

Context-Free Grammars: Definition of Context-

Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Trees, Ambiguity in Grammars and Languages, closure properties of CFL's.

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack,

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description.

Learning outcomes: At the end of this unit, the students will be able to

1. Derive Left most derivation tree and Right most derivation tree for a context free language using production parameters.
2. For a given context free grammar or language, construct push down automata .
3. Construct Turing machine for a given unrestricted grammars.

UNIT-III

10 Periods

Introduction to compiler: The structure of a compiler, the science of building a compiler, Lexical

Analysis, Role of Lexical Analysis, Lexical Analysis Vs. Parsing

Parsing: Parsing, role of parser, elimination of left recursion, left factoring, eliminating ambiguity from dangling-else grammar, classes of parsing, top down parsing - backtracking, recursive descent parsing, predictive parsers, LL(1) grammars.

Learning outcomes: At the end of this unit, the students will be able to

Illustrate compilation process for an expression through phases of compiler.

1. Identify tokens for a given source code.
2. Construct regular expressions for the given tokens and design the transition diagram.
3. Construct LL (1) grammar for the given context free grammar $G = (V, T, P, S)$ by using top down parsing approach and for the given grammar Predict the grammar is LL (1) or not.

UNIT-IV

12 Periods

Syntax Analysis: Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers Using Ambiguous Grammars.

Semantic analysis: SDT, Postfix notation, parsing tree, Intermediate code, Three address Code, Quadruples, Triples, symbol tables.

Learning outcomes: At the end of this unit, the students will be able to

1. Construct Operator precedence parser and shift reduce parser for the given context free grammar.
2. Construct LR parsing tables for the given context free grammar $G = (V, T, P, S)$ by using bottom up parsing approach and for the given grammar Predict the grammar is SLR(1) or not.
3. For the given statements, construct three address code and implement quadruples, triples, indirect triples.
4. Define data structures in the compiler construction such as abstract syntax trees, symbol tables, and stack machines.

UNIT-V

10 Periods

Code Optimization: Organization of code optimizer, basic blocks and flow graphs, optimization of basic blocks, the principal sources of optimization, the directed acyclic graph (DAG) representation of basic block, global data flow analysis.

Code Generation: Machine dependent code generation, object code forms, the target machine, a simple code generator, register allocation and assignment, peephole optimization.

Learning outcomes: At the end of this unit, the students will be able to

1. Analyze the program and minimize the code by using optimizing techniques and apply DAG for the optimized code.
2. Construct Directed Acyclic Graph (DAG) for the given three address code $x = y \text{ op } z$.

Text Books

1. Introduction to Automata Theory, Languages, and Computation, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, 3rd Edition, Pearson Education.
2. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, 2nd Edition,

References

1. Theory of Computer Science – Automata languages and computation, Mishra and Chandra shekaran, 2nd edition, PHI.
2. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
3. Introduction to Computer Theory, Daniel I. A. Cohen, John Wiley.
4. Kenneth. C. Loudon, Compiler Construction, Vikas Pub. House

Change of Syllabus

Combined two subjects of R15 as a single subject in R19 40% FLAT and 60% Compiler Design

SOFTWARE ENGINEERING

IT314
L T P E O
3 0 0 1 2

CREDITS 3
Sessional Marks: 40
End Exam: 3 Hours
End Exam Marks: 60

Pre requisites: computer fundamental, any programming languages

Course Objectives

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams.

Course Outcomes

1. Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
2. Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.
4. To manage time, processes and resources effectively by prioritising competing demands to achieve personal and team goals Identify and analyzes the common threats in each domain.

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO 1 | 3 | 2 | 3 | 3 | 1 | 1 | 1 | | | | 2 | 2 | 3 | 3 |
| CO 2 | 2 | 2 | 2 | 2 | 1 | | | | | 2 | 2 | 2 | 3 | 3 |
| CO 3 | 2 | 2 | 3 | 3 | 3 | | | | | | 1 | 1 | 3 | 3 |
| CO 4 | 2 | 2 | 3 | 3 | 3 | | | | | | 1 | 1 | 3 | 3 |

UNIT - I 8 Periods

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.

A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models.

Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

Learning outcomes:

1. Basic knowledge and understanding of the analysis and design of complex systems.
2. Ability to apply software engineering principles and techniques.

UNIT – II**10 Hours**

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System models: Context models, behavioral models, data models, object models, structured methods.

Learning outcomes:

1. defined as a process of analyzing user requirements
2. designing software application which will satisfy that requirements

UNIT – III**12 Hours**

Design Engineering: Design process and design quality, design concepts, the design model.

Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

Learning outcomes:

1. To produce efficient, reliable, robust and cost-effective software solutions.
2. Ability to perform independent research and analysis.

UNIT – IV**10 Hours**

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

Learning outcomes:

1. check whether the actual software product matches expected requirements
2. making it efficient and effective as per the quality standards defined for software products

UNIT – V**10 Hours**

Metrics for Process and Products: Software measurement, metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Learning outcome:

1. Ability to understand and meet ethical standards and legal responsibilities.
2. Ability to develop, maintain and evaluate large-scale software systems.

Text Books

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.

3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

Reference Books

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

Change of Syllabus: No change

ARTIFICIAL INTELLIGENCE

IT315
L T P E O
2 1 0 1 3

CREDITS 3
Sessional Marks: 40
End Exam Marks: 60
End Exam: 3 Hours

Prerequisite(s):

- **Good Command over programming languages**
- **Good knowledge on Mathematics**

Course Objectives

1. Explain how heuristicsoffer waysto pursuegoals in exponentiallylargesearchspaces.
2. Describe the representation and use of knowledge in inference-based problem solving byknowledge-basedagents.
3. Apply probability theory to describe and model agents operating in uncertainenvironments.
4. Describe waystosuperviseagentstolearnandimprove theirbehavior.
5. Explain adaptivelearningfromtheenvironment.
6. Relate theories of mind and the future of AI to ethical issues raised by artificialcognitivesystems.

Course Outcomes

After completion of the course, the students will be able to:

CO-1: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

CO-2: Apply basic principles of AI in solutions that require problem solving, inference, perception, Knowledge representation and learning.

CO-3: Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, neural networks.

CO-4: Solve problems with uncertain information using Bayesian approaches.

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 1 | 1 | | | | | | | 1 | 1 | | 1 | 2 | 2 |
| CO2 | 2 | 2 | 1 | 1 | 3 | 1 | | 1 | 1 | 1 | | 3 | 2 | 2 |
| CO3 | 2 | 1 | 3 | 2 | 3 | 3 | 1 | 2 | 3 | 2 | | 3 | 2 | 2 |
| CO4 | 2 | 2 | 2 | 1 | 1 | | | | 1 | 1 | | 3 | 2 | 2 |

SYLLABUS

UNIT I

10 Periods

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI. Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative- deepening a*, constraint satisfaction.

Learning outcomes: At the end of the unit, the students will be able to

- Gain perspective of AI and its foundations
- Identify the type of search strategy (blind/heuristic/adversarial) that is more appropriate to address a particular problem and implement the selected strategy

UNIT II

10 Periods

Logic concepts: Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic.

Learning outcomes: At the end of the unit, the students will be able to

- Solve problems in propositional logic, predicate calculus, and other axiomatic systems.
- Develop new facts from existing knowledge base using resolution and refutation.

UNIT III

10 Periods

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques:

Learning outcomes: At the end of the unit, the students will be able to

- Identify the role of knowledge representation, problem solving and learning in intelligent systems.
- Formulate knowledge representations in the form of logic expressions.

UNIT IV

10 Periods

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems, truth maintenance systems.

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, Dempster-Shafer theory

Learning outcomes: At the end of the unit, the students will be able to

- Differentiate traditional systems, Rule-based and Expert Systems.
- Analyze and apply probability theorem and Bayesian Networks.

UNIT V

10 Periods

Introduction to neural networks: Introduction, Model of artificial neuron, Characteristics of neural networks, Applications of Neural Networks, Genetic Algorithm, Learning Rules, Single layered Feed forward networks, Multi layered forward networks, Back Propagation networks

Learning outcomes: At the end of the unit, the students will be able to

- Become familiar with principles and applications of neural networks.
- Analyze various feedback networks.

Text Books

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Simon Haykin, —Neural Networks – A comprehensive Foundation, Pearson Education, 1999.

Reference Books

1. Artificial intelligence, structures and Strategies for Complex problem solving, George.F.Lugar, 5th edition, PEA
2. A first Course in Artificial Intelligence , Deepak Khemani
3. S. Rajasekaran, and G.A.Vijayalakshmi Pai, -Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications, PHI, New Delhi, 2004.
4. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
5. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

CHANGE OF SYLLABUS:

- **Unit-1 to Unit 4 there are no changes**
- **Unit-5 is replaced with Neural Networks**

| Previous Unit No | Current Unit No | Changes Incorporated |
|----------------------------|------------------------|---|
| Unit-1 | Unit-1 | No Changes |
| Unit-2 | Unit-2 | No Changes |
| Unit-3 | Unit-3 | No Changes |
| Unit-4 | Unit-4 | No Changes |
| Unit-5 | Unit-5 | <u>Topics included</u> <ul style="list-style-type: none">• Introduction• Model of artificial neuron• Characteristics of neural networks• Applications of Neural Networks• Genetic Algorithm• Learning Rules• Single layered Feed forward networks, Multi layered forward networks• Back Propagation networks <u>Topics excluded</u> <ul style="list-style-type: none">• Robotics 20% change has taken place |
| Overall change: 20% | | |

Note: This course is related to Employability/Skill development.

UML AND TESTING TOOLS LAB

COURSE CODEIT317

L T P E O

0 0 3 0 3

CREDITS 3

Sessional Marks: 50

End Exam Marks: 50

End Exam:3 Hours

Prerequisite: Object oriented concepts, C++ programming, Fundamentals of Software Engineering

Course Objectives:

- ☐ Learn the basics of OO analysis and design skills
- ☐ Be exposed to the UML design diagrams
- ☐ Learn to map design to code
- ☐ Be familiar with the various testing technique
- ☐ To learn how to write software testing documents, and communicate with engineers in various forms. To gain the techniques and skills on how to use modern software testing tools to support software testing projects

Course Outcomes:

| After completion of this course, a student will be able to: | |
|---|--|
| 1. | Design and implement projects using OO concepts |
| 2. | Use the UML analysis and design diagrams |
| 3. | Execute how to do performance testing using testing tools including Win runner and JMeter respectively |

Mapping of course outcomes with program outcomes:

| COs/POs -PSOs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO1 0 | PO1 1 | PO1 2 | PSO1 | PSO2 |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|------|------|
| CO1 | 1 | 2 | 2 | 3 | 3 | | | | 3 | | 3 | 2 | 2 | 2 |
| CO2 | 2 | 2 | 3 | 3 | 3 | | | | 3 | | 3 | 2 | 2 | 3 |
| CO3 | 3 | 2 | 3 | 3 | 3 | | | | 3 | | 3 | 2 | 2 | 3 |

LIST OF EXPERIMENTS

1. Write down the problem statement for a suggested system of relevance. –CO1
2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system. – CO1
3. To perform the function oriented diagram: Data Flow Diagram (DFD) and structured chart. –CO1
4. To perform the user_s view analysis for the suggested system: Use case diagram. –CO2
5. To draw the structural view diagram for the system: Class diagram, object diagram.—CO2
6. To draw the behavioral view diagram : State-chart diagram, Activity diagram ----- CO2
7. To perform the behavioral view diagram for the suggested system : Sequence diagram, Collaboration diagram –CO2
8. To perform the implementation view diagram: Component diagram for the system.-CO2
9. To perform the environmental view diagram: Deployment diagram for the system--- CO2
10. To perform various testing using the testing tool unit testing, integration testing for a sample code of the suggested system. (CO2)
11. A program for written in C language for Matrix Multiplication fails| introspect the causes for its failure and write down the possible reasons for its failure (CO3)
12. Take ATM system and study its system specifications and report various bugs. (CO3)
13. Write the test cases for banking application (CO3)
14. Study of testing tool (e.g.winrunner) (CO3)
15. Study of web testing tool (e.g. selenium) (CO3)
16. Study of bug tracking tool (e.g.bugzilla) (CO3)
17. Study of any test management tool (e.g. test director) (CO3)
18. Study of any open source testing tool (e.g. test link) (CO3)
19. Test Facebook Manually (beyond the syllabus) (CO3)
20. Take a mini project and execute it during SDLC create the various UML diagrams required designing and all testing documents like test plan, TCD etc. (CO3)

SUGGESTED DOMAINS FOR MINI-PROJECT:

- a. Student Result ManagementSystem
- b. Library managementsystem
- c. Inventory controlsystem
- d. Accounting system
- e. Fast food billingsystem
- f. Bank loansystem
- g. Blood banksystem
- h. Railway reservationsystem
- i. Automatic tellermachine
- j. Video library managementsystem
- k. Hotel managementsystem
- l. Hostel managementsystem
- m. E-ticking
- n. Share onlinetrading
- o. Hostel managementsystem
- p. Resource managementsystem
- q. Court case managementsystem

LAB EQUIPMENTS

SUGGESTED SOFTWARETOOLS:

Rational Suite (or) Argo UML (or) equivalent, Eclipse IDE and Junit

SOFTWARE TOOLS

Rational Suite

Open Source Alternatives: ArgoUML, Visual

Paradigm

Eclipse IDE and JUnit, Bugzilla

PCs 30

Reference Books:

Grady Booch, the UML user guide.

K.K. Aggarwal & Yogesh Singh, —Software EngineeringI, New Age International, 2005

Pankaj Jalote, —An Integrated Approach to Software EngineeringI, Second Edition

COMPUTER NETWORKS LAB

IT318

Instruction: 3 Periods/Week

End Exam: 3 Hours

CREDITS 1.5

Sessional Marks : 50

End Exam Marks: 50

Prerequisite(s): Computer Networks Concepts.

Course Objectives:

1. The objective of this lab is to introduce students to the design issues that arise in building and using networks and to give students hands on experience with building and using network services.
2. The practical issues to be stressed include design and installation of LAN, network operating system, setting up a network system such as users and their permissions and rights, groups and domains, adding workstations and sharing of resources across the network

Course Outcomes:

After completion of this course, a student will be able to:

CO-1 Understand and identify the various network infrastructure and command needed for network design and troubleshooting.

CO-2 Understand the building components of network design.

CO-3 Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Mapping of Course Outcomes with POs and PSOs

| | | PO | | | | | | | | | | | | PSO | |
|----|---|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO | 1 | 3 | | | | 3 | | | | | | | | 3 | 3 |
| | 2 | 3 | | | | 3 | | | | | | | | 3 | 3 |
| | 3 | 3 | | | | 3 | | | | | | | | 3 | 3 |

NETWORKING LAB EXPERIMENTS

List of Experiments

I. STUDY EXPERIMENTS:

(2 weeks duration)

This study experiments helps the learners to understand certain network components like Hubs, switches, routers, wireless access modems, transmission medium (coaxial cables, twisted pair cables, optical fiber) and several networking components

| | |
|---|-----|
| 1. Study of specifications of latest desktops and laptops | CO1 |
| 2. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, routers etc. | CO1 |
| 3. Familiarization with Transmission media and Tools: Co axial cable, UTP Cable, Crimping tool, Connectors etc. | CO1 |
| 4. Study of various LAN topologies and their creation using network devices, cables and computers | CO2 |
| 5. Study of Client Server Architecture | CO2 |
| 6. To study LAN using bus, tree, star topology | CO2 |
| 7. To study pc to pc communication using parallel port | CO2 |
| 8. To study fiber optics communication | CO2 |
| 9. To study wireless communication | CO2 |

II. HANDS ON EXPERIMENTS

(6 weeks duration)

This set of experiments helps the learners in gaining expertise in developing and maintaining a certain network which includes setting up a LAN network and maintaining it, configuring routers, switches and firewalls using a certain Hardware components.

| | |
|--|-----|
| 1. preparing straight and cross cables. | CO2 |
| 2. Study of network commands and network configuration commands | CO2 |
| 3. Implementation of file and printer sharing | CO2 |
| 4. Designing and implementing Class A, B, and C Networks | CO2 |
| 5. Subnet planning and its implementation. | CO2 |
| 6. To configure the IP address for a computer connected to LAN and to configure network parameters of a web browser for the same computer. | CO2 |
| 7. To configure WLAN | CO3 |
| 8. To install and configure wireless access points | CO2 |

| | |
|---------------------------------------|-----|
| 9. To configure hub/switch and router | CO1 |
| 10. Configuring Network Neighborhood. | CO2 |

III. PROGRAMMING EXPERIMENTS (6 weeks duration)

This set of programming experiments helps the learners in simulating different routing protocols, network topologies and several layered protocols using simulators like NS2 and packet tracing software's

| | |
|--|-----|
| 1. Configure a network topology using packet tracing software | CO3 |
| 2. Configure a network using Distance vector routing protocol using packet tracer software | CO3 |
| 3. Static and dynamic routing using packet tracer software | CO3 |
| 4. DHCP, DNS, HTTP configuration using packet tracer software | CO3 |
| 5. Configure a Network with Virtual LANS | CO3 |

Reference Books:

1. CCNA Study guide

Change of syllabus:

Topics Included

- VLANS

Topics Excluded

- To install any one open source packet capture software like wire shark etc
- To configure modem of a computer
- Configuring a router based firewall

Overall change:20%

WEB TECHNOLOGIES LAB

IT 319
L T P E O
0 0 3 0 3

CREDITS 3
Sessional Marks: 50
End Exam Marks: 50
End Exam: 3 Hours

Prerequisite(s): Basic Knowledge on core Java Concepts.

Course Objectives:

- Develop web applications using HTML, DHTML, XML and Java Script.
- Develop web applications by connecting to the databases to validate Credentials and to get the results.
- Gain the skills and project-based experience needed for entry into web designing and development careers.

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

CO-1: Design web applications using Technologies like HTML, JavaScript, PHP, Django and content management system (CMS).

CO-2: Apply CSS in Designing WebPages.

CO-3: Validate the credentials and get the results by Connecting to Databases.

Mapping of Course Outcomes with POs and PSOs

| COs/ POs- PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| CO1 | 3 | 3 | 3 | 3 | 3 | | | | 3 | 3 | 1 | 2 | 3 | |
| CO2 | 3 | | 3 | | 3 | | | | 1 | | | 1 | 3 | |
| CO3 | 3 | 3 | 3 | | 3 | | | | 1 | | | 2 | 3 | |

UNIT-1:

Introduction to Web Design: Introduction to hypertext markup language (HTML) , creating web pages, lists, hyperlinks, tables, web forms, inserting images, frames, hosting options and domain name registration. Customized Features: Cascading style sheet (CSS) for text formatting and other manipulations.

Learning outcomes: At the end of this unit the Students will be able to

- Get Familiarize with basics of the Internet Programming.
- Design web applications using HTML, DHTML and CSS.

UNIT-2:

JavaScript: Introduction to JavaScript, variables, constants, Data types, operations, Loops, Arrays, Functions, Strings & String methods, JS Forms, Forms API.

Bootstrap: Bootstrap Buttons, Button Groups, list groups, Images, Tables, Alerts, Forms, Inputs.

Learning outcomes: At the end of this unit the students will be able to

- Get familiarize with Java Scripting to process data using Arrays, Strings and functions.
- Design front-end framework for modern websites and web apps using Bootstrap.

UNIT-3:

PHP Programming: Introduction to PHP, variables, data types, Strings, numbers, constants, operations, PHP conditional events and Loops, functions, Arrays, PHP Forms.

Learning outcomes: At the end of this unit the students will be able to

- Develop Static websites or Dynamic websites or Web applications using PHP.
- Manage dynamic content, databases, session tracking using PHP.

UNIT-4:

Django: Installing Django, Basics of Dynamic Web Pages, Django Template System, Interacting with Database: Models, Form Processing.

Learning outcomes: At the end of this unit the students will be able to

- Familiarize with Python web framework-Django.
- Develop web applications using Django to interact with Databases.

UNIT-5:

Content management system (CMS): Introduction to CMS, Installing Joomla and Drupal, CMS Admin (Basics), Site Organization, Creating & Editing Articles, Menus & Modules, Creating Attractive Web Pages with Templates.

Learning outcomes: At the end of this unit the students will be able to

- Manage and edit web content, like images and text on the website using WYSIWYG editor (What You See Is What You Get).

Text Books:

1. Web Programming: building internet applications, Chris Bates 2nd edition, Wiley 2002
2. JavaScript: The Definitive Guide, David Flanagan, 7th Edition, O'Reilly
3. PHP: The Complete Reference Paperback, Steven Holzner, McGraw Hill, 2007.
4. -Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly, 3rd Edition, 2014.

Online Resources:

1. Web framework for Python Django by Suvash Sedhain (online edition: Link- <https://www.programmer-books.com/wp-content/uploads/2018/08/Django-Book-Web-framework-for-Python.pdf>).
2. <https://www.w3schools.com/bootstrap4>
3. <https://www.javatpoint.com/joomla>

LIST OF PROGRAMS:

| Sl. No | PROGRAM | CO |
|--------|---|----|
| 1 | Week-1-HTML: Program to illustrate body and pre tags. | 1 |
| 2 | Program to illustrate text Font tag. | 1 |
| 3 | Program to illustrate comment, h1...h6, and div tag. | 1 |
| 4 | Program to illustrate text formatting tags. | 1 |
| 5 | Program to illustrate Order List tag. | 1 |
| 6 | Program to illustrate Unorder List tag. | 1 |
| 7 | Program to illustrate Img tag. | 1 |
| 8 | Program to illustrate Hyper Link tag (Anchor tag). | 1 |
| 9 | Program to illustrate Table tag. | 1 |
| 10 | Program to illustrate Frame tag. | 1 |
| 11 | Program to illustrate Form tag. | 1 |
| 12 | WEEK-2: Create a complete registration web page using HTML. | 1 |
| 13 | Week-3- CSS: Program to illustrate CSS (cascading style sheet). | 2 |
| 14 | Program to Apply Different background colours for each line using css. | 2 |
| 15 | Program to Apply different colours for text using css. | 2 |
| 16 | To design login, registration page for online cart like Amazon using html, css. | 2 |
| 17 | Design login and registration page for online job portal using html and css. | 2 |
| 18 | To Write a Program to illustrate Embedded Multimedia. | 2 |
| 19 | Case Study: Create web pages: 1.cart page 2.catalogue page using html and css. | |
| 20 | Week-4: Program on Java Script To Perform All Arithmetic Operations. | 1 |
| 21 | Program on Java Script To Check Whether Given Number Is Prime Or Not. | 1 |
| 22 | Design HTML page including JavaScript that accepts given set of integer numbers and display them in descending order. | 1 |
| 23 | Program To Illustrate Subroutine. | 1 |
| 24 | Program on Java Script To Illustrate Different In-Built String Functions. | 1 |

| | | |
|----|---|---|
| 25 | Case Study: Design html form which contains all types of input fields & validate fields using java script. | 3 |
| 26 | BOOTSTRAP: Week-5: Apply bootstrap for Login form and tables. | 1 |
| 27 | Apply bootstrap for Images, links, buttons, list. | 1 |
| 28 | Week-6 PHP: Design php page to store registration & retrieve login details into/from database. | 3 |
| 29 | Design php page to check whether a number is prime or not. | 1 |
| 30 | Design php page to calculate matrix multiplication. | 1 |
| 31 | Design a web page using sessions where the count increments each time. | 1 |
| 32 | Week-7: Deploy login page and display hello world using sample php script. | 1 |
| 33 | Design a php page to get name and age values using \$-GET or \$_POST. | 1 |
| 34 | Using php Associative arrays display a web page which shows: O/P: Salary of ramesh:50000 Salary of suresh:60000 Salaray of rajesh:40000 | 1 |
| 35 | Create a form which contains customer id, name, email, phone number using php insert above values into customer table and create php report. | 1 |
| 36 | DJANGO: Week-8: i) Run Html login page using django. | 1 |
| | ii) Design a Welcome web page using django. | 1 |
| 37 | Week-9: Using django create a customer table through models.py, views.py and urls.py finally display customer details on webpage. | 1 |
| 38 | Week-10: Write procedure for ZOOMLA INSTALLATION and Design one webpage using ZOOMLA. | 1 |
| 39 | Week-11: Write procedure for DRUPAL INSTALLATION and Design one webpage using DRUPAL. | 1 |
| 40 | Week-12: CASE STUDY. | 1 |

CHANGE OF SYLLABUS:

Java Script is introduced

Django is introduced

Overall change=20%

CONSTITUTION OF INDIA & INTELLECTUAL PROPERTY RIGHTS (CI-3 & IPR -2)

IT
L T P E O
2 1 0 0 0

Credits: NIL
Sessional Marks: 50
End Exam Marks: NIL

Course Objectives

- To impart knowledge in basic concepts of Constitution of India
- To understand the fundamental principles of Intellectual Property Rights and its importance

At the end of this course, students will be able to:

| COURSE OUTCOMES | |
|-----------------|--|
| CO-1 | To impart basic knowledge about the Constitution of India |
| CO-2 | Comprehend the Fundamental Rights and Fundamental Duties of the Indian Citizen to implant morality, social values and their social responsibilities. |
| CO-3 | Familiarize with distribution of powers and functions of Local Self Government, state and central policies and amendment procedure |
| CO-4 | Understand the fundamental principles of IPR |
| CO-5 | Appraise of IP rights like patents, industrial design, trademark, copyrights for effective protection and utilization of their innovations. |

Module 1-Introduction and Basic Information about Indian Constitution:

Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947 , Enforcement of the Constitution, Indian Constitution and its Salient Features, Preamble of the Constitution.

Module 2 - Fundamental Rights and Directive Principles

Scheme of Fundamental Rights, Fundamental Duties, Directive Principles of State Policy – Its importance and implementation, Scheme of the Fundamental Right to certain Freedom under Article 19, Scope of the Right to Life and Personal Liberty under Article 21

Module 3 - Administrative organisation&Amendments

Federal structure and distribution of legislative and financial powers between the Union and the States, Parliamentary Form of Government in India – The constitution powers and status of the President of India, Amendment of the Constitutional Powers and Procedure,

Module 4 - Intellectual Property Rights Information:

Introduction to IPRs, Basic concepts and need for Intellectual Property – Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR

Module 5 - REGISTRATION OF IPRs

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical

Indications, Trade Secrets and Industrial Design registration in India and Abroad

Text Books:

1. V. Scoble Vinod, *Managing Intellectual Property*, Prentice Hall of India Pvt Ltd, 2012
2. S. V. Satakar, —*Intellectual Property Rights and Copy Rights*, Ess Publications, New Delhi, 2002
3. Brij Kishore Sharma: *Introduction to the Indian Constitution*, 8th Edition, PHI Learning Pvt. Ltd.
4. Granville Austin: *The Indian Constitution: Cornerstone of a Nation (Classic Reissue)* Oxford University Press.

References:

1. Deborah E. Bouchoux, —*Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets*, Cengage Learning, Third Edition, 2012.
 2. Prabuddha Ganguli, *Intellectual Property Rights: Unleashing the Knowledge Economy*, Mc Graw Hill Education, 2011.
 3. Edited by Derek Bosworth and Elizabeth Webster, *The Management of Intellectual Property*, Edward Elgar Publishing Ltd., 2013.
 4. Subhash C. Kashyap: *Our Constitution: An Introduction to India's Constitution and Constitutional Law*, NBT, 2018.
 5. Madhav Khosla: *The Indian Constitution*, Oxford University Press.
 6. PM Bakshi: *The Constitution of India*, Latest Edition, Universal Law Publishing.
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SEMESTER-II

UNIX NETWORK PROGRAMMING

(Professional Elective – I)

IT322(A)
L T P E O
3 0 0 1 2

CREDITS 3
Sessional Marks : 40
End Exam Marks: 60
End Exam: 3 Hours

Prerequisite(s): C programming, Basics of Unix systems, Basics of computer networks

Course Objectives

1. Students will gain the understanding of inter process communication and implementation of different forms of IPC in client-server environment
2. Students will gain the understanding of core network programming by using sockets and transport layer protocols like TCP and UDP
3. Develop skills in network programming techniques.
4. Apply the client-server model in networking applications.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Understand the fundamental concepts of UNIX systems in implementing its IPC.

CO-2: Explain the client-server paradigm and socket structures with underlying mechanisms to program client server model.

CO-3: Get familiar with the variety of interfaces and frameworks for network applications

CO-4: Apply the applications of sockets and demonstrate skill to design simple applications

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|--------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO1 | 3 | 2 | | | 2 | | | 1 | | | 2 | 1 | 3 | 2 |
| CO2 | 3 | 2 | | | 3 | | | 1 | | | 2 | 2 | 3 | 2 |
| CO3 | 3 | 2 | | | 3 | | | 1 | | | 2 | 2 | 3 | 2 |
| CO4 | 3 | 2 | | | 3 | | | 2 | | | 2 | 2 | 3 | 2 |

UNIT-I Overview of system programming & Inter process communication. 12 Periods

Unix History; Fundamental Concepts; System Programming Concepts; Unix File I/O; Standard I/O Library;fcntl; ioctl; Unix Processes; Program Execution; Error Handling; Unix Signals.

Unix IPC: Pipes, FIFOs, System V Message queues , System V Semaphores, System V Shared Memory, Memory mapping

Learning outcomes: At the end of this unit, the students will be able to

- Familiarize with basic fundamentals of UNIX systems
- make use of various solutions to perform inter-process communications

UNIT-II Socket Programming

12 Periods

Overview of Transport Layer Protocols: TCP, UDP; Client- server architectures; Sockets, Sockaddr structure; TCP and UDP Socket API; TCP client-server examples; UDP examples; Socket Options; Domain name conversion API; IPv6 differences; IPv4-IPv6- compatibility; Choice: TCP or UDP?; Adding reliability to UDP applications;

Learning outcomes: At the end of this unit, the students will be able to

- understand the key protocols which support the Internet
- demonstrate advanced knowledge of programming for network communications
- have a detailed knowledge of the TCP/UDP Sockets

UNIT-III UNIX I/O models & Domain Protocols

10 Periods

Non-Blocking I/O; I/O multiplexing; Signal driven I/O; Asynchronous I/O (POSIX API); Client and server design with select() call; shutdown(); Advanced I/O API; Addressing; Socket pair; Descriptor passing; User credentials; Credential passing; Daemon processes; inetd super server, syslogd

Learning outcomes: At the end of this unit, the students will be able to

- demonstrate advanced knowledge of programming for network communications
- make use of different types of I/O such as non-blocking I/O and event driven I/O
- create applications using several client server credentials which can result in effective communication

UNIT-IV Client-server Design Alternatives

9 Periods

Overview of Pthreads; Pthreads Synchronization; Non-blocking I/O; Non-blocking connect; Client alternative designs; Performance analysis; preforking models; Prethreading models; Performance analysis; Case study: Apache; The C10K problem; Event- driven architectures; Concurrency models for UDP servers;

Learning outcomes: At the end of this unit, the students will be able to

- understand several alternative models in an Unix network programming environment
- analyze specific system design using case studies

UNIT-V Multicasting & Raw sockets, Data link access

9 Periods

Broadcasting: concepts & implementation; Multicasting: addresses; concepts, implementation; Broadcasting & multicasting in IPv6; Socket creation; input, output; ping: design & implementation; trace route: design & implementation; UDP asynchronous errors;

Learning outcomes: At the end of this unit, the students will be able to

- learn advanced programming techniques such as IPv6 Socket Programming, Broadcasting, Multicasting
- apply knowledge of Unix/Linux operating systems to build robust client and server software for this environment;

Text Books (TNR-12-B-U)

1. W. R. Stevens, UNIX Network Programming, Vol I, Networking APIs: Sockets and XTI, Pearson Education, 3rd Edition.
2. W.R.Stevens, UNIX Network Programming, Interprocess Communication, Vol II Pearson Education, 2nd Edition..

References

1. The Linux Programming Interface: Linux and UNIX System Programming Handbook by Michael Kerrisk, No Starch Press © 2010 (<http://library.books24x7.com/toc.aspx?bookid=41558>)
2. W.R. Stevens, Advanced Programming in the UNIX Environment, Pearson Education, 2008.

Change of Syllabus

| Previous Unit No(R15) | Current Unit No (R19) | Changes Incorporated |
|-----------------------------------|--|--|
| Unit-1 | Unit-1 Overview of system programming & Inter process communication | <u>Topics included</u> <ul style="list-style-type: none">• Unix Fundamentals• Inter-process communication <u>Topics ignored</u> <ul style="list-style-type: none">• OSI model• Transport layer protocols 10% change in the first unit |
| Unit-2 | Unit-2 Socket Programming | <u>Topics included</u> <ul style="list-style-type: none">• Overview of transport layer protocols 5% change has taken place |
| Unit-3 | Unit-3 UNIX I/O models & Domain Protocols | No concepts are removed or included The topics are reorganized according to the prescribed text |
| Unit-4 | Unit-4 Client-server Design Alternatives | <u>Topics included</u> <ul style="list-style-type: none">• Threads• Alternative design• Case studies 10% change has taken place |
| Unit-5 | Unit-5 Classification | <u>Topics included</u> <ul style="list-style-type: none">• Broadcasting• Multicasting• Socket creation <u>Topics excluded</u> <ul style="list-style-type: none">• Concepts of classification 10% change has taken place |
| <u>Overall change: 35%</u> | | |

DATA WAREHOUSING & DATA MINING

(Professional Elective – I)

IT322 (B)

L T P E O
3 0 0 1 2

CREDITS 3

Sessional Marks: 40
End Exam Marks: 60
End Exam: 3 Hours

Prerequisite(s): DBMS

Course Objectives

1. To introduce the basic concepts of Data Warehouse and Data Mining techniques.
2. Examine the types of the data to be mined and apply preprocessing methods on raw data.
3. Discover interesting patterns, analyse supervised and unsupervised models and estimate the accuracy of the algorithms.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Apply critical operations involved in modelling and designing data warehouses.

CO-2: Evaluate data quality and implement well-known data mining techniques for obtaining interesting knowledge from data.

CO-3: Reflect on advantages and disadvantages of data mining solutions to solve real life problems.

CO-4: Evaluate the models, their usefulness and useability towards research and innovation.

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|--------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO1 | 2 | 2 | 3 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | | 1 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | | 1 | 3 | 2 |
| CO3 | 1 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | | 1 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 1 | | 2 | 3 | 2 |

UNIT-I Data warehouse

10 Periods

Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modelling, Schema Design, Star and Snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

Learning outcomes: At the end of this unit, the students will be able to

- Perform ETL operations.
- Design the data warehouse.
- Apply OLAP operations

UNIT-II Introduction to Data Mining

10 Periods

Fundamentals of data mining: Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major issues in Data Mining.

Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration & Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Applications and Trends in Data mining: Applications- Decisions involving judgments, Screening, Images, Load forecasting, Diagnosis, Marketing, Sales & financial domains, Bio-medical; Trends in Data Mining

Learning outcomes: At the end of this unit, the students will be able to

- Classify data mining systems and identify the major issues in data mining.
- Apply preprocessing steps.
- Characterize real world applications of data mining.

UNIT-III Association Rules

10 Periods

Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

Learning outcomes: At the end of this unit, the students will be able to

- Apply Apriori & FP growth algorithms to generate association rules.
- Represent frequent item sets in a compact way.

UNIT-IV Classification

10 Periods

Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision Trees- Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest Neighbour classification- Algorithm and Characteristics, Prediction: Accuracy and Error measures, Evaluating the accuracy of a classifier or a predictor, Ensemble methods.

Learning outcomes: At the end of this unit, the students will be able to

- Apply classification algorithms such as decision trees, Naïve bayes classifier, Bayesian belief networks and KNN for prediction.
- Analyse classifiers using classification metrics.
- Know the importance of ensemble methods.

UNIT-V Clustering

10 Periods

Clustering Overview, A Categorization of Major Clustering Methods, partitioning methods, hierarchical methods, partitioning clustering-k-means algorithm, Hierarchical clustering-agglomerative methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Key Issues in Hierarchical Clustering, Strengths and Weakness, Outlier Detection.

Learning outcomes: At the end of this unit, the students will be able to

- Categorize clustering techniques.
- Apply basic clustering methods to cluster the data.
- Identify outliers in the given data.

TEXT BOOKS

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann Publishers, Elsevier, 3 Edition, 2012.
2. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, , Pearson Education Limited 2014.

REFERENCES

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Ware Housing Fundamentals, PualrajPonnaiah, Wiley Student Edition.
3. The Data Ware House Life Cycle Toolkit- Ralph Kimball, Wiley Student Edition.
4. Data Mining, VikaramPudi, P Radha Krishna, Oxford University.

CHANGE OF SYLLABUS:

- **Unit-1 and Unit-2 are swapped.**
- **Unit-3 is replaced with Association rule mining**
- **Unit-4 is replaced with Classification**
- **Unit-5 is replaced with Clustering**

| Previous Unit No | Current Unit No | Changes Incorporated |
|-------------------------|--|--|
| Unit-2 | Unit-1 Introduction to Data Warehousing | <u>Topics included</u> <ul style="list-style-type: none"> • Difference between operational database systems and data warehouses • Extraction-Transformation-Loading • Schema Design, Star and Snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics 6% concepts relevant to data warehouse are included. |
| Unit-1 | Unit-2 Introduction to Data Mining | <u>Topics included</u> <ul style="list-style-type: none"> • Applications and Trends in Data mining: Applications- Decisions involving judgments, Screening, Images, Load forecasting, Diagnosis, Marketing, Sales & financial domains, Bio-medical; Trends in Data Mining <u>Topics ignored</u> <ul style="list-style-type: none"> • Types of databases 4% concepts pertaining to applications and trends are included |
| Unit-4 | Unit-3 Association Rules | <u>Topics included</u> <ul style="list-style-type: none"> • Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set. <u>Topics Ignored</u> <ul style="list-style-type: none"> • Concept description The topics are reorganized by including the basics of association rule mining and excluding few advanced topics – 4% change |
| Unit-5 | Unit-4 Classification | <u>Topics included</u> <ul style="list-style-type: none"> • K- Nearest Neighbour classification-Algorithm and Characteristics, Prediction: Accuracy and Error measures, Evaluating the accuracy of a classifier or a predictor • Ensemble methods. <u>Topics ignored</u> <ul style="list-style-type: none"> • Classification by Back propagation, Classification |

| | | |
|-----------------------------------|----------------------|--|
| | | <ul style="list-style-type: none"> • Based on Concepts from Association Rule Mining 4% change has taken place |
| | Unit-5 Clustering | <u>Topics included</u> <ul style="list-style-type: none"> • Hierarchical methods • hierarchical clustering-agglomerative methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, • Key Issues in Hierarchical Clustering • Strengths and Weakness • Outlier Detection. About 7% change has taken place emphasizing more on clustering concepts. |
| <u>Overall change: 25%</u> | | |

Note: This course is related to Employability/Skill development.

BUSINESS AUTOMATION
(Professional Elective – I)

IT322(C)
L T P E O
3 0 0 1 2

CREDITS 3
Sessional Marks : 40
End Exam Marks: 60
End Exam: 3 Hours

Prerequisite(s): Nil

Course Objectives

There are a number of methodologies and strategies for automating business processes, such as paradigm shifts, re-engineering, process redesign, and continuous improvement. In all of them, the objective is to define a new way of performing the processes in the company, aligning their execution with both the strategic objectives and goals of the organization, as well as delivering more value to the final customer, guaranteeing the complete service of their needs.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Analyse the performance of existing processes and identify process improvement opportunities/strategies, Life cycle of Business process.

CO-2: Create a BPM implementation strategy and implementation plan for an organization. Explain the role of Information Technology and other resources in BPM.

CO-3: Synthesize the principles Automation and Business intelligence, Importance of communication in Business Process.

CO-4: Analyze processes of reengineering and implementing HRIS in Business Automation.

Mapping of Course Outcomes with POs and PSOs(TNR-12-B-U-C)

| COs/POs-PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|--------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO1 | | | | | | | 1 | 1 | | | 2 | 1 | 1 | 1 |
| CO2 | | | | 1 | 1 | | 1 | 1 | 2 | | 2 | 1 | 1 | 1 |
| CO3 | | | | | | | 1 | 1 | | 3 | 2 | 1 | 1 | 1 |
| CO4 | | | | | | | 1 | 1 | | | 2 | 1 | 1 | 1 |

UNIT-I

10 Periods

Understanding Business Process Automation: Business process automation, BPA vs BPM, Agile process automation, Development of automation market, Supply chain optimization, existing BPA tools, Business benefits from BPA, Evolution of BPA.

Learning outcomes: At the end of this unit, the students will be able to

- Differentiate BPM and BPA.
- Know the evolution of BPA.

UNIT-II

12 Periods

Automation in Business process Lifecycle Management: Business process Management, Business process lifecycle, Design and analysis of Business process, Business process execution.

Learning outcomes: At the end of this unit, the students will be able to

- Classify phases in Business process lifecycle management
- Apply Business process execution.

UNIT-III

10 Periods

Automation and Business Intelligence: Introduction, History of Business intelligence, The need for intelligence, BI Environment and Architecture, ETL, Data warehouse, Data Mart, OLAP, Data Mining, Benefits of BI, ROI on BI.

Learning outcomes: At the end of this unit, the students will be able to

- Know the need for Business intelligence.
- Understand the architecture of BI environment.

UNIT-IV

12 Periods

Technology Enabled Business communication: Introduction, Using Telephones to Business advantages, Development of Markets using mobile phones, Effect of automation in Business communication.

Learning outcomes: At the end of this unit, the students will be able to

- Know the technology used in Business markets.
- Understand the effect of automation in business communication.

UNIT-V

10 Periods

Process Automation in HR and Payroll: Introduction, Understanding the need for HRIS, Evolution of HRIS, Process reengineering through Automation, Trends in HRIS, Developing HRIS, Project execution, project closure, Implementing HRIS.

Learning outcomes: At the end of this unit, the students will be able to

- Know the need for HRIS.
- Identify the trends in HRIS

TEXT BOOKS

Sanjay Mohapatra, Business Process Automation - PHI learning 2009., ISBN-978-81-203-3927-9.

(TNR-12) only two can be included

REFERENCES

1. John Jeston, Business process management 4th edition
2. Marlon dumas, Fundamentals of Business process management- 2nd Edition.

CHANGE OF SYLLABUS

New Subject added in R19 Regulation.

EMBEDDED SYSTEMS

(Professional Elective - I)

IT 322(D)
L T P E O
3 0 0 1 2

CREDITS 3
Sessional Marks: 40
End Exam Marks:60
End Exam: 3 Hours

Prerequisite(s): Knowledge in Computer organization, Micro Processor and Operating System.

Course Objectives

The Focus of the Course is the

1. Understand embedded system and its applications.
2. What is core embedded systems and its components
3. Introduction to Architecture of 8051 and also about registers, PSW and memory.
4. Outline of RTOS and RTOS Environment
5. Build embedded software using different software tools.

Course Outcomes:

After completion of this course, the students will be able to:

CO 1: Identify the need of embedded system and its components

CO 2: Demonstrate the architecture of 8051 microcontroller

CO 3: Classify RTOS and its tasks

CO 4: Elaborating different Embedded software development tools.

Mapping of Course Outcomes with POs and PSOs

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| CO2 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| CO3 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| CO4 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |

UNIT-I:Introduction to Embedded systems

8 Periods

What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems.

Learning Outcomes: At the end of this unit students will be able to

- Describe the importance of Embedded system and its classification.
- Compare and contrast the embedded system and general computing system.

UNIT – II

8 periods

Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components. **Embedded System - Applications & domain specific** – washing machine- Application specific Embedded system, Automotive – domain specific

Learning Outcomes: At the end of this unit students will be able to

- List the core of embedded system.
- Compare RISC and CISC processors
- Demonstrate on sensors and actuators.
- Applications of Embedded system

UNIT-III :Micro Processor and micro-Controller

12 Periods

Introduction, microprocessor, microcontroller, and comparison, **8051 Architecture:** 8051 micro control hardware, Program counter and data pointer, A and B CPU registers, flags and PSW, Internal memory, stack and stack pointer, Special function registers, Input output ports, pins and circuits.

Learning Outcomes: At the end of this unit students will be able to

- Microprocessor vs micro controller.
- Understand the architecture of 8051 and pin diagram
- Demonstration of various registers and IO ports

Unit IV: Introduction to RTOS

12Periods

Tasks and tasks states, tasks and data, semaphores and shared data More OS Services: Message queues, Mailboxes and pipes, Timer functions, events, memory management, Interrupt routines in an RTOS Environment.

Learning Outcomes: At the end of this unit students will be able to

- Know the importance of RTOS.
- List issues in real-time system scenario.
- Summarize various inter process communications.

Unit V: Embedded software Development Tools:

8 Periods

Host and target machines, Linkers/Locators for embedded software, getting embedded software in to target system.

Learning Outcomes: At the end of this unit students will be able to

- Demonstrate various embedded system development and debugging tools.
- Distinguish linkers and locators.

Text Book:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.
2. David E Simon, An Embedded Software Primer, Pearson Education, 2001.
3. Kenneth J. Ayala, The 8051 Microcontroller, 3/e, Thomson, 2004.

References:

1. Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
2. Embedded Systems, Rajkamal, TMH, 2009.
3. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

Change of Syllabus

ES subject is the new course for R19 Sem 2 Regulation.

MANAGEMENT INFORMATION SYSTEMS

IT322(E)
L T P E O
3 0 0 1 2

CREDITS 3
Sessional Marks : 40
End Exam Marks: 60
End Exam: 3 Hours

Prerequisite(s): Fundamentals of computer and databases.

Course Objectives The focus of the course is the To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.

1. To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
2. To enable students, understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
3. To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Analyse Information systems – Decision Support system, Knowledge Management System, Executive support system.

CO-2: Analyse information technology resources and software development methodologies.

CO-3: Assess latest business initiatives such as E-Business, E-Governance and cloud computing emerging in the field of information technology.

CO-4: Determine the concepts related to security and ethical challenges and Management challenges.

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|--------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO1 | 2 | 3 | | | | 0 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| CO3 | | | | 2 | | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| CO4 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |

UNIT-I Foundation concepts (TNR-12-B)

10 Periods

Foundation concepts: Foundations of Information Systems in Business- The Real World of Information Systems, The Fundamental Roles of IS in Business, Trends in Information Systems, Types of Information Systems. Competing with Information Technology- Fundamentals of Strategic Advantage, Strategic IT, Competitive Strategy Concepts. (TNR-12)

Learning outcomes: At the end of this unit, the students will be able to

- Understand IS in Business.
- Analyse Competitive Strategy Concepts.

UNIT-II Information Technologies

10 Periods

Information Technologies: Computer Software- Business Application Software, Software Suites and Integrated Packages, Web Browsers, Electronic Mail, Instant Messaging, and Weblogs. **Data Resource Management-** Database Management, Database Structures, Types of Databases. **Telecommunications and Networks-** Telecommunications Alternatives, Types of Telecommunications Networks, Wireless Technologies.

Learning outcomes: At the end of this unit, the students will be able to

- Identify the different resources in data resource management.
- Analyse Different wireless technologies .

UNIT-III Business Applications

10 Periods

Business Applications: e-Business Systems- Cross-Functional Enterprise Applications, Enterprise Application Integration, Enterprise Collaboration Systems. e-Commerce Systems- e-Commerce Fundamentals, e-Commerce Applications and Issues. **Supporting Decision Making-** Information, Decisions, and Management Information Quality, Decision Support Trends, Decision Support Systems

Learning outcomes: At the end of this unit, the students will be able to

- Analyse e-Business system.
- Apply decision support system in business.

UNIT-IV Development Process

10 Periods

Development Process: Developing Business/IT Strategies- Planning Fundamentals, Implementation Challenges. **Developing Business/IT Solutions-** The Systems Development Life Cycle, Starting the Systems Development Process, Systems Analysis, Systems Design.

Learning outcomes: At the end of this unit, the students will be able to

- Know the importance of Developing Business.
- Analyse IT solutions in Business.

UNIT-V Management Challenges

10 Periods

Management Challenges: Security and Ethical Challenges- Security, Ethical, and Societal Challenges of IT, Security Management of Information Technology. **Enterprise and Global Management of Information Technology-** Managing Information Technology, Managing Global IT.

Learning outcomes: At the end of this unit, the students will be able to

- Categorize Security, Social and Ethical challenges of IT.
- Analyse the Global management of IT.

Text Books (TNR-12-B-U)

1. James O'Brien, Management Information Systems - Managing Information Technology in the E-business enterprise, Tata McGraw Hill, 2010.

References:

1. Gordon Davis, Management Information System: Conceptual Foundations, Structure and Development, Tata McGraw Hill, 7th edition, 2006.
2. Haag, Cummings and McCubrey, Management Information Systems for the Information Age, McGraw Hill, 2012.

3. Turban, McLean and Wetherbe, Information Technology for Management – Transforming Organisations in the Digital Economy, John Wiley, 6th edition, 2009.
4. Raymond McLeod and Jr. George P. Schell, Management Information Systems, Pearson Education, 2007.
5. Robert Schultheis and Mary Summer, Management Information Systems – The Managers View, Tata McGraw Hill, 2008.
6. Corey Schou and Dan Shoemaker, Information Assurance for the Enterprise – A Roadmap to Information Security, Tata McGraw Hill, 2007.
7. Frederick Gallegor, Sandra Senft, Daniel P. Manson and Carol Gonzales, Information Technology Control and Audit, Auerbach Publications, 4th edition, 2012.

New Subject added in R19 Regulation.

DISTRIBUTED OPERATING SYSTEMS

(Professional Elective-II)

IT323(A)

L T P E O
3 0 0 1 2

CREDITS 3

Sessional Marks: 40
End Exam Marks: 60
End Exam: 3 Hours

Pre requisite(s): Operating Systems, Computer Networks

Course Objectives:

1. To introduce the foundations of Distributed Systems.
2. Introduce the idea of peer-to-peer services and distributed file system.
3. Examine in detail the system level and support required for distributed system.
4. Discover the issues involved in studying distributed process and resource management.

Course Outcomes:

1. Apply the critical operations involved in designing and establishing the communication in distributed systems.
2. Examine the models used to implement a consistent distributed Shared Memory system which also handles clock synchronization and deadlocks.
3. Evaluate the methods of Process and Resource Management to balance and share the load in distributed system.
4. Make use of distributed File System and Naming mechanisms for accessing, sharing and naming the files in distributed systems and its related applications.

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|--------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO1 | 3 | 2 | 1 | | | 1 | 1 | 1 | 1 | | 1 | 2 | 3 | 2 |
| CO2 | 2 | 3 | 2 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 |
| CO3 | 3 | 2 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 |
| CO4 | 2 | 2 | 2 | 3 | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 |

UNIT-I Fundamentals and Computer networks

10 Periods

Fundamentals: Distributed computing system, evolution, models, popularity, Distributed operating system, design issues, introduction to DCE. Computer networks: Introduction, Types, Protocols for Distributed Systems, Internetworking, ATM Technology.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand the fundamentals used in designing a distributed system.
- Observe the network fundamentals used in designing a distributed system

UNIT- II Message passing and Remote procedure call**11 Periods**

Message passing: Introduction, features, issues in IPC, synchronization, Buffering, multi datagram messages, encoding and decoding, process addressing, failure handling, group communication.

Remote procedure call: Introduction, RPC model, Transparency of RPC, Implementation, Stub generation, RPC messages, server management, parameter-passing semantics, call semantics, communication protocols, complicated RPC's, Client-Server Binding, exception handling, security, some special types of RPCs, RPC in heterogeneous environments, lightweight RPC

Learning Outcomes: At the end of this unit, the students will be able to

- Identify the message passing takes place in distributed systems.
- Analyze the working of RPC in distributed systems.

UNIT- III Distributed Shared memory and Synchronization**12 Periods**

Distributed Shared memory: Introduction, general architecture, design and implementation issues, granularity, structure of shared memory space, consistency models, replacement strategy, thrashing, other approaches to DSM, Heterogeneous DSM, Advantages.

Synchronization: Introduction, Clock Synchronization, Event ordering, Mutual Exclusion, Deadlock, Election Algorithms

Learning Outcomes: At the end of this unit, the students will be able to

- Design a consistent and distributed shared memory model.
- Experiment with clock synchronization and handling deadlocks in distributed systems

UNIT- IV Resource management and Process Management**10 Periods**

Resource management: Introduction, Desirable Features of a good global scheduling algorithm, Task assignment approach, load-balancing approach, load-sharing approach. Process Management: Introduction, process migration, Threads

Learning Outcomes: At the end of this unit, the students will be able to

- Examine the different load-balancing, load-sharing approaches.
- Organize processes and threads.

UNIT- V Distributed file systems and Naming**12 Periods**

Distributed file systems: Introduction, features, file models, Accessing models, sharing models, file-caching schemes, file Replication, Fault tolerance, Atomic transactions, design principles. Naming:

Introduction, features, fundamental terminologies, system-oriented names, object- locating mechanisms, human-oriented names, name caches, naming and security.

Learning Outcomes: At the end of this unit, the students will be able to

- Design a distributed file system.
- Make use of different naming mechanisms.

Text Books

1. Pradeep k. Sinha, -Distributed Operating Systems; concepts and designl, Edition, PearsonEducation.
2. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall ofIndia, 2007

Reference Books

1. Tanenbaum A.S., Van Steen M., -Distributed Systems: Principles and Paradigmsl, PearsonEducation, 2007.
2. Liu M.L., -Distributed Computing, Principles and Applicationsl, Pearson Education,2004.
3. Nancy A Lynch, -Distributed Algorithmsl, Morgan Kaufman Publishers, USA, 2003

CHANGE OF SYLLABUS

| Previous Unit No(R15) | Current Unit No (R19) | Changes Incorporated |
|----------------------------------|---|---|
| Unit-1 | Unit-1 Fundamentals and Computer networks | <u>Topics included</u> <ul style="list-style-type: none">• ATM Technology. <u>Topics ignored</u> LAN, WAN, Communication protocols 3% concepts relevant to communication in distributed system are included ignoring Network fundamentals as they are covered in CN. |
| Unit-2 | Unit-2 Message passing and Remote procedure call | No changes |
| Unit-3 | Unit-3 Distributed Shared memory and Synchronization | No changes |
| Unit-4 | Unit-4 Resource management and Process Management | No changes |
| Unit-5 | Unit-5 Distributed file systems and Naming | No changes |
| <u>Overall change: 3%</u> | | |

Note: This course is related to Employability/Skill development

MACHINE LEARNING

(Professional Elective – II)

IT323
L T P E O
3 0 0 1 2

CREDITS 3
Sessional Marks: 40
End Exam Marks: 60
End Exam: 3 Hours

Prerequisite(s): Probability, Linear Algebra, Programming Languages

Course Objectives

1. To give basic knowledge about the machine learning models and theory that form the foundation of machine learning.
2. Identify and apply the appropriate Machine learning technique to classification, tree models, rule models, probabilistic models and ensemble techniques.

Course Outcomes

After completion of the course, the students will be able to:

- CO-1:** Illustrate the steps to handle binary, multiclass classification algorithms with an application.
- CO-2:** Analyze the data and predict decisions using tree, rule and linear classifier models.
- CO-3:** Classify the data by using distance-based and probabilistic models.
- CO-4:** Explore the feature transformations and ensemble techniques.

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|---|
| CO1 | 3 | 2 | | | | 1 | | 1 | 1 | 1 | | | 1 | 3 | 2 |
| CO2 | 2 | 3 | 2 | | | | | 1 | 1 | 1 | | | 1 | 3 | 2 |
| CO3 | 3 | 2 | | | | | | 1 | 1 | 1 | | | 1 | 3 | 2 |
| CO4 | 2 | 3 | 3 | | 2 | 2 | 2 | 1 | 1 | 1 | | | 1 | 3 | 2 |

UNIT-I

12 Periods

The ingredients of machine learning: Tasks: the problems that can be solved with machine learning

Models: the output of machine learning, Features: the workhorses of machine learning, Binary classification, and related tasks: Classification, Scoring and ranking, Class probability estimation.

Learning outcomes: At the end of this unit, the students will be able to

- Understand features and tasks can be performed by machine learning
- Describe and Differentiate supervised and unsupervised learning

UNIT II

12 Periods

Handling more than two classes, Regression, Unsupervised and descriptive learning

Concept learning: The hypothesis space, Paths through the hypothesis space, beyond conjunctive concepts, Learnability

Learning outcomes: At the end of this unit, the students will be able to

- Define complete and consistent hypotheses
- Understand the notion of regression and concept learning

UNIT III

12 Periods

Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction

Rule models: Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

Linear models: The least-squares method, The perceptron, Support vector machines, Obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods

Learning outcomes: At the end of this unit, the students will be able to

- Explain tree models
- Implement linear models

UNIT IV

12 Periods

Distance-based models: Neighbours and exemplars, Nearest-neighbour classification, Distance-based clustering, Hierarchical clustering, From kernels to distances

Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimizing conditional likelihood, Probabilistic models with hidden variables, Compression-based models

Learning outcomes: At the end of this unit, the students will be able to

- Describe neighborhood classifier models
- Explain distributions and probabilistic models

UNIT V

12 Periods

Features: Kinds of feature, Feature transformations, Feature construction and selection

Model ensembles: Bagging and random forests, Boosting, Mapping the ensemble landscape

Learning outcomes: At the end of this unit, the students will be able to

- Describe Features
- Explain distributions and probabilistic models

Textbooks

1. Flach, P. (2012). Machine learning: the art and science of algorithms that make sense of data, Cambridge University Press.

Reference Books

1. Ethem Alpaydin, Introduction to machine Learning, 2nd ed, PHI
2. Baldi, P. and Brunak, S. (2002). Bioinformatics: A Machine Learning Approach. Cambridge, MA: MIT Press
3. Kearns, M. and Vazirani, U. (1994). Computational Learning Theory. Cambridge, MA: MIT Press.
4. Tom M. Mitchell (1997), Machine Learning, MGH.

Online Resources

- <http://www.cs.cmu.edu/afs/cs.cmu.edu/user/mitchell/ftp/mlbook.html>
- <http://neuralnetworksanddeeplearning.com/index.html>
- <https://www.deeplearningbook.org/>
- <https://www.cs.huji.ac.il/~shais/UnderstandingMachineLearning/understanding-machine-learning-theory-algorithms.pdf>

Change of syllabus

- The BoS expert committee suggested to change the textbook and reflect the changes in the syllabus accordingly.
- The suggested textbook is -Flach, P. (2012). Machine learning: the art and science of algorithms that make sense of data, Cambridge University Pressl.
- The syllabus is structured as per the contents of the text book

Note: This course is related to Employability/Skill development.

OPERATION RESEARCH

(Professional Elective – II)

COURSE CODE IT323(C)

L T P E O
3 0 0 1 2

CREDITS 3

Sessional Marks : 40

End Exam Marks: 60

End Exam: 3 Hours

Prerequisite(s): Mathematics

Course Objectives

The course is intended to identify and develop operational research models, understand the mathematical tools to solve optimisation problems, and develop a report that describes the model, the solving techniques and analyse the results.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Apply linear programming model and assignment model to domain specific situations

CO-2: Analyze the various methods under transportation model and apply the model for testing the closeness of their results to optimal results

CO-3: Apply the concepts of PERT and CPM for decision making and optimally managing projects. Analyse the inventory and queuing theories and apply them in domain specific situations.

CO-4: Analyze the various replacement and sequencing models and apply them for arriving at optimal decisions

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|--------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| CO2 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 |
| CO3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 2 |

UNIT-I

10 Periods

Overview of operations Research: OR models – OR Techniques Linear Programming: Introduction – Graphical solution; Graphical sensitivity analysis – The standard form of linear programming problems – Basic feasible solutions - unrestricted variables – simplex algorithm – artificial variables – Big M and two phase method – Degeneracy - alternative optima – unbounded solutions – infeasible solutions. Dual problems- Relation between primal and dual problems – Dual simplex method

Learning outcomes: At the end of this unit, the students will be able to

- Formulate real-world problems as a linear programming model and describe the theoretical workings of the graphical and simplex method, demonstrate the solution process by hand and solver.
- Explain the relationship between a linear program and its dual.

UNIT-II

10 Periods

Assignment problem – Hungarian Method.

Transportation model – starting solutions. North West corner Rule - lowest cost method – Vogels approximation method

Learning outcomes: At the end of this unit, the students will be able to

- Formulate specialized linear programming problems, namely transportation and assignment problems
- Describe theoretical workings of the solution methods for transportation and assignment problems, demonstrate solution processes by hand and solver

UNIT-III

10 Periods

Inventory Models : Static EOQ Models – Dynamic EOQ models.

Game theory: Two person Zero Sum Games – Mixed strategy games and their Algorithms

Learning outcomes: At the end of this unit, the students will be able to

- Apply the knowledge of game theory concepts to articulate real-world decision situations for identifying, analyzing, and practicing strategic decisions to counter the consequences.
- Demonstrate solution methods including graphs and linear programming to analyze and solve the Two-person, zero-sum games.

UNIT-IV

10 Periods

Integer Programming: Branch and Bound Algorithms cutting plan algorithm.

Dynamic Programming: Recursive nature of dynamic programming – Forward and Backward Recursion

Learning Outcomes: At the end of this unit, the students will be able to

- Identify and Apply the knowledge of Branch and Bound Algorithms for integer Programming
- Understand and Apply Forward and Backward Recursion for optimal Decisions.

UNIT-V

10 Periods

Network models – Basic Concepts – Construction of Networks – Project Network – CPM and PERT

Learning outcomes: At the end of this unit, the students will be able to

- PERT and CPM for decision making and optimally managing projects

Text Books

1. S.D.Shrama, Operation Research, Kedar Nath Ram Nath Publishers, 2015.
2. Handy A. Taha, Operations Research An introduction, 10th edition, 2017.

References

1. Hira D S and Gupta P K, Operations Research, S.Chand& Sons, 2007.
2. Panneerselvan. R., Operation Research, Prentice Hall of India Pvt Ltd. 2006.
3. Kanti Swarup, Gupta P.K., and Manmohan, Operations Research, S.Chand& sons, 2004.

CHANGE OF SYLLABUS

New Subject added in R19 Regulation.

INTERNET OF THINGS

(Professional Elective – II)

IT323(D)
L T P E O
3 0 0 1 2

CREDITS 3
Sessional Marks : 40
End Exam Marks: 60
End Exam: 3 Hours

Prerequisite(s): Network standards, protocols and technologies.

Course Objectives

1. Able to understand the application areas of IOT .
2. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
3. Able to understand building blocks of Internet of Things and characteristics.

Course Outcomes

After completion of this course, the students will be able to:

CO-1:Describe the design, functional blocks, levels, issues and challenges of IoT solution

CO-2:Analyse and evaluate protocols used in IOT

CO-3: Describe the basic building blocks of IoT device

CO-4:Design and evaluate an IoT system.

Mapping of Course Outcomes with POs and PSOs

| COs/P Os- PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | P01 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| CO1 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |
| CO2 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |
| CO3 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |
| CO4 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |

UNIT-I Introduction

10 Periods

Internet of Things Vision, Emerging Trends, Economic Significance, Technical Building Blocks, Physical design of IoT, Things of IoT, IoT Protocols, Logical design of IoT, IoT functional blocks, IoT communication models, IoT Communication APIs, IoT enabling technologies, IoT levels and deployment templates, IoT Issues and Challenges, Applications.

Learning outcomes: At the end of this unit, the students will be able to

- Explain functional building blocks of IoT.
- Understand IoT communication models.
- Enumerate IoT issues and challenges

UNIT-II Communication Protocols

12 Periods

Protocol Standardization for IoT, Efforts, M2M and WSN Protocols, SCADA and RFID Protocols, Issues with IoT Standardization, Unified Data Standards, Protocols – IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, Network layer, APSlayer.

Learning outcomes: At the end of this unit, the students will be able to

- Classify communication protocols.
- List the issues with IoT standardization.
- Characterize Zigbee Architecture.

UNIT-III IoT Physical Devices and Endpoints

10 Periods

Basic building blocks of an IoT device, Exemplary device: Raspberry Pi, Raspberry Pi interfaces, Programming Arduino with sensor interfaces.

Learning outcomes: At the end of this unit, the students will be able to

- Understand Raspberry Pi interfaces.
- Programming Arduino with sensor interfaces.

UNIT-IV

12 Periods

- a) IOT Applications.
 - i) Lighting as a service (case study)
 - ii) Intelligent Traffic systems (case study)
 - iii) Smart Parking (case study)
 - iv) Smart water management (case study)
- b) IOT for smart cities

Learning outcomes: At the end of this unit, the students will be able to

- Apply IoT concepts in traffic systems.
- Know the importance of IoT in smart cities.

UNIT-V

10 Periods

IOT in Indian Scenario

- i) IOT and Aadhaar
 - ii) IOT for health services.
 - iii) IOT for financial inclusion.
 - iv) IOT for rural empowerment.
- Challenges in IOT implementation.
- v) Big Data Management.
 - vi) Connectivity challenges.

Learning outcomes: At the end of this unit, the students will be able to

- Apply IoT in Indian scenarios.
- Enumerate the challenges in IoT implementation.

Text Books

1. The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World
2. Arshdeep Bahga, Vijay Madisetti, -Internet of Things – A hands-on approach, Universities Press, ISBN: 0: 0996025510, 13:978-0996025515

References

1. Honbo Zhou, -The Internet of Things in the Cloud: A Middleware Perspective, CRC Press, 2012. ISBN : 9781439892992

2 Dieter Uckelmann, Mark Harrison, Florian Michahelles, -Architecting the Internet of Things^l, Springer, 2011. ISBN:978-3-642-19156-5

Change of Syllabus: No change

USER EXPERIENCE (UX)
(Professional Elective – II)

IT323- (E)
L T P E O
3 0 0 1 2

CREDITS 3
Sessional Marks : 40
End Exam Marks: 60
End Exam: 3 Hours

Prerequisite(s): HTML5, CSS, JS

Course Objectives

1. Describe the User Interface.
2. Describe the User Experience.
3. Learn what the relevant tools are for UX Designers.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Describe UI and UX design by their own way.

CO-2: Build their different type of prototyping.

CO-3: Fetch all UI Elements in designed page.

CO-4: Design the Personas by their own way and Conduct a Usability Test and submit the Test Results Report.

Mapping of Course Outcomes with POs and PSOs

| COs/P Os- PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | P01 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| CO1 | 2 | 2 | 3 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | | 1 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | | 1 | 3 | 2 |
| CO3 | 1 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | | 1 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 1 | | 2 | 3 | 2 |

UNIT-I UI/UX Overview (Introduction)

10 Periods

Introduction - What is UX Design? - What is UI Design? - What is Interaction Design – UX Design Deliverables - Basics of HCI UX Design - User Centered Design - Design Thinking - Activity Based Design - Agile Process - User Research - Competitor Analysis.

Learning outcomes: At the end of this unit the Students will be able to

- Understand the concepts of UI/UX Design and Agile Process.

UNIT-II Interaction Design

10 Periods

Interaction Design - Ideation Methods - Interaction & Prototyping - Paper Prototyping - Build your own Prototyping - Heuristic (Expert) Evaluation - Designing a Web / Mobile App.

Learning outcomes: At the end of this unit the Students will be able to

- Understand the concepts of Prototyping and web /Mobile app design.

UNIT-III Visual Design

10 Periods

Visual Design - Web App UI Elements - Mobile App UI Elements - Grid Systems - Colors Theory and Palette - Understanding Typography - Material UI and other UI Kit.

Learning outcomes: At the end of this unit the Students will be able to

- Understand the concepts of UI Elements , grid systems and Typography.

UNIT-IV User Research

10 Periods

User Research - How to conduct user Interviews - User Research - Creating Personas - Empathy Mapping - Information Architecture - Building User Journey Maps.

Learning outcomes: At the end of this unit the Students will be able to

- Understand the concepts of User Research , Mapping , and Information Architecture.

UNIT-V Usability Testing

10 Periods

Usability Testing - Testing Methods - User Testing - A/B Testing - Conducting a Usability Test - Test Results Report.

Learning outcomes: At the end of this unit the Students will be able to

- Understand the concepts of Different testing methods and test reports.

Text Books

1. Text Books: Pardha S. Pyla, ,The UX Book: |AgileUX|Design|for|Quality|User|Experience', Morgan Kaufmann; 2nd edition, 2019 Link : {HYPERLINK [https://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&fieldauthor=Rex+Hartson&search-alias=stripbooks"](https://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&fieldauthor=Rex+Hartson&search-alias=stripbooks)},
2. Adam|Boduch,|,|React|Material-UI Cookbook: Build captivating user experiences using React and Material-UI',|Packt|Publishing|Limited,|2019.

References

- 1 Will|Grant,|,|101|UX|Principles:|A|definitive|design|guide',|Packt Publishing|Ltd|2018
- 2 The| Design| Studio| Method:|Creative|Problem|Solving|with|UX|Sketching',|Routledge,|2019 Link : {HYPERLINK [https://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&fieldauthor=Brian+Sullivan&search-alias=stripbooks"](https://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&fieldauthor=Brian+Sullivan&search-alias=stripbooks)}
- 3 Ellen|Lupton,|,|Thinking with Type: A Critical Guide for Designers, Writers, Editors, & Students',| Princeton Architectural Press; Revised, Expanded edition, 2014

Online resources:

1. <https://uxplanet.org>
2. <https://uxdesign.cc>

MOOCs:

1. <https://www.coursera.org/specializations/ui-ux-design>
2. UX Design & User Experience Design Course - Theory Only:
<https://www.udemy.com/course/how-to-change-careers-and-become-a-uxdesigner/>

Change of Syllabus

New subject in R-19 regulations

DESIGN AND ANALYSIS OF ALGORITHMS

IT324
L T P E O
3 0 0 1 3

CREDITS 3
Sessional Marks: 40
End Exam Marks: 60
End Exam: 3 Hours

Prerequisite(s): Introduction to programming, programming and data structures.

Course Objectives:

- Make students understand how asymptotic notations are used to provide a rough classification of algorithms.
- Explain different computational models (e.g., divide-and-conquer), complexity measures (e.g., running time) to analyze the complexity/performance of different algorithms.
- Explain various advanced design and analysis techniques such as greedy algorithms, dynamic programming & Know the concepts of tractable and intractable problems.

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

- CO-1:** Evaluate time complexities of various Brute force and other algorithms.
CO-2: Design algorithms to solve problems using divide and conquer, Decrease and conquer, Dynamic programming and Greedy Techniques.
CO-3: Transform and solve the problems with known algorithms.
CO-4: Solve the problems using tractable algorithms (Backtracking and Branch- and- bound).

Mapping of Course Outcomes with POs and PSOs

| COs/ POs- PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| CO1 | 3 | 3 | 2 | 3 | | | | | | | | 1 | 2 | 2 |
| CO2 | 3 | 3 | 3 | 2 | 2 | | | | | | 2 | 3 | 3 | |
| CO3 | 3 | 3 | 1 | | | | | | | | | 2 | 2 | |
| CO4 | 3 | 3 | 1 | 2 | | | | | | | | 1 | 2 | |

UNIT-I: 12 Periods

Introduction: Fundamentals of algorithmic problem solving.

Fundamentals of analysis of algorithms and efficiency : Analysis framework –Asymptotic Notations and Basic Efficiency classes –Mathematical Analysis of Non-recursive Algorithms –Mathematical Analysis of recursive Algorithms.

Brute Force –Selection Sort , Bubble sort , Sequential Search, Brute Force String Matching , Closest Pair and Convex-Hull Problems by Brute Force, Exhaustive search problems.

Learning outcomes: At the end of this unit the Students will be able to

- Understand the concepts of time complexity, worst case, average case and best case complexities.
- Evaluate the time complexities of various algorithms under Brute force technique.

UNIT-II:**12 Periods**

Divide-and-Conquer: Mergesort , Quicksort , Binary Search , Strassen's Matrix Multiplication, Closest-Pair and Convex-Hull Problems by Divide-and Conquer.

Decrease –and –Conquer: Decrease by a Constant Algorithms -Insertion Sort , Depth First Search and Breadth First Search, Topological Sorting, Decrease by a Constant Factor and Variable Size Decrease Algorithms.

Learning outcomes: At the end of this unit the Students will be able to

- Understand Divide-and-Conquer and Decrease –and –Conquer strategies to solve problems.
- Evaluate time complexities of various algorithms under Divide-and-Conquer and Decrease –and –Conquer techniques.

UNIT-III:**10 Periods**

Transform-and-Conquer: Presorting, Balanced Search Trees (AVL), Heaps and Heapsort , Problem Reduction.

Space and Time Tradeoffs –Sorting by Counting, Input Enhancement in string Matching – Horspool's algorithm, B-Trees.

Learning outcomes: At the end of this unit the Students will be able to

- Understand a wide range of searching and sorting algorithms.
- Evaluate time complexities of various algorithms under Transform-and-Conquer technique.

UNIT-IV:**10 Periods**

Dynamic Programming: Warshall's and Floyd's Algorithms, Optimal Binary Search Trees , The Knapsack Problem.

Greedy Technique: Prim's Algorithm , Kruskal's Algorithm , Dijkstra's Algorithm , Huffman Trees.

Learning outcomes: At the end of this unit the Students will be able to

- Understand Dynamic Programming and Greedy Techniques to solve problems.
- Evaluate time complexities of various algorithms under Dynamic Programming and Greedy Technique.

UNIT-V:**10 Periods**

Limitations of Algorithm Power: Lower-Bound Arguments , Decision Trees , P, NP, NP hard and NP complete problems .

Coping with the Limitations of Algorithms Power: Backtracking-n queens, Hamiltonian circuit, subset sum problem.

Branch and Bound-Assignment Problem, knapsack Problem, Traveling salesman problem.

Learning outcomes: At the end of this unit the Students will be able to

- Understand the notion of tractable and intractable problems.
- Understand the notion of P, NP and NP-complete class problems.

Text Book:

1. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, 2003.
2. Introduction to Algorithms by Thomas H. Corman, Charles E. Leiserson, Ronald R. Rivest & Clifford Stein, Prentice Hall.

Reference Books:

1. The Design and Analysis of computer Algorithms, Aho, Hopcroft & Ullman, Pearson Education.

Change of syllabus

| Sr.No. | Changes incorporated in syllabus with respect to old syllabus. |
|---------------------------|--|
| 1 | In Unit-1 important problem types, fundamental data structures removed. |
| 2 | In Unit-2 Binary Tree Traversals, Multiplication of large integers under divide and conquer technique and Generating combinatorial objects under Decrease and conquer technique are removed. |
| 3 | In Unit-3 Gaussian elimination, Horner's rule and Binary Exponentiation, Hashing is removed. |
| 4 | In Unit-4 Computing Binomial coefficient is removed |
| Overall Change=10% | |

DESIGN THINKING

IT325

L T P E O

3 0 0 1 2

CREDITS 3

Sessional Marks : 40

End Exam Marks: 60

End Exam: 3 Hours

Prerequisite(s): Nill

Course Objectives

The course titled Design thinking is aimed to give an in-depth Understanding on Various aspects of Innovation, Creativity, evolving business models, incubation and entrepreneurship. Come up with exposure to design thinking for designing innovative products. The course is a blend of theory and practice therefore this course does not require any prerequisite and will be useful to understand innovation and its applications in different spheres of development and growth.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Apply critical operations involved in modelling and designing data warehouses.

CO-2: Empathize and analyze model action plan.

CO-3: Apply design thinking techniques for given tasks.

CO-4: Apply the design thinking techniques for solving problems in various sectors.

Mapping of Course Outcomes with POs and PSOs

| COs/POs-PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|--------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO1 | 3 | 3 | 2 | | | | 1 | | | 1 | 1 | 1 | 2 | 1 |
| CO2 | 3 | 3 | 1 | | | | 1 | | | 1 | 1 | 1 | 2 | 1 |
| CO3 | 3 | 3 | 2 | | | | 1 | | | 1 | 1 | 1 | 2 | 1 |
| CO4 | 3 | 2 | 1 | | | | 1 | | | 1 | 1 | 1 | 2 | 1 |

UNIT-I

10 Periods

Introduction to Design Thinking: Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

Learning outcomes: At the end of this unit, the students will be able to

- Know the fundamentals of Design thinking.
- Analyse the design components.

UNIT-II

10 Periods

Design thinking: Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brain storming, product development.

Learning outcomes: At the end of this unit, the students will be able to

- Apply Design thinking on Social innovations.
- Apply the tools of Design thinking.

UNIT-III

10 Periods

Innovation: Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Learning outcomes: At the end of this unit, the students will be able to

- Categorize the innovation and creativity.
- Apply creativity and innovation in organizations.

UNIT-IV

12 Periods

Design thinking for strategic Innovation: An exercise in design thinking — implementing design thinking for better process. Implement design thinking process in various Industries. Design thinking for Startups.

Learning outcomes: At the end of this unit, the students will be able to

- Apply Design thinking as an exercise.
- Analyse Design thinking for start-ups.

UNIT-V

10 Periods

Design thinking in various sectors: Case studies in Information Technology, Finance, Education, Management and Retail sector. Analyze and Prototyping, Usability testing, Organizing and interpreting results.

Learning outcomes: At the end of this unit, the students will be able to

- Apply Design thinking Finance and Education.
- Analyse and Organizing interpreting Results.

Text Books:

1. Change by design, Tim Brown, Harper Bollins (2009)
2. Design Thinking in the Class Room by David Lee, Ulysses press

References:

1. Design the Future , by Shrrutin N Shetty , Norton Press
2. Universal principles of design- William lidwell, kritina holden, Jill butter.
3. The era of open innovation — chesbrough.H
4. Product Design and Manufacturing by A.K. Chitale and R.C. Gupta, Prentice Hall

CHANGE OF SYLLABUS

New Subject added in R19 Regulation.

ETL Tools

(Elective Lab)

IT327

L T P E O
0 1 3 0 3

Credits: 2.5

Sessional Marks: 50

End Exam Marks: 50

End Exam: 3 Hours

Prerequisite: Basics of Data Warehousing, Programming Knowledge preferably Python

Course Objectives

1. To explore different types of data and learn the key aspects of warehousing in extracting, transforming, and loading the warehouse with the data.
2. To be able to perform the tasks using familiar tools such as Talend Open Studio, Apache Airflow

Course Outcomes

At the end of the course, the student will be able to:

CO-1: Consolidate data from different sources into a centralized location and assimilate different types of data into a common format using ETL Tools.

CO-2: Refine the data during the transformation phase using ETL Tools.

CO-3: Load the transformed data to a single, unified target location for storage and analysis using ETL Tools.

Mapping of Course Outcomes with POs and PSOs

| COs/P Os- PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | P01 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| CO1 | | 2 | 1 | 2 | 3 | | | | | | 1 | 2 | 3 | 3 |
| CO2 | | 2 | 3 | 1 | 3 | | | | | | 1 | 2 | 3 | 3 |
| CO3 | | 2 | 3 | 1 | 3 | | | | | | 1 | 2 | 3 | 3 |

Memory Requirements

- Memory usage: 4 GB minimum, 8 GB recommended
- Disk space: 20 GB

Software Requirements

- Java 8 JRE Oracle.
- A properly installed and configured MySQL database, with a database named getting started.
- Talend Open Studio

Syllabus overview

1) Data Extraction from Sources (CO-1)

- Identifying different types of data and sources.
- Extracting raw data from an array of sources including databases, network appliances, security hardware and software applications, and others.
- Identify relevant data necessary for transformation.

2) Data Profiling & Data Quality (CO-1)

- **Structure discovery** — Structure discovery (or analysis) helps determine whether your data is consistent and formatted correctly. It uses basic statistics to provide information about the validity of data.
- **Relationship discovery** — Relationship discovery identifies connections between different data sets.
- **Content discovery** — Content discovery focuses on data quality. Data needs to be formatted, standardized, and properly integrated with existing data in a timely and efficient manner. For example, if a street address is incorrectly formatted it could mean that certain customers can't be reached, or a delivery becomes misplaced.
- **Quality Analysis**
 - Connecting to a data source including databases and delimited file
 - Database content analysis
 - Column analysis
 - Table analysis
 - Redundancy analysis
 - Correlation analysis
 - Patterns and Indicators

3) Data Transformations (CO-2)

- Data cleaning
- Data recovery – using data profiling.
- Data mapping
- Generating code
- Executing the code
- Review
- Customized operations – Additional steps
 - Filtering (e.g., Selecting only certain columns to load).
 - Enriching (e.g., Full name to First Name, Middle Name, Last Name).
 - Splitting a column into multiple columns and vice versa.
 - Joining together data from multiple sources.
 - Removing duplicate data.

4) Data Loading to Target (CO-3)

The transformed, high quality data is then delivered to a single, unified target location for storage and analysis.

5) Data Reconciliation (CO-3)

- Setting up a reconciliation strategy for deployment conflicts
- Setting up the reconciliation strategy for deployment conflicts in preferences

Note: This course is related to Employability/Skill development.

List of Experiments

| Week No | Name of the experiment | CO# |
|---------|---|-----|
| 1 | Discovering Talend Open Studio | 1 |
| 2 | Working with Projects, Extracting Data | 1 |
| 3 | Quality Analysis | 1 |
| 4 | Transformation | 2 |
| 5 | Working with Databases | 2 |
| 6 | Filtering, Sorting, and other processing techniques | 2 |
| 7 | Managing Files | 2 |
| 8 | Job Orchestration | 2 |
| 9 | Managing Jobs | 2 |
| 10 | Global Variables and contexts | 2 |
| 11 | Loading (Publishing) | 3 |
| 12 | Auditing and Reconciliation | 3 |
| 13 | Archive and clean up | 3 |

Textbooks

- Getting started with Talend Open Studio for Data Integration, Jonathan Bowen, Packt, 2012, ISBN: 9781849514729

References

- Talend Open Studio Cookbook, Rick Barton, Packt, 2013, ISBN: 9781782167266
- Talend Open Studio for Data Quality User Guide, Creative Commons Public License
- Talend Open Studio for Big Data User Guide, 2017, Creative Commons Public License
- The data warehouse ETL toolkit : practical techniques for extracting, cleaning, conforming, and
- delivering data / Ralph Kimball, Joe Caserta, Wiley Publishing, 2004, eISBN: 0-764-57923-1.

CHANGE OF SYLLABUS

New Lab added in R19 Regulation.

ADVANCED JAVA PROGRAMMING LAB

IT327

L T P E O

0 1 3 0 0

CREDITS 2.5

Sessional Marks: 50

End Exam Marks: 50

End Exam:3 Hours

Prerequisite(s): Basic Knowledge on core Java Concepts, HTML tags and DBMS.

Course Objectives:

- Familiarize with User Interface (GUI), networking, and data base manipulation.
- Understand the enterprise application concepts and HTTP protocol.
- Illustrate the concepts of Java Servlets and Java Server Pages to develop web applications.

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

CO-1: Design and develop various web applications by integrating any of Servlets, JSPs, Swing and Applet using Database.

CO-2: Design and implement components like: Session, JSTL, Tag Extension and Filter.

CO-3: Distinguish Web Server, Web Container and Application Server.

Mapping of Course Outcomes with POs and PSOs

| COs/ POs- PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| CO1 | 3 | 2 | 2 | 2 | 3 | | | | 3 | 1 | 2 | 3 | 3 | |
| CO2 | 3 | 2 | 2 | 2 | 3 | | | | 3 | 1 | 2 | 3 | 3 | |
| CO3 | 3 | 1 | | | 3 | | | | | | | 1 | 2 | |

UNIT-I:J2EE and Web Development

J2EE and Web Development Java Platform, J2EE Architecture Types, Explore Java EE Containers, Types of Servers in J2EE Application, HTTP Protocols and API, Request Processing in Web Application, Web Application Structure, Web Containers and Web Architecture Models.

Learning Outcomes: At the end of this Unit the student will be able to

- Distinguish Web Server, Web Container and Application Server.
- Understand various Types of Enterprise Edition Architectures and Web Servers.

UNIT-II:Advance Networking

Advance Networking Basics, Introduction of Socket, Types of Socket, Socket API, TCP/IP client sockets, URL, TCP/IP server sockets, Datagrams, java.net package, ServerSocket, Client Server programming.

Learning Outcomes: At the end of this Unit the student will be able to

- Understand various sockets available in java.net package for network programming.
- Develop applications using networking connections.

UNIT-III: JDBC Programming

JDBC Programming JDBC Architecture, Types of JDBC Drivers, Introduction to major JDBC Classes and Interface, Creating simple JDBC Application, Types of Statement (Statement Interface, PreparedStatement, CallableStatement), Exploring ResultSet Operations.

Learning Outcomes: At the end of this Unit the student will be able to

- Develop applications to interact with Databases.
- Distinguish various statements available in JDBC.

UNIT-IV: Servlets

Servlet API and Overview Servlet Introduction, Servlet Life Cycle, Types of Servlet, Servlet Configuration with Deployment Descriptor, Working with ServletContext and ServletConfig Object, Attributes in Servlet, Response and Redirection using Request Dispatcher and using sendRedirect Method, Filter API, Manipulating Responses using Filter API, Session Tracking: using Cookies, HttpSession.

Learning Outcomes: At the end of this Unit the student will be able to

- Develop applications using Servlets.
- Develop applications to track sessions.

UNIT-V: JSP and JSTL

JSP architecture, JSP page life cycle, JSP elements, ExpressionLanguage, TagExtensions, TagExtensionAPI, Tag handlers, JSP Fragments, Tag Files, JSTL, Core Tag library, overview of XML Tag library.

Learning Outcomes: At the end of this Unit the student will be able to

- Develop applications using JSP.
- Develop applications using XML tags.

TEXTBOOKS:

1. Black Book -Java server programming| J2EE, 1st ed., Dream Tech Publishers, 2008.
2. Complete Reference J2EE by James Keogh mcgraw publication.
3. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication.

LIST OF PROGRAMS:

| Sr.No | PROGRAM | CO |
|--------------|---|-----------|
| 1 | Week-1: Working with Net Beans: Installing NetBeans and Oracle Database on Windows / Linux operating System. | 3 |
| 2 | Week-2: Socket Programming using Java.net package. Develop a chatting application by establishing connection between client and server. | 1 |
| 3 | Week 3: JDBC Programs using Statement A program to test the connection with the database. | 1 |
| | A program to create a table | 1 |
| | A program to insert record in a table | 1 |
| 4 | Week-4: JDBC Programs using Statement A program to fetch records from a table | 1 |
| | A program to update record in a table | 1 |
| | A program to delete record from a table | 1 |
| 5 | Week-5: JDBC Programs using PreparedStatement A program to insert a record and select records. | 1 |
| | A program to update a record. | 1 |
| 6 | Week-6: JDBC Programs using CallableStatement A program to execute a procedure to compute a square. | 1 |
| 7 | Week-7: Servlet Programming Servlet Execution on tomcat. | 1 |
| | A servlet program to print hello world. | 1 |
| | A servlet program to display request details. | 1 |
| | A servlet program to handle user form. | 1 |
| 8 | Week-8:Servlet Programming servlet program to create a cookie. | 2 |
| | A servlet program to display cookie. | 2 |
| | A servlet program to do session tracking. | 2 |
| 9 | Week-9: JSP Programming JSP program to display hello world. | 1 |
| | JSP program to demonstrate arithmetic operations. | 1 |
| 10 | Week-10: JSP Programming JSP program to demonstrate jsp:forward action tag. | 1 |
| | JSP program to request implicit object. | 1 |
| | Develop web application to insert record into Oracle Database using JSP and JDBC. | 1 |

| | | |
|----|---|---|
| 11 | Week-11: JSTL Programs Write a JSTL program to demonstrate core tags. | 2 |
| | Write a JSTL program to find the given Number is Even OR Odd using CORE Tags in JSTL. | 2 |
| | Write a JSTL program to demonstrate IF Statement using Core Tags. | 2 |
| | Write a JSTL program to demonstrate Nested IF Statement Using Core Tags. | 2 |
| 12 | Week-12: JSTL Programs Write a JSTL program to demonstrate XML tags to parse an XML document. | 2 |
| | Write a JSTL program to demonstrate XML tags to read an XML document. | 2 |

CHANGE OF SYLLABUS

New Lab added in R19 Regulation.

DEVOpps (Elective lab 1)

IT327

L T P E O
0 1 3 0 3

CREDITS 2.5

Sessional Marks : 50
End Exam Marks: 50
End Exam: 3 Hours

Prerequisite(s): Operating System, Virtualization, Cloud Computing, Java and Web Programming, and Software Engineering & Monitor the Software Applications

Course Objectives

DevOps improves collaboration and productivity by automating infrastructure and workflows and continuously measuring applications performance

Course Outcomes

Students will be able to:

1. Remember the importance of DevOps tools used in software development life cycle
2. Analyze & Illustrate the Containerization of OS images and deployment of applications over Docker
3. Summarize and Synthesize the importance of Software Configuration Management in DevOps using Chef/Puppet/Ansible or Saltstack

Mapping of Course Outcomes with POs and PSOs(TNR-12-B-U-C)

| COs/P Os- PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | P01 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| CO1 | 2 | 2 | 3 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | | 1 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | | 1 | 3 | 2 |
| CO3 | 1 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | | 1 | 3 | 2 |

Hardware & Software Requirements:

Hardware & Software Requirements:

PC With following Configuration

1. Windows or Linux Desktop OS for Client machines
2. Internet Connection for each PC with at least 2 MBPS
3. Intel Core i3/i5/i7 Processor with Intel VT-X support
4. 8 GB RAM Minimum
5. 500 GB Hard Disk
6. Gigabit Ethernet (GbE) network interface card (NIC CentOS/Fedora/Ubuntu/Redhat Server OS for One Server)
7. JDK or higher
8. Netbeans or Eclipse
9. OpenSSH.
10. List of Software's - Maven, Jenkins

| Sr. No | Module / Experiment Number | Detailed Content | CO Mapping |
|--------|---|---|--------------|
| 1 | Prerequisite | To Understand the Concept of DevOps with related technologies which are used to Code, Build, Test, Configure & Monitor the Software Applications. | CO 1 |
| 2 | Build & Test Applications with Continuous Integration | To Install and Configure Jenkins to test, and deploy Java or Web Applications using Netbeans or eclipse. | CO 1 |
| 3 | Version Control | To Perform Version Control on websites/ Softwares using different Version control tools like RCS/ CVS/GIT/Mercurial (Any two) | CO 1 CO 3 |
| 4 | Virtualization & Containerization | To Install and Configure Docker for creating Containers of different Operating System Images | CO 1 CO 3 |
| 5 | Virtualization & Containerization | To Build, deploy and manage web or Java application on Docker | CO 1 CO 3 |
| 6 | Software Configuration Management | To install and configure Software Configuration Management using Chef/Puppet/Ansible or Saltstack. | CO 1 CO 3 |
| 7 | Provisioning | To Perform Software Configuration Management and provisioning using Chef/ Puppet/ Ansible or Saltstack. | CO 1 CO 3 |

Text Books:

1. Karl Matthias & Sean P. Kane, Docker: Up and Running, O'Reilly Publication.
2. Len Bass, Ingo Weber, Liming Zhu, DevOps, A Software Architects Perspective, Addison-Wesley-Pearson Publication.
3. John Ferguson Smart, Jenkins, The Definitive Guide, O'Reilly Publication.
4. Learn to Master DevOps by Star EduSolutions.

Reference Books:

1. Sanjeev Sharma and Bernie Coyne, DevOps for Dummies, Wiley Publication
2. Httermann, Michael, DevOps for Developers, Apress Publication.
3. Joakim Verona, Practical DevOps, Pack publication.

Term Work:

Term Work shall consist of experiments on above guidelines/syllabus. Also Term work Journal must include at least 2 assignments.

CHANGE OF SYLLABUS

New Lab added in R19 Regulation.

INTERNET OF THINGS LAB

IT328

L T P E O
0 0 3 0 3

CREDITS 1.5

Sessional Marks : 50

End Exam Marks: 50

End Exam: 3 Hours

Prerequisite(s): Network standards, protocols and technologies.

Course Objectives

1. Able to understand the application areas of IOT .
2. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
3. Able to understand building blocks of Internet of Things and characteristics.

Course Outcomes

After completion of this course, the students will be able to:

CO-1:Evaluate the wireless technologies for IoT

CO-2:Design and develop IoT based systems in various domains using sensors, single board computers and open source IoT platforms.

CO-3: Identify the requirements and Implementthe IOT based project by designing, coding, emulating and testing.

Mapping of Course Outcomes with POs and PSOs

| COs/P Os- PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| CO1 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |
| CO2 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |
| CO3 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |

UNIT-I Introduction

3 Periods

Internet of Things Vision, IoT Protocols, Logical design of IoT, IoT communication models, IoT Communication APIs, IoT enabling technologies, IoT levels and deployment templates.

Learning outcomes: At the end of this unit, the students will be able to

- Describe the logical design of IoT.
- Classify IoT Communication APIs.
- Apply IoT technologies.

UNIT-II Communication Protocols

3 Periods

Protocol Standardization for IoT, M2M and WSN Protocols, SCADA and RFID Protocols, Unified Data Standards, Protocols – IEEE 802.15.4, BACNet Protocol, Modbus, Zigbee Architecture.

Learning outcomes: At the end of this unit, the students will be able to

- Understand M2M and WSN Protocols.
- Classify Unified Data Standards.
- Explain Zigbee Architecture.

UNIT-III IoT Physical Devices and Endpoints**3 Periods**

Basic building blocks of an IoT device, Exemplary device: Raspberry Pi, Raspberry Pi interfaces, Programming Arduino with sensor interfaces.

Learning outcomes: At the end of this unit, the students will be able to

- Describe Basic building blocks of IoT device.
- Understand Raspberry Pi interfaces.

UNIT-IV**3 Periods**

- a) IOT Applications.
 - vii) Lighting as a service (case study)
 - viii) Intelligent Traffic systems (case study)
 - ix) Smart Parking (case study)
 - x) Smart water management (case study)
- b) IOT for smart cities

Learning outcomes: At the end of this unit, the students will be able to

- Understand the applications of IoT in day to day life.
- Explain the application of IoT for smart cities

UNIT-V**3 Periods**

IOT in Indian Scenario

- xi) IOT and Aadhaar
 - xii) IOT for health services.
 - xiii) IOT for financial inclusion.
 - xiv) IOT for rural empowerment.
- Challenges in IOT implementation.
- xv) Big Data Management.
 - xvi) Connectivity challenges.

Learning outcomes: At the end of this unit, the students will be able to

- Understand the applications of IoT in Indian Scenario.
- Explain the challenges in IoT implementation.

List of Experiments

| S. No | Experiments | Couse Outcome |
|-------|---|---------------|
| 1 | Start raspberry pi and try various IINUX commands Windows: ls, cd, touch, mv, rm, man, mkdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping, etc. | CO1 |
| 2 | Study and implement zigbeeprotocol . | CO1 |
| 3 | Study and install ide of arduino and different types of arduino | CO1 |
| 4 | Implement facial recognition door with raspberry pi and python. | CO2 |
| 5 | Study and implement nodemcu ,esp8266 controlling home automation | CO2 |
| 6 | Study and implement street light monitoring system using iot. | CO2 |
| 7 | Study and implement smart dustbin using iot systems. | CO2 |
| 8 | Implement the smart irrigation system using iot. | CO2 |
| 9 | Application of bluetooth in iot systems. | CO2 |
| 10 | Design a simple iot system comprising sensors(motion,ldr,gas,rain,pressure). Wireless network connection, data analysis. | CO3 |

Text Books

1. Vijay Madiseti, Arshdeep Bahga, -Internet of Things: A Hands-On Approach
2. WalteneusDargie,ChristianPoellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice

CHANGE OF SYLLABUS

New Lab added in R19 Regulation.

COMPUTER GRAPHICS AND MULTIMEDIA LAB

IT329

L T P E O
0 0 3 0 1

CREDITS 1.5

Sessional Marks : 50
End Exam Marks: 50
End Exam: 3 Hours

Prerequisite(s): C Programming, coordinate geometry.

Course Objectives

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Learn the various photo editing features and animation techniques and demonstrate proficiency in developing the multimedia presentations.

Course Outcomes

After completion of this course, the students will be able to:

CO-1: Implement scan conversion algorithms for lines and curves. Perform transformations on 2D and 3D objects

CO-2: Create animations using various editing tools.

CO-3: Use audio, video, image editing tools to develop multimedia applications

Mapping of Course Outcomes with POs and PSOs

| COs/P Os- PSOs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| CO1 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |
| CO2 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |
| CO3 | 3 | 2 | 1 | 1 | 3 | | | | 2 | 2 | | 2 | 2 | 1 |

UNIT-I Introduction

3 Periods

Advantage of Computer Graphics and Areas of Applications, Hardware and Software for Computer Graphics. (Hard Copy, Display Technologies), Scan Conversion Algorithms (Line, Circle)

Learning outcomes: At the end of this unit, the students will be able to

- Enumerate computer graphics applications
- Implement scan conversion algorithms

UNIT-II

3 Periods

2-Dimensional transformation, 2-D Translation, Rotation, Scaling, Homogeneous Coordinates, Reflection, Shear transformation 3-dimensional transformation, 3-D Translation, Rotation Scaling, Reflection, Shear.

Learning outcomes: At the end of this unit, the students will be able to

- Implement 2D transformations on graphic objects.
- Implement 3D transformations on graphic objects.

UNIT-III**3 Periods**

Basic Principles of Animation and Types of Animation, Introduction to the flash interface, Setting stage dimensions, working with panels, panel layouts , Layers & Views, Shaping Objects – Overview of shapes, Drawing & Modifying Shapes , Animation -Principles, Frame by frame animation, tweening, masks

Learning outcomes: At the end of this unit, the students will be able to

- Enumerate types of animations.
- Describe animation principles.

UNIT-IV**3 Periods**

Introduction to Digital Image Processing: Definition, application areas. File forms, Basic digital Image processing techniques like antialiasing, Convolutions, Thresholding etc, Image enhancement.

Learning outcomes: At the end of this unit, the students will be able to

- Understand the applications of IoT in day to day life.
- Explain the application of IoT for smart cities

UNIT-V**3 Periods**

Video – Broadcast video standards (NTSC, PAL), Integrating computer and television, video capture board, video, colour, shooting and editing video, recording formats 9S-VHS video hardware resolution, video compression (JPEG, MPEG)

Learning outcomes : At the end of this unit, the students will be able to

- Understand the applications of IoT in Indian Scenario.
- Explain the challenges in IoT implementation.

List of Experiments

| S.No | Experiment | Course Outcome |
|-------------|---|-----------------------|
| 1 | To implement Bresenham's algorithms for line, circle drawing | CO1 |
| 2 | To perform 2D Transformations such as translation, rotation, scaling, Reflection and shearing. | CO1 |
| 3 | To implement Cohen-Sutherland 2D clipping. | CO1 |
| 4 | To perform 3D Transformations such as translation, rotation and scaling. | CO1 |
| 5 | User Interface Design & Graphics II: Create a user interface for your final project. Include 2 backgrounds and 1 button set. Aim for a cohesive look. | CO3 |
| 6 | Multimedia Sound: Create 2 soundtracks and 2 EFX sounds for a previous project. | CO3 |
| 7 | Procedure to create an animation to indicate a ball bouncing on steps | CO2 |
| 8 | Procedure to simulate movement of a cloud. | CO2 |
| 9 | Procedure to create an animation with the following features. WELCOME | CO2 |

| | | |
|-----------|--|------------|
| 10 | Letters should appear one by one the fill color of the text should change to a different color after the display of the full word. Procedure to create an animation to represent the growing moon | CO2 |
| 11 | Procedure to extract the flower only from given photographic image and organize it on a background. Selecting your own background for organization. | CO3 |
| 12 | Procedure to use appropriate tool(s) from the toolbox cut the objects from 3 files (f1.jpg, f2.jpg & f3.jpg); organize them in a single file and apply feather effects. | CO3 |

Text Books

1. Hearn & Baker: Computer Graphics (2nd Ed.). Prentice Hall India.
2. Vaughan, T. -Multimedia – Making it work (5th edition), McGrawHill.

Reference Books

1. Krihsnamurthy N: Introduction to computer Graphics, Tata Mc Graw Hill Edition.
2. Zhigang X. &Plastock R.a. : Theory and problems of Computer Graphics (Schaum's Outline), Tata Mc Graw Hill.
3. Gonzalez &gonzalez, Digital Image Processing, Pearson Education.
4. Jain V.K. Fundamentals of Digital Image processing, Pearson Education.

| Previous (R15-IT227) | Current Unit No (R19 – IT329) | Changes Incorporated |
|-----------------------------|--------------------------------------|--|
| | Unit-1 | <u>Theory topics included</u> <ul style="list-style-type: none"> • Advantage of Computer Graphics and Areas of Application • Hardware and Software for Computer Graphics (Hard Copy Display Technologies) • Scan Conversion Algorithms (Line, Circle) <p>4 % Tutorial theory topics are added</p> |
| | Unit-2 | <u>Theory topics included</u> <ul style="list-style-type: none"> • 2-Dimensional transformation, 2-D Translation, Rotation, Scaling, Homogeneous Coordinates, Reflection, Shear transformation • 3-dimensional transformation, 3-D Translation, Rotation Scaling, Reflection, Shear. <p>4 % Tutorial theory topics are added</p> |
| | Unit-3 | <u>Theory topics included</u> <ul style="list-style-type: none"> • Basic Principles of Animation and Types of Animation, • Introduction to the flash interface , Setting stage |

| | | |
|-----------------------------------|--------|---|
| | | <p>dimensions, working with panels, panel layouts , Layers & Views,</p> <ul style="list-style-type: none"> • Shaping Objects – Overview of shapes, Drawing & Modifying Shapes , Animation -Principles , Frame by frame animation, tweening, masks <p>4% Tutorial theory topics are added</p> |
| | Unit-4 | <p><u>Theory Topics included</u></p> <ul style="list-style-type: none"> • Introduction to Digital Image Processing: Definition, application areas. File forms • Basic digital Image processing techniques like antialiasing, Convolutions, Thresholding etc, • Image enhancement. <p>4% Tutorial theory topics are added</p> |
| | Unit-5 | <p><u>Theory Topics included</u></p> <ul style="list-style-type: none"> • Video – Broadcast video standards (NTSC, PAL), Integrating computer and television • video capture board, video, colour, shooting and editing video, recording formats 9S-VHS video hardware resolution • video compression (JPEG, MPEG) <p>4% Tutorial theory topics are added</p> |
| <u>Overall change: 20%</u> | | |