LNCT University B.TECH-AIML

IV-Semester

AL -401 Web Technology

COURSE OUTCOMES:

After Completing the course student should be able to

CO1	Use the various html tags to develop the user friendly web pages.
CO2	Use CSS to provide the styles to the web pages at various levels
CO3	Demonstrate characteristics of java scripts for dynamic web pages.
CO4	Install Node JS and mongo DB to deal with data.
CO5	Develop the modern web applications with client side and server side technologies.

Unit 1 Web 3.0 and HTML-Introduction: Concept of WWW, Internet and WWW, HTTP Protocol : Request and Response, Web browser and Web servers, Features of Web 2.0, Web 3.0 Overview:Markup Language,Basic Structure of HTML,Head Section and Elements of Head Section, Meta Tags, CSS Tags, Script Tag, Table Tag , Div Tag ,Anchor tags , Image Tag, ObjectTag,Iframe Tag , Forms , Form Tag , Attributes of Form , POST and GET Method Text input,Text area , Checkbox and Radio Button , Dropdown, List and Opt-group , File Upload and HiddenFields o Submit,HTML Validators,Introduction to HTML5 o Features ofHTML5 , HTML5DocType.

Unit 2 CSS Codes-Introduction to Cascading Style Sheets ,Types of CSS , CSS Selectors , Universal Selector IDSelector, Tag Selector , Class Selector , Sub Selector , Child Combinatory Selector CSS Properties,Type Properties , Background Properties , Block Properties , Box Properties,ListPropertiesBorderProperties,PositioningProperties,Real-timeI mplementation,ConverstionofTabletoCSS Layout , CSS MenuDesign(Horizontal, Vertical).

Unit 3 Javascript JQuery-Introduction to Client Side Scripting , Introduction to Java Script , JavaScript Types , Variables inJS , Operators in JS , Conditions Statements , Java Script Loops , JS Popup Boxes , JS EventsJSArrays , Working with Arrays , JS Objects , JS Functions , Using Java Script in Real-time RelatedExamples Introduction to jQuery o jQuery Features, Installing jQuery , jQuery Syntax ,jQueryFunctionsand form UIdesigning.

Unit 4 Node JS and Angular-JS server-side JS applications. Installing Node JS, Node JS Modules Create,publish,extend,manage,NodeJSHTTP,Express,MongoDBoverviewofstructuralframeworkAn gularJS,ReactPHP: Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing,

Unit5-Moreonwebtechnologies-

Howwebsiteworks,client,server,uploading,FTP,HTTP,clientserverscriptinglanguages,domainshosting,Int ro to CMS word press, joomla,drupal,

Case study of full stack development on web

Books Suggested:

- MasteringHTML,CSS,JavascriptWebpublishingHTML5BlackBook.
- JavaScript:TheDefinitiveGuidebyDavidFlanagan.
- ProfessionalJavaScriptforWebDevelopersbyNicholasC.Zakas.
- MikeCantelon, T.J.Holowaychuk,MarcHarter,NathanRajlich,Node.JS

Suggested List of Experiments

Lab work includes web page preparation using all technologies in sequent. Static web page development using HTML and CSS, adding dynamism with CSS, Javascript, bootstrap, Node JS, Server side programming and then collectively create a mini project of web application

LNCT University B.TECH-AIML

Analysis and Design of Algorithm (AL-402)

COURSE OUTCOMES:
After Completing the course student should be able to

CO1	Evaluate space and time complexity of merge sort algorithms.
CO2	Use greedy strategy to find minimum spanning tree using prim's algorithm.
CO3	Apply backtracking techniques for solving eight-queen problem.
CO4	Implement branch and bound methods to solve traveling salesman problem.
CO5	Solve knapsack problem using dynamic programming algorithm.

Course contents

Unit I: Definitions of algorithms and complexity, Time and Space Complexity; Time space tradeoff, various bounds on complexity, Asymptotic notation, Recurrences and Recurrences solving techniques, Introduction to divide and conquer technique, example: binary search, merge sort, quick sort, heap
sort, strassen's matrix multiplication etc, Code tuning techniques: Loop Optimization, Data Transfer Optimization, Logic Optimization, etc.
Unit II : Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm etc. Correctness proof of Greedy algorithms.
Unit III : Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm etc.
Unit IV : Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph colouring problem etc. Introduction to branch & bound method, examples of branch and bound method like travelling salesman problem etc. Meaning of lower bound theory and its use in solving
algebraic problem, introduction to parallel algorithms.
Unit V : Advanced tree and graph algorithms, NP-hard and NP-complete problems, Approximations Algorithms, Data Stream Algorithms, Introduction to design and complexity of Parallel Algorithms

References:

1. Coremen Thomas, Leiserson CE, Rivest RL, Introduction to Algorithms, Third edition, PHI.

2. Horowitz &Sahani, Analysis & Design of Algorithm, Fourth Edition Computer Science Press.

3. Dasgupta, algorithms, Fifth Edition, TMH

4. Ullmann; Analysis & Design of Algorithm, Addison-wesley publishing company,

5. Michael T Goodrich, RobartoTamassia, Algorithm Design, Wiely India

6. Rajesh K Shukla: Analysis and Design of Algorithms: A Beginner's Approach; Wiley

LNCT University B.TECH-AIML

List of Experiments:

1. Write a program for Iterative and Recursive Binary Search.

2. Write a program for Merge Sort.

3. Write a program for Quick Sort.

4. Write a program for Strassen's Matrix Multiplication.

5. Write a program for optimal merge patterns.

6. Write a program for Huffman coding.

7. Write a program for minimum spanning trees using Kruskal's algorithm.

8. Write a program for minimum spanning trees using Prim's algorithm.

9. Write a program for single sources shortest path algorithm.

10. Write a program for Floye-Warshal algorithm.

11. Write a program for traveling salesman problem.

12. Write a program for Hamiltonian cycle problem.

LNCT University B.TECH-AIML

Software Engineering and Project Management (AL-403)

COURSE OUTCOMES:
After Completing the course student should be able to

CO1	Compare software development models with their merits and demerits.
CO2	Construct software requirement specifications with functional and non-functional requirements.
CO3	Apply boundary value analysis and equivalence partitioning testing techniques.
CO4	Calculate cyclomatic complexity for given program.
CO5	Apply cocomo model for estimating cost and efforts.

Course contents.

Unit I : The Software Product and Software Process Software Product and Process Characteristics, Software Process Models: Linear SequentialModel, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model,Spiral Model, Component Assembly Model, RUP and Agile processes. Software Processcustomization and improvement, CMM, Product and ProcessMetrics

Unit II: Requirement Elicitation, Analysis, and Specification Functional and Non-functional requirements, Requirement Sources and Elicitation Techniques,Analysis Modeling for Function-oriented and Object-oriented software development, Use caseModeling, System and Software Requirement Specifications, Requirement Validation,Traceability

Unit III: Software Design The Software Design Process, Design Concepts and Principles, Software Modeling and UML,Architectural Design, Architectural Views and Styles, User Interface Design, Function-orientedDesign, SA/SD Component Based Design, and DesignMetrics.

Unit IV : Software Analysis and Testing Software Static and Dynamic analysis, Code inspections, Software Testing, Fundamentals,Software Test Process, Testing Levels, Test Criteria, Test Case Design, Test Oracles, TestTechniques, Black-Box Testing, White-Box Unit Testing and Unit, Testing Frameworks,Integration Testing, System Testing and other Specialized, Testing, Test Plan, Test Metrics,Testing Tools. , Introduction to Object-oriented analysis, design and comparison with structuredSoftwareEngg.

Unit V : Software Maintenance & Software Project Management Need and Types of Maintenance, Software Configuration Management (SCM), Software ChangeManagement, Version Control, Change control and Reporting, Program ComprehensionTechniques, Re-engineering, Reverse Engineering, Tool Support. Project Management Concepts, Feasibility Analysis, Project and Process Planning,Resources Allocations, Software efforts,Schedule, and Cost estimations, Project Scheduling and Tracking, Risk Assessment andMitigation, Software Quality Assurance (SQA). Project Plan, ProjectMetrics.

Practical and Lab work :

Lab work should include a running case study problem for which different deliverable sat the end of each phase of a software development life cycle are to be developed. This will includemodeling the requirements, architecture and detailed design. Subsequently the design models willbe coded and tested. For modeling, tools like Rational Rose products. For coding and testing, IDElike Eclipse, Net Beans, and Visual Studio can beused.

References:

1. Pankaj Jalote ,"An Integrated Approach to Software Engineering", NarosaPub, 2005

2. RajibMall, "Fundamentals of Software Engineering" Second Edition, PHI Learning
3. R S. Pressman,"Software Engineering: A Practitioner's Approach", Sixth edition 2006, McGraw-Hill.
4. Sommerville,"SoftwareEnginerring",PearsonEducation.
5. Richard H.Thayer,"SoftwareEnginerring& Project Managements",WileyIndia
6. Waman S.Jawadekar,"Software Enginerring",TMH
7. BobHughes, M.Cotterell, RajibMall"SoftwareProjectManagement", McGrawHil

LNCT University B.TECH-AIML

AI Product Development and Deployment AL-404

COURSE OUTCOMES:
After Completing the course student should be able to

CO1	Understand AI product prototyping strategy used to solve business problems
CO2	Analyse and Compare model optimization techniques
CO3	Identify the architectures for scalable AI deployment
CO4	Make use containers for AI product deployment and Orchestration
CO5	Design Applications with Docker and Kubernetes with CI/CD

AI Product Development and Deployment Objectives: The objective of this course is to teach students the basic concepts of AI Product Engineering, Optimization Packaging, Reproducibility, Deployment, and Monitoring

Unit I: AI Product Prototyping: Strategy, Experimentation, and Responsible Design

Problem Definition & Stakeholder Alignment: Define Stakeholders, Business and Technical Requirement, Feasibility Analysis, KPIs, Data Strategy & Prototyping: What is Prototype, Rapid-Prototype Workflow, Jupyter Notebook, Sreamlit, Gradio, Generate Synthetic Data with Faker, Greetal.ai, Model Prototyping & Experimentation: Protype Models, Multiple Model, Baseline Model, Moving to Advanced Model, Track Experiments, MLFlow, Ethics & Bias in Prototyping: Bias in AI, How Bias Sneaks, Spotting Bias Early, Fairlearn, Aequitas, Key Fairness Metrics

Unit II: Production-Ready AI Optimization, Packaging, and Reproducibility

Model Optimization: Hyperparameter Tuning, Model Pruning, Quantization, Knowledge Distillation, TinyML Optimization, ONNX for Portability, Quantization-Aware Training (QAT), Model Packaging: Package Models, Packaging Formats, MLflow Models, MLflow Packaging Docker, Docker Packaging, PMML, PMML Packaging, pip requirements, conda environemnt, Reproducibility & Versioning: Tools, Git, DVC Commands, Combining Git and DVC, Versioning Models, Versioning Environment

Unit III: Scalable AI Deployment: Architectures, Containers & Edge Systems Deployment Architecture: What is Deployment, Deployment Methods, REST API, FastAPI, Batch Processing, Tools for Batch Jobs, Serverless, AWS Lambda, Model Serving Frameworks,

Unit IV Containerization & Orchestration: What is Container, Packaging vs Containerization, Dockerfile, Docker Compose, Orchestration, What is Kubernetes(K8), Pod in Kubernetes, Kubernetes Cluster Components, Master Node, Worker Node, Kubelet, Deployment YAML. Replicas, Cloud vs Edge Deployment: Why Reproducibility Matters, Cloud Deployment vs Edge Deployment, When to use, AWS SageMaker, Google Vertex AI, ONNX runtime, Hybrid Deployment

Unit V: AI in Production: Monitoring, CI/CD, and Business Integration

Monitoring & Observability: What is Monitoring, Monitoring vs. Logging vs. Observability, Logs, Metrics, and Alerts, Open-Source Tools for Monitoring ML, Prometheus, Grafana, Evidently AI, CI/CD for AI Systems: What is CI/CD, Key Components, Automated Retraining, Data Drift & Triggering Retrain, Apache Airflow, Kuberflow, Business Integration & ROI in AI: What is AI ROI, What AI Project Fail, Successful AI Project, Measuring ROI with KPI,

References

- The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in
- Technology Organizations, Gene Kim, Jez Humble, Patrick Debois, John Willis,TMH

Suggested List of Experiments

- Study and set up AI product prototyping tools CO1
- Implement Continuous Integration (CI), Continuous Delivery (CD) with it CO1
- Apply hyperparameter tuning CO2
- Illustrate version controlling tools, CO2
- Illustrate DevOps process for build management, Artifacts repository management, CO3
- Illustrate it for release management using AWS CO3
- Integrate AI framework with scalable tools CO4
- Build Pipeline and Automate workflow with tools CO4
- Install docker and create Dockerfile CO5
- Install Kubernetes and review its architecture CO5

LNCT University B.TECH-AIML

Machine Learning and Pattern Recognition AL-405

COURSE OUTCOMES:
After Completing the course student should be able to

CO1	Explain the use of Machine Learning Models in business and understand machine learning models can be used to solve business problems
CO2	Compare machine learning algorithms such as supervised, unsupervised, and reinforcement learning models
CO3	Identify the performance of different machine learning models and compare them to optimizethe results
CO4	Make use continuous and discrete data set to fit regression and classification models
CO5	Understand and apply Linear Discriminant Analysis (LDA) for classification tasks

Course content

UNIT – I Introduction: Learning systems, real world applications of machine learning, why machine learning, variable types and terminology, function approximation Types of machine learning: Supervised learning, unsupervised learning, reinforcement learning

UNIT – II Important concepts of machine learning: Parametric vs non-parametric models, the trade-off between prediction accuracy and model interpretability, the curse of dimensionality, measuring the quality of fit, bias- variance trade off, overfitting, model selection, no free lunch theorem

UNIT – III Linear Regression: Linear regression, estimating the coefficients, accessing the accuracy of coefficient estimates, accessing the accuracy of the model, multiple linear regression, qualitative predictors

UNIT – IV Classification: Logistic regression, estimating regression coefficients, making predictions, multiple logistic regressions

UNIT – V Linear discriminant analysis, bayes' theorem of classification, LDA for p=1, LDA for p>1, quadratic discriminant analysis

Reference Books:

- Machine Learning by Tom M. Mitchell - McGraw Hill Education; First edition
- Pattern Recognition and Machine Learning (Information Science and Statistics) by Christopher M. Bishop -Springer; 1st ed. 2006. Corr. 2nd printing 2011 edition
- Elements of Statistical Learning: Data Mining, Inference, and Prediction by Trevor Hastie

Suggested List of Experiments

Select Iris Dataset, Titanic Dataset and perform regression and classification. Practice with Python train the model