VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ACCREDITED BY NAAC WITH 'A++' GRADE

Ibrahimbagh, Hyderabad-31

Approved by A.I.C.T.E., New Delhi and

Affiliated to Osmania University, Hyderabad-07

Sponsored

by

VASAVI ACADEMY OF EDUCATION

Hyderabad

SCHEME OF INSTRUCTION AND SYLLABI UNDER CBCS FOR

B.E. CSE (AI & ML) VII and VIII Semesters

With effect from 2024-25

(For the batch admitted in 2021-22)

(R-21)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Phones: +91-40-23146020, 23146021

Fax: +91-40-23146090

Institute Vision

Striving for a symbiosis of technological excellence and human values

Institute Mission

To arm young brains with competitive technology and nurture holistic development of the individuals for a better tomorrow

Department Vision

To be a center for academic excellence in the field of Computer Science and Engineering education to enable graduates to be ethical and competent professionals

Department Mission

To enable students to develop logic and problem solving approach that will help build their careers in the innovative field of computing and provide creative solutions for the benefit of society.

.

B.E (CSE) Program Educational Objectives (PEO's)	
Graduates should be able to utilize the knowledge gained from their academic program to:	
PEO I	Solve problems in a modern technological society as valuable and productive engineers.
PEO II	Function and communicate effectively, both individually and within multidisciplinary teams.
PEO III	Be sensitive to the consequences of their work, both ethically and professionally, for productive professional careers.
PEO IV	Continue the process of life-long learning.

B.E. (CSE) PROGRAM OUTCOMES (PO's) Engineering Graduates will be able to:	
PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

P1O	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
P11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
P12	**Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

B.E (CSE) PROGRAM SPECIFIC OUTCOMES (PSO's)	
PSO I	Graduates will have knowledge of programming and designing algorithms to develop solutions for engineering problems pertaining to AI&ML.
PSO II	Graduates will be able to develop models in Machine Learning, Deep Learning using knowledge of AI and modern tools.
PSO III	Graduates will apply AI&ML techniques for real world applications in the areas of Cyber Security, Image processing, Natural Language Processing and IoT.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION(R-21)
FOR B.E 2021-22 ADMITTED BATCH VII SEMESTER (A.Y. 2024-25)

B.E CSE (AI&ML) VII Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
UII21PC710CS	Distributed Systems and Cloud Computing	3	-	-	3	60	40	3
UII21PC720CS	Natural Language Processing	3	-	-	3	60	40	3
UII21PE7X0CS	Professional Elective-I	3	-	-	3	60	40	3
UII21PE7X0CS	Professional Elective-II	3	-	-	3	60	40	3
PRACTICALS								
UII21PC711CS	Distributed Systems and Cloud Computing Lab	-	-	2	3	50	30	1
UII21PC721CS	Natural Language Processing Lab	-	-	2	3	50	30	1
UII21PE721CS	Cryptography and Network Security Lab	-	-	2	3	50	30	1
UII21PE751CS	Reinforcement Learning Lab	-	-	2	3	50	30	1
UII21PW719CS	Project Seminar	-	-	2	-	-	30	1
TOTAL		**12**	**0**	**10**	**-**	**440**	**310**	**17**
GRAND TOTAL		**22**				**750**		

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

DISTRIBUTED SYSTEMS & CLOUD COMPUTING

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks :60	Course Code: **UII21PC710CS**
Credits :3	CIE Marks :40	Duration of SEE : 3Hours

COURSEOBJECTIVES	**COURSEOUTCOMES** On completion of the course, students will be able to
1 Explain distributed system and cloud models 2 Apply distributed computational model and understand the need for cloud computing.	1 Explain distributed system models and cloud service & deployment models. 2 Analyze the need for virtualization in a cloud environment and apply it in compute, Memory and storage levels 3 Explain Container based virtualization and orchestration of containers using Kubernetes 4 Explain distributed computation model on large datasets using parallel and distributed programming approaches over cloud platforms 5 Explain the role of trust, load balancing

UNIT I:

Distributed System Models & Enabling technology: Scalable computing over the internet, Technologies for network-based system, System models for distributed & cloud, Software environments for distributed & Cloud.

Introduction to Cloud Computing: Cloud Computing in a Nutshell, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Service Models, Challenges and Risks.

SLA Management in the cloud: Types of SLA, Life cycle of SLA, SLA management in cloud.

UNIT II:

Virtual Machines and Virtualization of Cluster and Data Centers: Levels of Virtualization, Virtualization Structures/Tools and Mechanisms-KVM, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Centre Automation.

UNIT III:

Container based Virtualization: Creating and running containers-Docker, Deploying a Kubernetes Cluster, Managing virtual machines on Kubernetes cluster-Kubervirt, AWS Lambda and Azure function.

UNIT IV:

Cloud Programming & Software Environments: Features of Cloud & Grid, Parallel & Distributed programming paradigms, Map-Reduce, HDFS, Programming support of Google Cloud, Google File System, Big Table, Amazon AWS & Azure.

Case Study: OpenStack & Aneka

UNIT V:

Trust Management and Security: Trust, Reputation and Security Management in P2P Systems, Load Balancing- HAProxy, Data Security, Identity and Access Management in cloud. Consensus and related problems. Edge Computing, Multi cloud and Federated cloud

Learning Resources:

1. Kai Hwang. Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing, From parallel processing to the internet of things", Elsevier, 2012.
2. George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, "DISTRIBUTED SYSTEMS Concepts and Design", Fifth Edition, Addison-Wesley, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, "Cloud Computing: principles and paradigms (Wiley Series on Parallel and Distributed Computing), Wiley Publishing (c) 2011.
4. Brendan Burns, Joe Beda, and Kelsey Hightowe: "Kubernetes: Up and Running" 2nd Edition, Oreilly, 2019
5. Raluca Ada Popa, Catherine M.S. Redfiled, NickolaiZeldovich, and Hari Balakrishnan, "Crypt DB" Protecting confidentiality with encrypted Query Processing" 23rd ACM Symposium on Operating Systems principles (SOSP 2011), Cascais, Portugal October 2011.

6. Craig Gentry,A fully Homomorhic Encryption Scheme, Doctoral Dissertation, September 2009
7. Ajay D. Kshemkalyani and Mukesh Singhal,Distributed Computing: Principles, Algorithms, and Systems, Cambridge, 2008
8. https://onlinecourses.nptel.ac.in/noc18_cs45/
9. https://cloud.google.com/load-balancing/docs/
10. https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-overview
11. https://www.docker.com/resources/what-container
12. http://www.haproxy.org/

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

NATURAL LANGUAGE PROCESSING

YLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code: **UI21PC720CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. Learn the concepts of Natural Language processing. 2. Gain knowledge understanding of relevant terminology, concepts in Natural Language Processing.	1. Apply N-grams for language modeling. 2. Apply FNNs for language modeling and HMM algorithm for part of speech tagging a given text. 3. Apply Text classification and summarization 4. Understand working of machine translation application. 5. Analyse syntax of sentences using parsing techniques.

UNIT-I

Introduction: Knowledge in Speech and Language processing, Ambiguity, Models and algorithms, Text Normalization, Minimum Edit Distance, N-Grams, Smoothing.

UNIT-II:

Vector Semantics and Embeddings: Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Applications of the TF-IDF vector model,Word2Vec,HMM Part-of-Speech Tagging, Named Entity Recognition, Word Disambiguation.

UNIT-III:

NLP CLASSIFIERS: Text classification, Applications, A Pipeline for Building Text Classification System, LSTMs for Text classification, Text classification with Large, pre-Trained Language Models, Text Summarization, Summarization Use Cases, Recommender Systems for Textual Data.

UNIT-IV:

Machine Translation: Language Divergences and Typology, Machine Translation using Encoder-Decoder, Details of the Encoder-Decoder Models.

UNIT-V:

Constituency Parsing: Constituency, Context-Free Grammars,Treebanks, Grammar Equivalence and Normal Form, Ambiguity, CKY Parsing: A Dynamic Programming Approach.

Learning Resources:

1. Daniel Jurafsky and James H. Martin, "Speech and Language Processing", (3rd ed.)
2. Allen, James, "Natural Language Understanding", Second Edition, Benjamin/ Cumming, 1995.
3. Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta, Harshit Surana, "Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems", O'REILY,2020.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

UNMANNED AERIAL VEHICLES
(Professional Elective-I)
SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code: **UI21PE710CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. To gain insight into the basic elements of commercial-off-the-shelf (COTS) drone systems used in civilian missions. 2. To introduce unmanned aerial systems (UAS) including drones and autonomous unmanned aerial vehicles (UAV) with sensors. 3. To Understand the regulatory procedures of drones, pilot certification and licensing and basic safetymeasures required of UAS / UAV.	1. Understand the evolution and classification of Drones / Unmanned aerial Vehicle (UAVs) 2. Gain knowledge on UAVs technology side of things (i.e., sensors, platforms, navigation, power source, communication, range, altitude and speed) 3. Illustrate the commercial applications used by various types of drones such as aerial photography, law enforcement surveillance, and border enforcement. 4. Thorough knowledge on the hardware and software used for data collection, storage, analytical requirements and system life cycle. 5. Discuss Indian government airspace policy, regulations, and a comparison of other international regulations, and risk factors. 6. Realize the emerging technologies being integrated into the drone market including semi-autonomous and autonomous systems for various applications like crop sensing, emergency response missions, and coordinated swarms.

UNIT: I

Introduction to Autonomous Flights: History of Autonomous Flights – Principles of Flight – Flight Maneuvers – Showcase of DIY drones.

Technologies and Requirements: Critical Technologies – Navigation, Sensors and Payloads, Power Sources, Communications – COTS Drone Technologies.

UNIT: II

Design Fundamentals: UAV Classifications – Review of few Successful UAVs – Design Project Planning – Feasibility Analysis- Design Process – UAV Conceptual Design – UAV Preliminary Design – UAV Detail Design – Design Review, Evaluation, Feedback – UAV Design Steps.

Principles of UAVs: Airframe - Building the Little Dipper Airframe – Step by step build instructions – Power Train – Propellers – Motors – Total Lift – Wrapping UP.

UNIT: III

Control and Navigation: Flight Controller – Build Instructions of Flight Controller – GPS – Compass – Battery Monitor – Transmitter – Frequency Bands – Different Modes Around the World.

UNIT: IV

Telemetry Radios, Camera and First Person View (FPV) Equipment:

Software Monitoring and control – Popular Drone Cameras – FPV for Live stream – Key Flight Safety Rules – PreFlight Checklist and Flight Log information – Laws and Regulation.

UNIT: V

Overview of Commercial Drones and Kits: (9 Hours)

Parallax ELEV-8 Quadcopter - DJI Phantom 2 Vision - OpenROV - Actobotics Nomad - Brooklyn

Aerodrome Flack – Choosing Between Commercial Options – Making your own Airframe, Contemporary issues.

Learning Resources:

1. Terry Kilby and Belinda Kilby Make: Getting Started with Drones, First Edition, Maker Media Inc,San Francisco CA, 2016.
2. John Baichtal "Building your own Drones A beginners Guide to Drones, UAVs and ROVs", QuePublishing 2016.

Reference Books:

1. Mohammad H. Sadraey "Design of Unmanned Aerial Systems" First Edition, John Wiley & Sons, Inc.,USA 2020.
2. A.R. Jha, "Theory, Design, and Applications of Unmanned Aerial Vehicles", First Edition, CRCPress, 2020.
3. Alain Cardon and Mohamed Itmi "New Autonomous Systems" Volume 1, John Wiley & Sons, Inc.Hoboken, USA. 2016.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

CRYPTOGRAPHY AND NETWORK SECURITY
(Professional Elective-I)

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code:**UI121PE720CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVE	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. Learn fundamentals in cryptography and understand the need of cryptographic algorithms to design network security protocols.	1. Understand the basic fundamentals in cryptography and vulnerability scenarios. 2. Demonstrate the flow of constructing the Block ciphers and stream ciphers. 3. Grasp the significance of hash function, message authentication code constructions. 4. Grasp the significance of security constructions of TLS and Email security. 5. Appreciate the security constructions of wireless network and Internet.

UNIT I: Computer and network security concepts & Examples of Vulnerabilities:

Introduction: Security attacks, security services; mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cryptanalysis.

Examples of Vulnerabilities: Cyber threats and their defense(Phishing Defensive measures, web based attacks, SQL injection and Defense

techniques), Buffer overflow & format string vulnerabilities, TCP session hijacking(ARP attacks, route table modification) UDP hijacking (man-in-the-middle attacks).

UNIT II: Symmetric and Asymmetric Key Cryptography

Symmetric key cryptography:Traditional Block Cipher Structure, DES, Block Cipher Design Principles, Triple DES, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher, Modes of Operations, Stream Cipher, RC4.

Public Key Cryptography: Principles, public key cryptography algorithms, RSA Algorithm, Diffie Hellman Key Exchange, Man in middle attack, Elgamal encryption and decryption, Introduction to Elliptic Curve Cryptography.

UNIT III : Cryptographic Hash Functions & Digital Signatures

Cryptographic Hash functions: Application of Cryptographic hash Functions, Requirements, Security, Secure Hash Algorithm,

Message Authentication Functions: Requirements, Security, HMAC & CMAC.

Digital Signatures: Digital Signatures, Elgamal Distial Signature scheme, NIST Digital Signature Algorithm.

Key management and distribution: Symmetric key distribution methods, Distribution of public keys, X.509 certificates, Public key infrastructure.

User Authentication: Remote user authentication principles, Kerberos.

UNIT IV: Transport Layer Security and Email Security

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell (SSH)

Electronic Mail Security: Internet mail architecture, Email formats, Email threats, Comprehensive Email security, Pretty Good Privacy (PGP) and S/MIME.

UNIT V: Wireless Network security & IP security, Intrusion detection

Wireless Network Security: Wireless security, Mobile device security, IEEE 802.11 Wireless LAN overview, IEEE 802.11i Wireless LAN security.

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Internet Key exchange.

Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS, Machine learning approaches to intrusion detection.

Learning Resources:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Network Security and Cryptography, Bernard Menezes, CENGAGE Learning, Second Edition.
3. Cryptography and Network security, Behrouz Forouzhan, Debdeep Mukhopadyay, Third Edition.
4. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

DATA AND VISUAL ANALYTICS IN AI

(Professional Elective-I)

SYLLABUS FOR B.E. VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code:**UI21PE740CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. To explore statistical analysis methods and machine learning algorithms for data analysis. 2. To gain proficiency in data visualization techniques to communicate insights effectively. 3. To apply AI-driven approaches for advanced analytics tasks such as predictive modelling and clustering. 4. To explain techniques and algorithms for creating effective visualizations based on principles from graphic design. 5. To introduce several industry-standard software tools to create a compelling and interactive visualization of various types of data.	1. Understand the key techniques and theory used in visualization, including data models, graphical perception, and techniques for visual encoding and interaction. 2. Apply knowledge to a number of common data domains and corresponding analysis tasks, including multivariate data, networks, text, and cartography. 3. Describe big data and use cases from selected business domains. 4. Explain NoSQL big data management and other technologies such as Hadoop and HDFS. 5. Practical experience building and evaluating visualization systems.

UNIT – I (3 Lectures)

Introduction: Data for Graphics, Design principles, Value for visualization, Categorical, time series, and statistical data graphics, Introduction to Visualization Tools.

UNIT – II (8 Lectures)

Graphics Pipeline: Introduction, Primitives: vertices, edges, triangles, Model transforms: translations, rotations, scaling, View transform, Perspective transform, window transform.

Aesthetics and Perception: Graphical Perception Theory, Experimentation, and the Application, Graphical Integrity, Layering and Separation, Color and Information, Using Space Effectively.

UNIT – III (8 Lectures)

Visualization Design: Visual Display of Quantitative Information, Data-Ink Maximization, Graphical Design, Exploratory Data Analysis, Heat Map.

UNIT – IV (13 Lectures)

Multidimensional Data: Query, Analysis and Visualization of Multi-dimensional Relational Databases, Interactive Exploration, tSNE.

Interaction: Interactive Dynamics for Visual Analysis, Visual Queries, Finding Patterns in Time Series Data, Trend visualization, Animation, Dashboard, Visual Storytelling

UNIT – V (10 Lectures)

Collaboration: Graph Visualization and Navigation, Online Social Networks, Social Data Analysis, Collaborative Visual Analytics, Text, Map, Geospatial data.

Laboratory:

Visualization Design, Exploratory data analysis, Interactive Visualization Tools like Tableau, Gephi, D3, etc. Mini Project

Text Books:

1. E. TUFTE (2001), The Visual Display of Quantitative Information, Graphics Press, 2nd Edition.
2. J. KOPONEN, J. HILDÉN (2019), Data Visualization Handbook, CRC Press.

Reference Books:

1. M. LIMA (2014), The Book of Trees: Visualizing Branches of Knowledge, Princeton Architectural Press.
2. R. TAMASSIA (2013), Handbook of Graph Drawing and Visualization, CRC Press.
3. S. MURRAY (2017), Interactive Data Visualization for the Web, O'Reilly Press, 2nd Edition.

The break-up of CIE: Internal Tests + Assignments + Quizzes

With effect from the Academic Year 2024-25

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

REINFORCEMENT LEARNING
(Professional Elective-II)

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks:60	Course Code:**UII21PE750CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVE	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. Understand issues and techniques involved in the reinforcement learning	1. Illustrates various elements of reinforcement techniques. 2. Model a control task in the framework of MDPs. 3. Compute optimal values and policies using complete environment knowledge 4. Apply Monte Carlo method for prediction. 5. Apply Temporal-Difference(TD) learning for prediction and Understand the On-policy Prediction with Approximation

UNIT – I

The Reinforcement Learning Problem: Reinforcement Learning, Examples, Elements of Reinforcement Learning, Limitations and Scope, An Example.

Multi-arm Bandits: An k-Armed Bandit Problem, Action-Value Methods, The 10-armed Testbed, Incremental Implementation, Tracking a Nonstationary Problem, Optimistic Initial Values, Upper-Confidence-Bound Action Selection, Gradient Bandits algorithms.

UNIT – II

Finite Markov Decision Processes: The Agent–Environment Interface, Goals and Rewards, Returns and Episodes, Unified Notation for Episodic

and Continuing Tasks, Policies and value functions, Optimal Policies and Optimal Value Functions, Optimality and Approximation.

UNIT – III

Dynamic Programming: Policy Evaluation, Policy Improvement, Policy Iteration, Value Iteration, Asynchronous Dynamic Programming, Generalized Policy Iteration, Efficiency of Dynamic Programming

UNIT – IV

Monte Carlo Methods: Monte Carlo Prediction, Monte Carlo Estimation of Action Values, Monte Carlo Control, Monte Carlo Control without Exploring Starts, Off-policy Prediction via Importance Sampling, Incremental Implementation, Off-Policy Monte Carlo Control.

UNIT – V

Temporal-Difference (TD) Learning: TD Prediction, Advantages of TD Prediction Methods, Optimality of TD(0), Sarsa: On-Policy TD Control, Q-Learning: Off-Policy , Expected Sarsa.

On-policy Prediction with Approximation: Value Function Approximation, The Prediction objective, Stochastic-gradient and Semi – gradient Methods.

Learning Resources:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning: An Introduction", 2nd Edition. MIT Press, 2018
2. Kyriakos G. Vamvoudakis, Yan Wan, Frank L. Lewis, Derya Cansever,"Handbook of ReinforcementLearning and Control (Studies in Systems, Decision and Control, 325)", 1st Edition.
3. Nimish Sanghi,"Deep Reinforcement Learning with Python: With PyTorch, TensorFlow and OpenAI Gym", 1st Edition.
4. Boris Belousov, Hany Abdulsamad, Pascal Klink, Simone Parisi, Jan Peters."Reinforcement Learning Algorithms: Analysis and Applications", 1st Edition.
5. https://nptel.ac.in/courses/106106143
6. https://www.coursera.org/specializations/reinforcement-learning

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

ADVANCED DATABASES
(Professional Elective-II)

SYLLABUS FOR B.E. VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code:**UII21PE760CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Apply knowledge of advanced database management techniques to provide solution for a database intensive problem.	1 create and query tables in object relational and object oriented databases 2 create, query and process data in XML files 3 describe query processing mechanisms and query optimization 4 explain inter query, intra query parallelism and distributed database processing techniques 5 apply performance tuning methods and describe data representation in spatial, geographical and temporal databases

UNIT-I: Object Based Databases: Overview, Complex Data Types, Structured Types and Inheritance in SQL, Table Inheritance, Array and Multiset Types in SQL, Object-Identity and Reference Types in SQL, Implementing O-R features, Persistent Programming Languages, Object-Relational Mapping, Object-Oriented versus Object-Relational.

UNIT-II: XML: Motivation, Structure of XML data, XML Document Schema, Querying and Transformation, Application program Interfaces to XML, Storage of XML Data, XML applications.

UNIT-III: Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions.

Query Optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Evaluation Plans, Materialized Views.

UNIT-IV: Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Interoperation Parallelism, Interoperation Parallelism.
Distributed Databases: Homogeneous and Heterogeneous Databases, Distributed Data Storage, Distributed Transactions, Commit Protocols, Concurrency Control in Distributed Databases, Heterogeneous Distributed Databases, and Cloud-Based Databases.

UNIT-V: Advanced Application Development: Performance Tuning, Performance Benchmarks, Other Issues in Application Development, Standardization.
Spatial and Temporal Data and Mobility: Motivation, Time in Databases, Spatial and Geographic Data, Multimedia Databases, Mobility and Personal Databases.

Learning Resources:

1. Abraham Silberschatz, Henry F Korth, Sudharshan S, Database System Concepts, 6th Edition(2011), McGraw-Hill International Edition.
2. RamezElmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, 4th Edition(2006), Pearson Education.
3. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System , 8th Edition(2006) Pearson Education.
4. Raghu Ramakrishna, and Johannes Gehrke, Database Management Systems, 3rd Edition(2003), McGraw Hill.
5. http://nptel.ac.in/courses/106106093/

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

BLOCKCHAIN PLATFORMS AND APPLICATIONS
(Professional Elective-II)

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks:60	Course Code:**UII21PE780CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 To provide understanding and significance of Blockchain. 2 To familiarize with platforms such as Ethereum, Hyperledger Fabric involved in building Blockchain applications. 3 To impart knowledge about the applications of Blockchain in various sectors.	1 Understand the significance of Blockchain technology and its associated components. 2 Understand the need for consensus protocols in Blockchain. 3 Experience the Ethereum and Solidity Programming 4 Understand the basics of Hyperledger fabric. 5 Incorporate Blockchain in financial software Systems and supply chain environments.

UNIT - I

Introduction: Overview of distributed systems; Introduction to Blockchain; Properties of Blockchain; Evolution of Blockchain, Components of Blockchain, Ecosystem, Hash Functions, Merkle Trees; Types of Blockchain; Blockchain Platforms.

Cryptography: Privacy and Security on Blockchain.

UNIT - II

Distributed consensus: Consensus algorithms, Consensus in a Bitcoin network, Proof of Work (PoW), Proof of Stake, Proof of Burn, Proof of Elapsed Time; Consensus models for permissioned block chain, Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine

general problem, Byzantine fault tolerant system, BFT over Asynchronous systems.

UNIT - III

Ethereum: Introduction to Ethereum Smart Contracts; Mining in Ethereum; Consensus mechanism in Ethereum; Technologies that support Ethereum;

Ethereum Programming Languages-Solidity-Basic Syntax,Types, Variables, Variables Scope, Operators, Loops, Decision Making, Strings, Arrays, Enums, Structs, Mapping, Conversions , Ether Units, Solidity Functions, Solidity Common Patterns – Restricted Access, Withdrawal Pattern, Contracts, Inheritance, Constructors, Abstract Contracts, Interfaces, Interfaces, Events, Error Handling.

UNIT – IV

Hyperledger Fabric: Introduction to Hyperledger Fabric; Hyperledger Fabric architecture; Consensus in Hyperledger Fabric; Hyperledger API and Application Model;

UNIT – V

Use Case I: Blockchain in Financial Software and Systems (FSS): Settlements, KYC, Insurance.

Use case II: Blockchain in trade/supply chain:- Tuna fish Problem

Use Case III: Blockchain for Government: Digital identity, land records and other kinds of record keeping between government entities.

Learning Resources:

1. Imran Bashir, "Mastering Blockchain : A deep dive into distributed ledgers, consensus protocols,smart contracts, DApps, cryptocurrencies, Ethereum, and more", Packt Publishing,Third Edition, 2020,
2. Mark Gates, "Blockchain: Ultimate guide to understanding blockchain, bitcoin, cryptocurrencies, smart contracts and the future of money", Wise Fox Publishing and Mark Gates, 2017.
3. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Blockchain with Hyperledger: Building decentralized applications with Hyperledger Fabric and Composer", 2018.
4. ArshdeepBahga, Vijay Madisetti, "Blockchain Applications: A Hands-On Approach", ArshdeepBahga, Vijay Madisetti publishers 2017.

Suggested Reading:

1. Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly Media,Inc., 2014.
2. Melanie Swa, "Blockchain", O'Reilly Media, 2014.

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc18_cs47/preview
2. Hyperledger Fabric - https://www.hyperledger.org/projects/fabric
3. Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits, 2017 https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.htm
4. https://www.udemy.com/blockchain-and-bitcoin-fundamentals/

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

DISTRIBUTED SYSTEMS & CLOUD COMPUTING LAB

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code: **UII21PC711CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Implement distributed transactions 2 Install, configure and deploy applications using various cloud platforms	1 Launch and run highly available cloud services using AWS (Amazon web Services) 2 Create a virtual machine in a private cloud using OpenStack 3 Create and deploy an application on a Docker container 4 Implement a distributed application using MapReduce programming model 5 Demonstrate cloud security, load balancing and auto scaling features

Programming Exercises:

1. Hosting a static website in Amazon S3 Bucket.
2. Create a virtual machine using Amazon EC2.
3. Adding storage to EC2 using amazon EFS.
4. Create an Amazon RDS database and perform CRUD operations.
5. Deploy a Node.js application on a Docker Container
6. Running Containers on Amazon Elastic Kubernetes Service (Amazon EKS).
7. Implement a serverless architecture using Amazon Lambda
8. Build a Virtual Private Cloud to produce a customized network.
9. Streaming dynamic content using Amazon CloudFront.

10. Implement a distributed application on Hadoop framework to count word frequency with MapReduce.
11. Demonstrate Identity and access management for controlling account access.
12. Implement Elastic load balancing and auto scaling service.

Learning Resources:

1. George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, DISTRIBUTED SYSTEMS Concepts and Design, Fifth Edition, Addison-Wesley, 2012.
2. Kai Hwang. Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing from parallel processing to the internet of things", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, "Cloud Computing: principles and paradigms (Wiley Series on Parallel and Distributed Computing), Wiley Publishing (c) 2011.
4. Raluca Ada Popa, Catherine M.S. Redfiled, NickolaiZeldovich, and Hari Balakrishnan, "Crypt DB" Protecting confidentiality with encrypted Query Processing" 23rd ACM Symposium on Operating Systems principles (SOSP 2011), Cascais, Portugal October 2011.
5. Craig Gentry, A fully Homomorhic Encryption Scheme, Doctoral Dissertation, September 2009.
6. Ajay D. Kshemkalyani and Mukesh Singhal, Distributed Computing: Principles, Algorithms, and Systems, Cambridge, 2008.
7. https://www.virtualbox.org/wiki/Documentation
8. https://cloud.google.com/docs
9. https://docs.aws.amazon.com/
10. https://docs.microsoft.com/en-us/azure/?product=featured
11. https://wiki.openstack.org/wiki/Documentation
12. http://www.manjrasoft.com/aneka_architecture.html
13. https://www.docker.com/resources/what-container
14. http://www.haproxy.org/

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test : 2Hours			

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

NATURAL LANGUAGE PROCESSING LAB

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code:**UI121PC721CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. Apply dynamic programming design strategy for NLP tasks 2. Design Feedforward and Recurrent Neural Networks for performing Language Modelling	1. Implement the word tokenization for NLP pre-processing 2. Implement the N-gram and Neural language models. 3. Implement parsing algorithms for grammar checking 4. Implement solution for sentiment analysis 5. Implement the NLP task namely document classification

The following experiments are to implemented using Python library nltk and spaCY and without using the library wherever applicable. And each student is expected to develop and submit a mini project in the area of NLP at the end of the course.

1. Implement a word tokenization using UNIX utilities
2. Implement a word tokenization using regular expressions
3. Implement Minimum Edit Distance (MED) algorithm for spelling correction
4. Implement n-gram language model
5. Implement Naïve Bayes classification for sentiment analysis
6. Implement POS tagging using HMM
7. Implement CKY parsing algorithm

8. Implement PCKY parsing algorithm
9. Compute cosine similarity between the words using term-document matrix and term-term matrix
10. Compute tf-idf matrix for the given document set
11. Implement language model using Feed forward Neural Network
12. Implement language model using RNN
13. Perform Text Analytics

Learning Resources:

1. DanielJurafsky&JamesH.Martin,"SpeechandLanguageProcessing", 3rd edition,PearsonEducation. (https://web.stanford.edu/~jurafsky/slp3/)
2. James Allan, Natural Language Understanding, 2ndedition(1995), Pearson Education
3. Charnaick, Eugene, Statistical Language Learning, MIT Press, 1993
4. Christopher D.Manning, HinrichSchutze, Foundations of Statistical Natural Language Processing, (1999),The MIT Press.
5. Tanveer Siddiqui, US Tiwary, Natural Language Processing and I Retrieval, (2008), Oxford University Press.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

UNMANNED AERIAL VEHICLES LAB

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code**: UII21PE711CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. The aim of this course is to empower student to explore drones technology through their significantlearning of the Components, Assembly and Calibrations. 2. Students will understand fundamental concepts of drone. 3. It ensures learning of various design models. 4. It also provides an open-access tool that facilitates drones' programming in different scenarios, applying concepts related to computer vision, artificial intelligence, automation, autonomous navigation, or control algorithms 5. It comprises a collection of lab exercises assembling drone applications in real life, such as following a road, visual landing, and people search and rescue, including their corresponding background theory.	1. Understand UAV (Unmanned Aerial Vehicles) and its application along with Law enforcement required for deployment and testing 2. Gain the knowledge about the components required for UAV 3. Elucidate the drone assembly 4. Familiarize quadcopter calibrations 5. Acquaint Design models with Path planning and Navigation 6. Simulate and Deploy Drone for real life applications by conducting experiments that facilitates drones' programming with computer vision, artificial intelligence, automation, autonomous navigation, or control algorithms.

Lab experiments:

List of Free/ Open Source Simulator:

- **Gazebo simulator** is a Robot simulator**.**
- PX4 is an open source flight control software for drones and other unmanned vehicles.

1. Basic building blocks and 3D Design of a Drone
2. Making the drone to be stable and fly autonomously with little human intervention
3. Design a control system architecture that will hover a quadcopter
4. How to create flight software from the control architecture
5. How a good model of the drone and the environment it operates in can be used forsimulation and test. Tuning the PID Controller
6. Quadcopter Flying Training Simulator (Simulator).
7. Hands on session on quadcopter (Hands-on): Implementation/ assembling of drone
8. Testing Session (on field), Mount Arduino/Raspberry PI board on Drones,
9. Application of drones such as surveillance, tracking, navigation, gesture control andagriculture,
10. Deployment of deep learning model over RPi Board for different applications.

Learning Resources:

1. R. Jha, Theory, Design, and Applications of Unmanned Aerial Vehicles (1st Edition), CRC Press, 2016. ISBN 978-1315371191
2. Syed Omar FarukTowaha, Building Smart Drones with ESP8266 and Arduino: Build exciting drones by leveraging the capabilities of Arduino and ESP8266, Packt Publishing, 2018.
3. Randal W. Beard and Timothy W. McLain: Small Unmanned Aircraft: Theory and Practice, Princeton University Press, 2012.
4. Kenneth Munson, Jane's Unmanned Aerial Vehicles and Targets, (1st Edition), Jane's Information Group, United Kingdom ,1995, ISBN 978-0710612571.
5. Rafael Yanushevsky, Guidance of Unmanned Aerial Vehicles (1st Edition), CRC Press 2011. ISBN : 978-0429109898.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

CRYPTOGRAPHY AND NETWORK SECURITY LAB

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code:**UI121PE721CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. Implement cryptographic algorithms 2. Implement Network security protocols.	1. Implement symmetric key and asymmetric key algorithms 2. Implement hash and digital signature algorithms. 3. Understand the openSSL libraries and their usage 4. Run the wireshark, Snort network packet analyzers to understand the packet transfers. 5. Run the NMAP to understand the ports usage in communication.

Lab experiments:

1) Implement Miller Rabin, Chinese remaindering theorem, Modular exponentiation, Euler totient.
2) Implement SQL injection remedies.
3) Implement DES, triple DES encryption algorithms.
4) Implement Blowfish, IDEA, RC4 Algorithms.
5) Implement simplified AES encryption algorithm.
6) Implement RSA algorithm.
7) Implement Diffie Hellman key exchange algorithm.
8) Implement SHA algorithm.
9) Implement HMAC/CMAC Algorithms.

10) Implement NIST digital signature.
11) Implement ElGamal digital signature algorithm.
12) Working with Sniffers for monitoring network communication using a)Wire shark b) Snort c) tcp dump.
13) Using open SSL for web server - browser communication.
14) Using NMAP for ports monitoring.

Learning Resources:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Network Security and Cryptography, Bernard Menezes, CENGAGE Learning, Second Edition.
3. Cryptography and Network security, Behrouz Forouzhan, Debdeep Mukhopadyay, Third Edition.
4. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

REINFORCEMENT LEARNING LAB

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code:**UI21PE751CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. Implement efficient algorithms in Reinforcement leaning 2. Get insight into the various techniques in Reinforcement learning.	1. Implement greedy and epsilon greedy algorithms. 2. Implement markov decision techniques in reinforcement learning 3. Implement dynamic algorithm techniques for reinforcement learning problems. 4. Implement on policy and off policy algorithms 5. Implement TD(0), SARASA, Q learning algorithm in reinforcement learning.

Lab experiments:

1) Write a python program to implement greedy agent, $\in -$greedy agent on 10-armed Testbed. Check the results with averaging multiple runs. Also check the effect of step size for the results.
2) Consider the online advertising scenario and implement following techniques in python.
   i) Greedy 2) $\in -$greedy 3) UCB 4) Thompson sampling
3) Write a python program to design the optimal policy for the parking system (smart grid) by applying Markov Decision process.

Implement the simple food truck inventory planning problem in Python programming with following algorithms:

4) Write a python program to evaluate the given policy by simple policy iterating method.
5) Write the python program to compare the policy evaluation with simulation.
6) Implement generalized policy iteration to obtain the optimal policy
7) Implement the value iteration algorithm
8) Implement first-visit monte carlo method
9) Implement on-policy monte -control method
10) Implement Off policy monte carlo method
11) Evaluate the given policy TD(0) prediction
12) Implement On-policy control with SARSA.
13) Implement off-policy control with Q-learning.
14) Implement stochastic gradient for monte carlo.
15) Implement Stochastic Gradient for SARSA.

Learning Resources:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning: An Introduction", 2nd Edition. MIT Press, 2018
2. Kyriakos G. Vamvoudakis, Yan Wan, Frank L. Lewis, Derya Cansever,"Handbook of ReinforcementLearning and Control (Studies in Systems, Decision and Control, 325)", 1st Edition.
3. Nimish Sanghi,"Deep Reinforcement Learning with Python: With PyTorch, TensorFlow and OpenAI Gym", 1st Edition.
4. Boris Belousov, Hany Abdulsamad, Pascal Klink, Simone Parisi, Jan Peters."Reinforcement Learning Algorithms: Analysis and Applications", 1st Edition.
5. https://nptel.ac.in/courses/106106143 6. https://www.coursera.org/specializations/reinforcement-learning

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

BLOCKCHAIN PLATFORMS AND APPLICATIONS LAB

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code:**UI21PE781CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Understanding Block chain Fundamentals and creating basic blocks. 2 Able to Develop Block chain Applications in a structured manner	1 Learn how to implement cryptographic functions for secure key generation and transaction validation. 2 Learn how to create a blockchain. 3 Learn how to get tokens from metamask and transfer from one account to another 4 Students will become familiar with solidity programming 5 Learn to Design and Implement Blockchain Applications.

Lab experiments:

1. Write the following programs for Blockchain in Python:
   A. A simple client class that generates the private and public keys by using the built in Python RSA algorithm and test it.
   B. A transaction class to send and receive money and test it.
   C. Create multiple transactions and display them.
2. Write the following programs for Blockchain in Python:
   A. Create a blockchain, a genesis block and execute it.
   B. Create a mining function and test it.
   C. Add blocks to the miner and dump the blockchain.

3. Install and configure Metamask and get free tokens to Metamask Wallet. Transfer tokens from one account to another.
4. Implement and demonstrate the use of the following in Solidity: A. Variable, Operators, Loops, Decision Making, Strings,
5. Implement and demonstrate the use of the following in Solidity: Arrays, Enums, Structs, Mappings,
6. Implement and demonstrate the use of the following in Solidity: Conversions, Ether Units Special Variables.
7. Implement Functions, Function Modifiers, View functions, Pure Functions
8. Implement Fallback Function, Function Overloading, Mathematical functions, Cryptographic functions.
9. Implement and demonstrate the use of the following in Solidity: Withdrawal Pattern, Restricted Access.
10. Implement and demonstrate the use of the following in Solidity :Inheritance, Constructors, Abstract Contracts, Interfaces.
11. Implement and demonstrate the use of the following in Solidity : Events, Error handling.
12. Build Dapps .

Learning Resources:

1. Kevin Solorio, Randall Kanna, David H. Hoover,Hands-On Smart Contract Development with Solidity and Ethereum: From Fundamentals to Deployment [1 ed.] O'RELLY
2. Chris Dannen Introducing Ethereum and Solidity: Foundations of Cryptocurrency and Blockchain Programming for Beginners, Apress;
3. https://soliditylang.org/
4. https://www.tutorialspoint.com/solidity/index.htm

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING(Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

PROJECT SEMINAR

SYLLABUS FOR B.E. VII-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : --	Course Code:**UII21PW719CS**
Credits : 1	CIE Marks : 30	Duration of SEE : --

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Select a Problem by reviewing Literature 2 Present the selected topic effectively in oral & written form	1 Select a problem related to Computer science area by reviewing the Literature 2 Analyze the existing solutions for the problem identified 3 Identify the gaps in the existing solutions 4 Present the analysis of the identified problem 5 Design a Document according to the format

Oral presentation is an important aspect of Engineering education. The objective of the Project seminar is to prepare the student for a systematic and independent study of the state of the art topics in a broad area of his/her specialization of the Project.

Project Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to the following aspects of a seminar presentation.

- Problem Definition and Specification
- Literature survey
- Broad Knowledge of available techniques to solve a particular problem
- Organization of the material
- Presentation

Each student is required to :

1. Submit a one page synopsis before the seminar talk.
2. Give a 20 minute presentation followed by a 10 minute discussion.

3. Submit a report on the seminar topic with a list of references.

Seminars are to be scheduled from the 3rd week to the last week of the semester and any change in schedule should be discouraged. For award of the Sessional marks, students are to be judged by at least two faculty members on the basis of an oral and written presentation as well as their involvement in the discussions.

With effect from the Academic Year 2024-25

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-21)
FOR B.E 2021-22 ADMITTED BATCH VIII SEMESTER (A.Y 2024-25)

B.E CSE (AI&ML) VIII Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
UII21PE8X0CS	Professional Elective – III	3	-	-	3	60	40	3
UII21PE8X0CS	Professional Elective – IV	3	-	-	3	60	40	3
PRACTICALS								
UII21PW819CS	Project / Internship	-	-	12	Viva-Voce	50	50	6
	TOTAL	**6**	**-**	**12**		**170**	**130**	**12**
	GRAND TOTAL	**18**				**300**		

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

DATA MINING
(Professional Elective-III)

SYLLABUS FOR B.E. VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code:**UII21PE810CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Identify the steps involved in KDD, understand various data pre-processing techniques and data mining functionalities	1 Explain the steps in KDD, Identify various pre-processing techniques and compute similarity among data objects
2 Learn different classification, Clustering and Association rule mining techniques	2 Construct Multidimensional data models to represent data cubes and perform characterization & generalization tasks on data cubes 3 Compute associations and correlations among items by mining frequent patterns from transactional databases 4 Build model to classify unknown data objects 5 Build clusters using clustering techniques and evaluate clusters formed

UNIT-I:

Introduction: Fundamentals of Data Mining, Kinds of Patterns can be mined, Technologies Used, Applications and Issues in Data Mining

Types of Data: Attribute types, Basic Statistical descriptions of Data, Measuring data Similarity and Dissimilarity

UNIT-II:

Data Preprocessing: Need of Preprocessing, Data Cleaning, Data Integration, Data Reduction, Data Transformation

Data Warehouse and OLAP: Data Warehouse, Data Warehouse Modeling, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-oriented induction

UNIT-III:

Mining Frequent Patterns, Associations and Correlations: Market Basket Analysis, Association rule mining, Frequent Item set mining methods, Pattern Evaluation methods, Constraint based frequent pattern mining, Mining Multilevel and Multidimensional patterns

UNIT-IV:

Classification: General approach to classification, Rule-based classification, Model evaluation and Selection, Techniques to Improve Classification Accuracy, Lazy Learners- KNN classifiers, Other Classification methods- Fuzzy set approaches, Rough set approach , Classification using Frequent patterns, Support Vector Machines

UNIT-V:

Cluster Analysis: Basic Clustering methods, Partitioning methods, Density –Based Methods, Grid-based methods, and Evaluation of Clustering, Outlier Analysis and Detection methods

Advanced Data Mining Techniques: Mining sequence data, Time-series data, Mining Graphs and Networks, Mining Multi-media

Learning Resources:

1. Jiawei Han & Micheline Kamber and Jain Pei ,Data Mining Concepts and Techniques , Third Edition(2011), India.
2. Pang-Ning Tan, Vipin Kumar, Michael Steinbach, "Introduction to Data Mining", (2017),Pearson Education,
3. Margaret H Dunham, Data Mining Introductory and advanced topics , Pearson education
4. Arun K Pujari ,Data Mining Techniques, (2017) ,University Press
5. Sam Anahory , Dennis Murray ,Data Warehousing in the Real World, Pearson Education
6. Paulraj Ponnaiah, Data Warehousing Fundamentals, Wiley Student ed. http://web.stanford.edu/class/cs345a/

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

ADHOC AND SENSOR NETWORKS
(Professional Elective-III)

SYLLABUS FOR B.E. VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code:**UII21PE820CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Understand the design issues and applications of an Ad hoc and sensor network.	1 Compare topologies based on position-based routing approaches. Explain the environment and communication systems in an Adhoc network. 2 Categorize data transmission techniques in MANETs and the network architecture of wireless mesh networks. 3 Demonstrate Cognitive Radio technologies and TCP issues in Ad hoc networks. 4 Explain the design and network issues of a sensor network. 5 Identify the security mechanisms of an ad hoc and sensor network. Integrate MANETs, WLANs, and cellular networks.

UNIT-I:
Introduction: Introduction, Application of MANETs, Challenges
Routing in Ad Hoc Networks: Topology Based Routing Protocols – Proactive Routing, Reactive Routing and Hybrid Routing, Position Based Routing - Principles and Issues, Location Services, Forwarding Strategies

UNIT-II: Broadcasting, Multicasting and Geocasting
Wireless Mesh Networks: Introduction, Network Architecture, Challenging technologies

UNIT-III:

Cognitive Radio and Networks: Introduction, Spectrum Access Models, Cognitive Radio Technologies and Challenges, The IEEE 802.22 Standard

TCP over Ad Hoc Networks: TCP protocol overview, Solutions for TCP over Ad hoc

UNIT-IV:

Sensor Networks Design Considerations: Introduction, Design Issues, Localization Scheme, clustering of SNs, MAC layer, The Self-organizing MAC for WSNs and the Eaves-drop-and-Register protocol.

Sensor Networks in Controlled Environment and Actuators: Regularly placed sensors**,** Design Issues, Network Issues

Applications of Sensor Networks: Body Area Network, Habitat monitoring, Health Care Monitoring, Greenhouse monitoring

UNIT-V:

Security in Ad Hoc and Sensor Networks:

Distributed systems security, Secure routing, Cooperation in MANETs, WSN Security.

Integrating MANETs, WLANs and Cellular Networks: Ingredients of a heterogeneous architecture, Protocol Stack, Comparison of the Integrated Architectures

Learning Resources:

1. Carlos de Morais Cordeiro and Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks : Theory and Applications", Second Edition, World Scientific Publishers, 2011
2. Prasant Mohapatra and Sriramamurtyhy, "Ad Hoc Networks: Technologies and Protocols", Springer International Edition, 2009.
3. Kazem Sohraby, Daniel Minoli, TaiebZnati, "Wireless Sensor Networks', A John Wiley & Sons Inc. Publication, 2007.
4. https://nptel.ac.in/courses/106105160/

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

CYBER SECURITY
(Professional Elective-IV)

SYLLABUS FOR B.E. VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code: **UI21PE860CS**
Credits : 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES *On completion of the course, students will be able to*
1. Learn the fundamentals of Cyber Security 2. Gain understanding of relevant terminology, concepts in Cyber Security.	1. Understand Cyber Security Fundamentals. 2. Gain knowledge about attacker techniques and motivation 3. Gain knowledge about exploitations used by the attackers 4. Understand the various kinds of malicious codes. 5. Gain knowledge about defense and analysis techniques.

UNIT-I

Cyber Security Fundamentals:

Network and Security Concepts – Information Assurance Fundamentals, Basic Cryptography, Symmetric Encryption, Public Key Encryption, The DNS, Firewalls.

OS Security Concepts, Microsoft Windows Security Principles – Window Tokens, Window Messaging, Windows Program Execution, The Windows Firewall.

Digital certificates – Concept and implementation details.

UNIT-II:

Attacker Techniques and Motivations:

Usage of Proxies by Attackers, Tunneling techniques.
Fraud Techniques – Phishing, Smishing, Vishing, Mobile malicious code, Rogue antivirus, Click fraud and Ransomware.
Threat Infrastructure – Botnets, Fast-Flux, Advanced Fast-Flux.

UNIT-III:
Exploitation:
Techniques to gain a foothold- Shell code, Integer overflow vulnerabilities, Stack based buffer overflow, Format string vulnerabilities, SQL injection, Malicious PDF files, Race conditions, Web exploit tools, Dos Conditions, Brute Force and dictionary attacks.
Misdirection, Reconnaissance, and Disruption Methods – Cross site scripting, Social Engineering, WarXing, DNS Amplification attacks

UNIT IV:
Malicious Code:
Self-replicating malicious code – worms and viruses.
Evading detection and Elevating Privileges – Obfuscation, VM Obfuscation, Persistent software techniques, Rootkits, Spyware, Attacks against privileged user accounts and escalation of privileges, token kidnapping, VM detection.
Stealing information and exploitation – Form grabbing, Man-in-the-middle attacks, DLL injections, Browser Helper objects.

UNIT V:
Defense and Analysis techniques:
Memory Forensics – Importance and capabilities of memory forensics, Memory analysis frameworks, Dumping physical memory, Installing and using volatality, Finding hidden processes, Volatality Analyst Pack.
Honeypots, Malicious code naming, Automated Malicious Code Analysis Systems: Passive Analysis, Active Analysis.
Intrusion Detection Systems

Learning Resources:

1. James Graham, Richard Howard, Ryan Olson, "Cyber Security Essentials", CRC Press, 2016.
2. Nina Godbole and Sunit Belapure, "Cyber Security", Wiley India, 2012.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

PROJECT/ INTERNSHIP

SYLLABUS FOR B.E. VIII-SEMESTER

L:T:P (Hrs./week): 0:0:12	SEE Marks:50	Course Code: **UI21PW819CS**
Credits : 6	CIE Marks:50	Duration of SEE : Viva-Voce

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
• Review the literature to find a problem in Computer science area • Design a system for identified problem, analyze , implement and demonstrate the Problem identified	1. Perform literature survey and find a problem in the interested area 2. Analyze the feasibility of selected problem to design a solution 3. Design a system to address the proposed problem 4. Develop a system based on the design ,verify the correctness of the system with exhaustive test cases and provide the conclusion for the proposed system 5. Demonstrate the work done in the project

The aim of Project is to implement and evaluate the proposal made as part of the literature survey. Students can also be encouraged to do full time internship as part of project.

Project coordinator will coordinate the following:

Grouping of students (maximum of 2 to 3 in a group)

Allotment of projects and project supervisors
Project monitoring at regular intervals

The students placed in internships need to write the new proposal in consultation with industry coordinator and internal project guide within two weeks from the commencement of instruction.

All projects (internship and departmental) will be monitored twice in a semester through student presentation for the award of sessional marks. Sessional marks are awarded by a monitoring committee comprising of faculty members as well the supervisor. The first review of projects for 15 marks is conducted after completion of five weeks. The second review for another 35 marks is conducted after 14 weeks of instruction.

The students are required to submit copies of their project report following IEEE standards one week before the last instruction date.

	B. E. List of Professional Electives - Stream wise								
		Artificial Intelligence & Data Engineering		Systems & Networks		Software Engineering		Applications	
Sem -VII	PE-I	UII21PE710CS	Unmanned Aerial Vehicles	UII21PE 720CS	**Crypto-graphy and Network Security**	UII21PE730CS	Software Design tools and methodologies	UII21PE740CS	Data and Visual analytics in AI
	PE-II	UII21PE750CS	**Reinforcement Learning**	UII21PE760CS	Advanced Databases	UII21PE770CS	Software Testing Methodologies	UII21PE780CS	Block chain Platforms and Applications
Sem -VIII	PE-III	UII21PE810CS	**Data Mining**	UII21PE820CS	Adhoc and Sensor Networks	UII21PE830CS	Software Processes and Agile Practices	UII21PE840CS	Robotic Process Automation
	PE –IV	UII21PE850CS	Information Retrieval Systems	UII21PE860CS	**Cyber Security**	UII21PE870CS	Secure Software Design	UII21PE880CS	Human Computer Interaction