St. Johns College of Engineering & Technology (Autonomous)

(Accredited by NAAC, Approved by AICTE, Recognized by UGC under 2(f) & 12(B) An ISO 9001:2015 Certified Institution and Affiliated to JNTUA, Ananthapuramu)

Yerrakota, Yemmiganur-518360, Kurnool (Dist), Andhra Pradesh, India.

M.Tech (Regular-Full time)

(Effective for the students admitted into I-Year from the Academic Year **2024-25** onwards)

Computer Science Engineering

I & II YEAR COURSE STRUCTURE AND SYLLABUS

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

M.TECH. IN COMPUTER SCIENCE AND ENGINEERING
COURSE STRUCTURE & SYLLABI-R24

M.Tech I Semester

S.No.	Course code	Title	L	T	P	Credits
1	24G3D58101	Advanced Data Structures and Algorithms	3	0	0	3
2	24G3D58102	Advanced Computer Networks	3	0	0	3
3	24G3D58103a 24G3D58103b 24G3D58103c	**Program Elective Course - I** Machine Learning Object Oriented Software Engineering Digital Image &Video Processing	3	0	0	3
4	24G3D58104a 24G3D58104b 24G3D58104c	**Program Elective Course–II** Data Science Design Patterns Information Security	3	0	0	3
5	24G3D58105	Advanced Data Structures and Algorithms Laboratory	0	0	4	2
6	24G3D58106	Advanced Computer Networks Lab	0	0	4	2
7	24G3DRM101	Research Methodology and IPR	2	0	0	2
8	24G3DAC101a 24G3DAC101b 24G3DAC101c	**Audit Course–I** English for Research paper writing Disaster Management Sanskrit for Technical Knowledge	2	0	0	0
Total			**14**	**0**	**8**	**18**

M.Tech. II Semester

S.No.	Course code	Title	L	T	P	Credits
1	24G3D58201	Advanced Operating Systems	3	0	0	3
2	24G3D58202	Internet of Things	3	0	0	3
3	24G3D58203a 24G3D58203b 24G3D58203c	**Program Elective Course – III** Deep Learning Service Oriented Architecture Computer Vision	3	0	0	3
4	24G3D58204a 24G3D58204b 24G3D58204c	**Program Elective Course–IV** Data Visualization Techniques Distributed Systems Privacy Preserving Data Publishing	3	0	0	3
5	24G31D58205	Advanced Operating Systems Lab	0	0	4	2
6	24G31D58206	Internet of Things Lab	0	0	4	2
7	24G3D25206	Technical seminar	0	0	4	2
8	24G3DAC201a	**Audit Course–II** Pedagogy Studies	2	0	0	0

	24G3DAC201b 24G3DAC201c	Stress Management for Yoga Personality Development through Life Enlightenment Skills				
Total			**14**	**00**	**12**	**18**

M.Tech. III Semester

S.NO	Subject Code	Title	L	T	P	Credits
1	24G3D58301a 24G3D58301b 24G3D58301c	**Program Elective Course – V** Software Defined Networks Reinforcement Learning Data Analytics	3	0	0	3
2	24G3DOE301b 24G3DOE301c 24G3DOE301f	**Open Elective** Industrial Safety Business Analytics Optimization Techniques	3	0	0	3
3	24G3D25302	Dissertation Phase–I	0	0	20	10
4	24G3D25303	Co-curricular Activities				2
		Total	**06**	**0**	**20**	**18**

M.Tech. IV Semester

SNO	Subject Code	Title	L	T	P	Credits
1	24G3D17304	Dissertation Phase–II	0	0	32	16
		Total	**0**	**0**	**32**	**16**

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

ADVANCED DATA STRUCTURES AND ALGORITHMS

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58101	PC	3	0	0	3	40	60	100

Course Objectives:

- To understand concepts of dictionaries and hash tables.
- To implement lists and trees.
- To analyze usage of Btrees, Splay trees and2-3trees.
- To understand the importance of text processing and computational Geometry.

Course Outcomes After the completion of the course students will be able to

CO1:	Understand the implementation of symbol table using hashing techniques
CO2:	Apply advanced abstract data type (ADT) and data structures in solving real world problem
CO3:	Effectively combine the fundamental data structures and algorithm ic techniques in building a solution to a given problem
CO4:	Develop algorithms for text processing applications

UNIT-I:
Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries, Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.
UNIT-II:
Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists, Trees: Binary Search Trees (BST), AVL Trees, Red Black Trees: Height of a Red Black Tree, Red Black Trees Bottom-Up Insertion,Top-DownRedBlackTrees,Top-DownDeletioninRedBlackTrees,AnalysisofOperations.
UNIT-III:
2-3 Trees , Advantage of 2-3 trees over Binary Search Trees, Search and Update Operations on 2-3 Trees, Analysis of Operations, B-Trees: Advantage of B-trees over BSTs, Height of B-Tree, Search and Update Operations on 2-3 Trees, Analysis of Operations, Splay Trees: Splaying, Search and Update Operations on Splay Trees, Amortized Analysis of Splaying.
UNIT-IV:
Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS),Applying Dynamic Programming to the LCS Problem
UNIT-V:
Computational Geometry: One Dimensional Range Searching, Two-Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad trees, k-D Trees.

Textbooks:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, second Edition, Pearson, 2004.
2. T.H. Cormen, C.E. Leiserson, R.L.Rivest, Introduction to Algorithms, Third Edition Prentice Hall, 2009

Reference Books:

1. Michael T. Goodrich, Roberto Tamassia, Algorithm Design, First Edition, Wiley, 2006.

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

ADVANCED COMPUTER NETWORKS

M.Tech – I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58102	PC	3	0	0	3	40	60	100

Course Objectives:

- To understand computer network architectures, protocols, and interfaces.
- The OSI reference model and the Internet architecture network applications.
- The course will expose students to the concepts of traditional as well as modern day
- Computer networks - wireless and mobile, multimedia-based.
- Students completing this course will understand the key concepts and practices employed in modern computer networking

Course Outcomes: At the end of the course, the students will be able to:	
CO1:	Analyse computer network architectures and estimate quality of service
CO2:	Design application-level protocols for emerging networks .
CO3:	Analyse TCP and UDP traffic in data networks
CO4:	Design and analyse medium access methods, routing algorithms and IPv6 protocol for data networks
CO5:	Analyze Data Center Networks and Optical Networks

UNIT-I:
Network Architecture, Performance: Bandwidth and Latency, High Speed Networks, Network-Centric View, Error Detection, Reliable Transmission, Ethernet and Multiple Access Networks, Overlay Networks: Routing Overlays, Peer-to-Peer Networks and Content Distribution Networks, Client-Server Networks, Delay Tolerant Networks,
UNIT-II:
Switching: Circuit-Switched Networks, Datagram Networks, Virtual-Circuit Networks, Message-Switched Networks, Asynchronous Transfer Mode: Evolution, Benefits, Concepts, Exploring Broadband Integrated Services Digital Network, Layer and Adaptation Layer, IPv4: Address Space, Notations, Classful, Classless, Network Address Translation, Datagram
UNIT-III:
Fragmentation and Checksum IPv6 Addresses: Structure, Address Space, Packet Format and Extension Headers, ICMP, IGMP, ARP, RARP, Congestion Control and Resource Allocation: Problem, Issues, Queuing, TCP Congestion Control, Congestion-Avoidance Mechanisms and Quality of Service,
UNIT-IV:
Internetworking: Intra-Domain and Inter-Domain Routings, Unicast Routing Protocols: RIP, OSPF and BGP, Multicast Routing Protocols: DVMRP, PIM-DM, PIM-SM, CBT, MSDP and MOSPF, Spanning Tree Algorithm, Optical Networking: SONET/SDH Standards, Traffic Engineering: Requirement, Traffic Sizing, Characteristics, Protocols, Time and Delay Considerations, Connectivity, Availability, Reliability and Maintainability and Throughput.
UNIT-V: Analysis of Gas Power Cycles
Multimedia Over Internet: Transmission, IP Multicasting and VoIP, Domain Name System: Name Space, Domain Name Space, Distribution, Domains, Resolutions and Dynamic Domain Name System, SNMP, Security: IPSec, SSL/TLS, PGP and

Firewalls, Datacenter Design and Interconnection Networks.

Textbooks:

1. Larry L. Peterson and Bruce S. Davie, Computer Networks: A System Approach, Fifth Edition,
Morgan Kaufmann, Elsevier, 2012.
2. Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill, Fifth Edition, 2017.
3.Chwan-Hwa (John) Wu, J. David Irwin, Introduction to Computer Networks and Cyber Security, CRC
press, Taylor & Francis Group,2014
4. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Pearson, 5th Edition, 2014.

Reference Books:

1. Satish Jain Advanced Computer Networking: Concepts and Applications

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

MACHINE LEARNING

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58103a	PE-I	3	0	0	3	40	60	100

Course Objectives:

- To understand various key paradigms for machine learning approaches.
- To familiarize with the mathematical and statistical techniques used in machine learning.
- To understand and differentiate among various machine learning techniques.

Course Outcomes: After the completion of the course students will be able to

CO1:	To formulate a machine learning problem
CO2:	Select an appropriate pattern analysis tool for analysing data in a given feature space.
CO3:	Apply pattern recognition and machine learning techniques such as classification and feature selection to practical applications and detect patterns in the data.

UNIT-I:
Introduction: Definitions, Datasets for Machine Learning, Different Paradigms of Machine Learning, Data Normalization, Hypothesis Evaluation, VC-Dimensions and Distribution, Bias-Variance Tradeoff, Regression
UNIT-II:
Bayes Decision Theory: Bayes decision rule, Minimum error rate classification, Normal density and discriminant functions. Parameter Estimation: Maximum Likelihood and Bayesian Parameter Estimation
UNIT-III:
Discriminative Methods: Distance-based methods, Linear Discriminant Functions, Decision Tree, Random Decision Forest and Boosting Feature Selection and Dimensionality Reduction: PCA, LDA, ICA, SFFS, SBFS
UNIT-IV:
Learning from unclassified data. Clustering. Hierarchical Agglomerative Clustering. k-means partitional clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabelled data.
UNIT-V:
Kernel Machines: Kernel Tricks, SVMs (primal and dual forms), K-SVR, K-PCA (6 Lectures) Artificial Neural Networks: MLP, Backprop, and RBF-Net

Textbooks:

1. Shalev-Shwartz,S., Ben-David,S., (2014), Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press
2. R. O. Duda, P. E. Hart, D. G. Stork (2000), Pattern Classification, Wiley-Black well, 2nd Edition.

Reference Books:

1) Machine Learning Methods in the Environmental Sciences, NeuralNetworks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

OBJECT ORIENTED SOFTWARE ENGINEERING

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58103b	PE-I	3	0	0	3	40	60	100

Course Objectives:

- To learn and understand various O-O concepts along with their applicability contexts.
- Given a problem, identify domain objects, their properties, and relationships among them.
- How to identify and model/represent domain constraints on the objects and (or) on their relationships
- To learn various modelling techniques to model different perspectives of object-oriented software

design (UML)

Course Out comes: A student after completion of the course will be able to

CO1:	Discuss about software development process models
CO2:	Identify the contemporary issues and discuss about coding standards
CO3:	Recognize the knowledge about testing methods and comparison of various testing techniques.
CO4:	Use the concept and standards of quality and getting knowledge about software quality assurance group

UNIT-I:
Introduction to Software Engineering - Software Development process models – Agile Development - Project & Process - Project management - Process& Project metrics - Object Oriented concepts, Principles & Methodologies.
UNIT II:
Software Requirements Specification, Software prototyping - Software project planning - Scope - Resources - Software Estimation - Empirical Estimation Models – Planning - Risk Management - Software Project Scheduling - Object Oriented Estimation & Scheduling.
UNIT-III:
Analysis Modeling - Data Modeling - Functional Modeling & Information Flow – Behavioral Modeling Structured Analysis - Object Oriented Analysis – Domain Analysis-Object oriented Analysis process - Object Relationship Model - Object Behavior Model, Design modeling with UML.
UNIT-IV:
Design Concepts & Principles - Design Process - Design Concepts - Modular Design - Design Effective Modularity - Introduction to Software Architecture - Data Design - Transform Mapping - Transaction Mapping - Object Oriented Design - System design process- Object design process - Design Patterns.
UNIT-V:
Top - Down, Bottom-Up, object oriented product Implementation & Integration. Software Testing methods White Box, Basis Path-Control Structure - Black Box - Unit Testing - Integration testing - Validation & System testing - Testing Tools – Software Maintenance & Reengineering.

Textbooks:

1. Fairley R, “Software Engineering Concepts”, second edition, Tata McGraw Hill, NewDelhi, 2003.
2. Jalote P, “An Integrated Approach to Software Engineering”, third edition, Narosa Publishers, New Delhi, 2013.

Reference Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson - "the Unified Modeling Language User Guide" - Addison Wesley, 1999.
2. Ali Bahrami, “Object Oriented Systems Development” 1st Edition, The McGraw-Hill Company, 1999

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

DIGITAL IMAGE AND VIDEO PROCESSING

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58103c	PE-I	3	0	0	3	40	60	100

Course Objectives:

- To study the image fundamentals and mathematical transforms necessary for image Processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.

Course Out comes: A student after completion of the course will be able to

CO1:	Review the fundamental concepts of a digital image processing system.
CO2:	Analyse images in the frequency domain using various transforms.
CO3:	Evaluate the techniques for image enhancement and image restoration..
CO4:	Categorize various compression techniques

UNIT-I:
Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing. Introduction, Need for transform, image transforms, Fourier transform, 2 D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar transform, slant transform Discrete cosine transform, KL transform, singular value decomposition, Radon transform, comparison of different image transforms
UNIT II:
Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering. Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind de-convolution.
UNIT-III:
Image Segmentation: Introduction to image segmentation, Point, Line and Edge Detection, Region based segmentation., Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge based segmentation, Edge detection and linking, Hough transform, Active contour Image Compression: Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon – Fano coding, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standard, Wavelet-based image compression, JPEG Standards.
UNIT-IV:
Basic Steps of Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.
UNIT-V:
2-D Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block Matching Algorithm, Mesh based Motion Estimation, Global Motion

Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

Textbooks:

1. Digital Image Processing – Gonzaleze and Woods, 3rd Ed., Pearson.
2. Video Processing and Communication – Yao Wang, Joem Oster mann and Ya–quin Zhang.1st Ed., PH Int.

Reference Books:

1. S.Jayaraman, S.Esakkirajan and T.VeeraKumar, "Digital Image processing, TataMcGraw Hill publishers, 2009

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

DATA SCIENCE

M.Tech– I Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
24G3D25 104a	**PE-II**	3	0	0	3	40	60	100

Course Objectives:

- Provide you with the knowledge and expertise to become a proficient data scientist.
- Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
- Produce Python code to statistically analyse a dataset;
- Critically evaluate data visualizations based on their design and use for communicating stories from data;

Course Out comes: A student after completion of the course will be able to

CO1:	Explain how data is collected, managed and stored for data science;
CO2:	Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists;
CO3:	Implement data collection and management scripts using Mongo DB

UNIT-I:
Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.
UNIT II:
Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources
UNIT-III:
Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance ,Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes
UNIT-IV:
Data visualization: Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings
UNIT-V:
Applications of Data Science, Technologies for visualization, Bokeh (Python) Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science

Textbooks:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly.
2. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press

Reference Books:

1. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. MIT Press, 2013.
2. Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. O'Reilly, 2013.

3. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, Second Edition. Springer, 2009.

4.Avrim Blum, John Hopcroft and RavindranKannan. Foundations of Data Science.2018.

5. Mohammed J. Zaki and Wagner Miera Jr. Data Mining and Analysis: Fundamental Concepts and Algorithms. Cambridge University Press, 2014.

6.Jiawei Han, MichelineKamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. Morgan Kaufmann, 2011.

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

DESIGN PATTERNS

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58104b	PE-II	3	0	0	3	40	60	100

Course Objectives:

- To understand the basic concepts of Design Patterns.
- To implement the document editor process for a considered case study.
- To implement various Structural and Behavioral Patterns.

Course Out comes: A student after completion of the course will be able to

CO1:	Identify basic concepts of Design Patterns.
CO2:	Design Document editor for a considered application.
CO3:	Analyze the structural Patterns.
CO4:	Examine the Behavioral Patterns.

UNIT-I:
Introduction: What Is a Design Pattern?, Design Patterns in Small talk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.
UNIT II:
A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.
UNIT-III:
Structural Pattern Part-I: Adapter, Bridge, Composite. Structural Pattern Part-II: Decorator, Façade, Flyweight, Proxy
UNIT-IV:
Behavioral Patterns Part-I: Chain of Responsibility, Command, Interpreter, Iterator. Behavioral Patterns Part-II: Mediator, Memento, Observer.
UNIT-V:
Behavioral Patterns Part-II (cont'd): State, Strategy, Template Method, Visitor, and Discussion of Behavioral Patterns. What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

Textbooks:

1. Design Patterns By Erich Gamma, Pearson Education
2. Design Patterns Explained By Alan Shalloway, Pearson Education

Reference Books:

1. Pattern's in JAVA Vol-I By Mark Grand, Wiley Dream Tech.
2. Pattern's in JAVA Vol-II By Mark Grand, Wiley Dream Tech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand, Wiley Dream Tech.
4. Head First Design Patterns By Eric Free man-Oreilly-spd

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

INFORMATION SECURITY

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58104c	PE-II	3	0	0	3	40	60	100

Course Objectives:

- To understand basics of Cryptography and Network Security.
- To be able to secure a message over insecure channel by various means.
- To learn about how to maintain the Confidentiality, Integrity and Availability of a Data
- To understand various protocols for network security to protect against the threats in the networks.

Course Out comes: A student after completion of the course will be able to

CO1:	Provide security of the data over the network.
CO2:	Do research in the emerging areas of cryptography and network security.
CO3:	Implement various networking protocols.
CO4:	Protect any network from the threats in the world

UNIT-I:
Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.
UNIT II:
Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.
UNIT-III:
Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.
UNIT-IV:
Email privacy: Pretty Good Privacy (PGP) and S/MIME.IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
UNIT-V:
Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats.

Textbooks:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand,
David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, wiley Dreamtech,
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson

Reference Books:

1. Network Security and Cryptography‖, Bernard Menezes ,Cengage Learning.
2.Cryptography and Security‖, C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.
3. Applied Cryptography, Bruce Schiener, 2nd edition, John Wiley & Sons.
4. Cryptography and Network Security‖, AtulKahate, TMH.
5. ‗Introduction to Cryptography‖, Buchmann, Springer.
6. ‗Number Theory in the Spirit of Ramanujan‖, Bruce C.Berndt, University Press
7. Introduction to Analytic Number Theory‖, Tom M.Apostol, University Press

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

ADVANCED DATA STRUCTURES AND ALGORITHMS LAB

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58105	PC	0	0	4	2	40	60	100

Course Objectives:

- Implement linear and non linear data structures.
- Analyze various algorithms based on their time complexity.
- Choose appropriate data structure and algorithm design method for a specific application.
- Identify suitable data structure to solve various computing problems.

Course Outcomes: After the completion of the course students will be able to

CO1:	Implement divide and conquer techniques to solve a given problem.
CO2:	Implement hashing techniques like linear probing, quadratic probing, and random probing and double hashing/rehashing.
CO3:	Perform Stack operations to convert infix expression into post fix expression and evaluate the post fix expression.
CO4:	Differentiate graph traversal techniques Like Depth First Search, Breadth First Search.
	Identify shortest path to other vertices using various algorithms.

List of Experiments

S.No.	Title of the Experiment
1.	To implement functions of Dictionary using Hashing (division method, Multiplication method, Universal hashing).
2.	To perform various operations i.e., insertions and deletions on AVL trees.
3.	To perform various operations i.e., insertions and deletions on 2-3 trees
4.	To implement operations on binary heap.
5.	To implement operations on graphs
6.	To implement Depth First Search for a graph non-recursively.
7.	To implement Breadth First Search for a graph non-recursively.
8.	To implement Prim's algorithm to generate a min-cost spanning tree.
9.	To implement Krushkal's algorithm to generate a min-cost spanning tree.
10.	To implement Dijkstra's algorithm to find shortest path in the graph.

St. Johns College of Engineering and Technology

(AUTONOMOUS)

DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

ADVANCED COMPUTER NETWORKS LAB

M.Tech– I Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
24G3D58106	**PC**	0	0	4	2	40	60	100

Course Objectives:

- Aims to provide advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks.

Course Outcomes: After the completion of the course students will be able to

CO1:	Develop programs for client-server applications
CO2:	Perform packet sniffing and analyze packets in network traffic.
CO3:	Implement error detecting and correcting codes
CO4:	Implement network security algorithms

List of Experiments

S.No.	Title of the Experiment
1.	Implementation of client server programs for different network applications
2.	Study and analysis of the network using Wireshark network protocol analyser
3.	Implementation of topology generation for network simulation
4.	Implementation of queuing management
5.	Implementation of MAC-layer protocols
6.	Implementation of routing protocols
7.	Implementation of transport-layer protocols
8.	Implementation of network security mechanisms

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

RESEARCH METHODOLOGY AND IPR

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3DRM101	MC	2	0	0	2	40	60	100

Course Objectives:

- Identify an appropriate research problem in their interesting domain.
- Understand ethical issues understand the Preparation of a research project thesis report
- Understand the Preparation of a research project thesis report
- Understand the law of patent and copy rights.
- Understand the Adequate knowledge on IPR

Course Out comes: A student after completion of the course will be able to

CO1:	Analyze research related information
CO2:	Follow research ethics
CO3:	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity
CO4:	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
CO5:	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT-I:
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, scope, and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations
UNIT II:
Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee
UNIT-III:
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT
UNIT-IV:
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.
UNIT-V:
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies of IPR.

Textbooks:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

Reference Books:

1. Ranjit Kumar, 2nd Edition, "Research Methodology :A Step by Step Guide for beginners"
2. Halbert, "Resisting Intellectual Property", Taylor & amp; Francis Ltd, 2017.
3. Mayall," Industrial Design", McGraw Hill ,2012.
4. Niebel, "Product Design", McGraw Hill, 2014.
5. Asimov, "Introduction to Design", Prentice Hall, 2002.
6. RobertP.Merges, PeterS. Menell, MarkA. Lemley, "Intellectual Property in New Technological Age", 2016.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

ENGLISH FOR RESEARCH PAPER WRITING

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
24G3DAC101a	AC	L	T	P	C	CIA	SEE	Total
		2	0	0	0	40	00	40

Course Objectives:

- Understand the essentials of writing skills and their level of readability
- Learn about what to write in each section
- Ensure qualitative presentation with linguistic accuracy

Course Out comes: A student after completion of the course will be able to

CO1:	Understand the significance of writing skills and the level of readability
CO2:	Analyze and write title, abstract, different sections in research paper
CO3:	Develop the skills needed while writing a research paper
CO4:	Develop the Key skills needed for writing a Title
CO5:	Understand the Appropriate language to formulate Methodology

UNIT-I: Overview of a Research Paper
Overview of a Research Paper-Planning and Preparation-Word Order-Useful Phrases – Breaking up Long Sentences-Structuring Paragraphs and Sentences-Being Concise and Removing Redundancy - Avoiding Ambiguity
UNIT II: Essential Components of a Research Paper
EssentialComponentsofaResearchPaper-Abstracts-BuildingHypothesis-ResearchProblem- Highlight Findings- Hedging and Criticizing, Paraphrasing and Plagiarism, Cauterization
UNIT-III: Introducing Review of the Literature
Introducing Review of the Literature–Methodology-Analysis of the Data-Findings–Discussion Conclusions-Recommendations.
UNIT-IV: Key skills needed for writing a Title
Key skills needed for writing a Title, Abstract, and Introduction
UNIT-V: Appropriate language to formulate Methodology
Appropriate language to formulate Methodology, incorporate Results, put forth Arguments and draw Conclusions

SuggestedReading

1. GoldbortR (2016) Writing for Science, Yale University Press (available on Google Books) Model Curriculum of Engineering & Technology PG Courses [Volume-I]
2. DayR (2016) How to Write and Publish a Scientific Paper, Cambridge University Press
3. High manN(2018),Hand book of Writing for the Mathematical Sciences, SIAM. Highman's book
4. Adrian Wall work, English

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

DISASTER MANAGEMENT

M.Tech– I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3DAC101b	AC	2	0	0	0	40	00	40

Course Objectives:

- Learn to demonstrate critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk education and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations
- Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Course Out comes: A student after completion of the course will be able to

CO1:	Understand the significance of Disaster Management
CO2:	Analyze the Repercussions of Disasters and Hazards
CO3:	Understand the Disaster Preparedness and Management
CO4:	Understand the Risk Assessment Disaster Risk
CO5:	Understand the Disaster Mitigation

UNIT-I: Introduction: Disaster
Introduction: Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude. Disaster Prone Areas in India: Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post- Disaster Diseases and Epidemics
UNIT II: Repercussions of Disasters and Hazards
Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Melt down, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.
UNIT-III: Disaster Preparedness and Management
Disaster Preparedness and Management: Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation of Risk:Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.
UNIT-IV: Risk Assessment Disaster Risk
Risk Assessment Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.
UNIT-V: Disaster Mitigation
Disaster Mitigation: Meaning, Concept and Strategies of Disaster Mitigation , Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India

Suggested Reading

1. R.Nishith, Singh AK, “Disaster Management in India: Perspectives, issues and strategies
2. “’New Royal book Company. Sahni, Pardeep Et. Al.(Eds.), ”Disaster Mitigation Experiences And Reflections”, Prentice Hall Of India, New Delhi.
3. GoelS.L.,Disaster Administration And Management Text And Case Studies”, Deep & Deep Publication Pvt. Ltd., New Delhi

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

SANSKRIT FOR TECHNICAL KNOWLEDGE

M.Tech – I Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
24G3DAC101c	AC	L	T	P	C	CIA	SEE	Total
		2	0	0	0	40	00	40

Course Objectives:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge
- Knowledge from ancient literature

Course Out comes: A student after completion of the course will be able to

CO1:	Understanding basic Sanskrit language
CO2:	Ancient Sanskrit literature about science & technology can be understood
CO3:	Being a logical language will help to develop logic in students
CO4:	Understanding Technical information about Sanskrit Literature
CO5:	Understanding Technical concepts of Engineering

UNIT-I:
Alphabets in Sanskrit,
UNIT II:
Past/Present/Future Tense, Simple Sentences
UNIT-III:
Order Introduction of roots
UNIT-IV:
Technical information about Sanskrit Literature
UNIT-V:
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Suggested Reading

1. "Abhya spustakam"–Dr.Vishwas,Sanskrit-BhartiPublication,NewDelhi
2. "Teach Yourself Sanskrit "Prathama Deeksha Vempati Kutumb shastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

"India's Glorious Scientific Tradition"Suresh Soni, Ocean books (P)Ltd., New Delhi

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

ADVANCED OPERATING SYSTEMS

M.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58201	PC	3	0	0	2	40	60	100

Course Objectives:

- To be able to read and understand sample open source programs and header files.
- System calls which explore networking and security Applications..
- To acquire the knowledge in the implementation of interprocess communication..

Course Out comes: A student after completion of the course will be able to

CO1:	To explain the functionality of a large software system by reading its source.
CO2:	To revise any algorithm present in a system.
CO3:	Inter process communication mechanism
CO4:	Android mobiles inner process system

UNIT-I:
Basic Operating System Concepts - Overview of Unix File System - Files - Links - Types - Inodes -Access Rights - System Calls - Overview of Unix Kernels -Model - Implementation - Reentrant Kernels - Address Space - Synchronization - Interprocess Communication - Process Management - Memory Management - Device Drivers.
UNIT II:
Processes, Lightweight Processes, and Threads - Process Descriptor - State - Identifying a Process - Relationships among processes - Organization - Resource Limits - Creating Processes - System Calls - Kernel Threads - Destroying Processes - Termination - Removal.
UNIT-III:
The Virtual File System (VFS) - Role - File Model -System Calls - Data Structures - Super Block, Inode, File, dentry Objects - dentry Cache - Files Associated with a Process – File system Types - Special Files systems – File system Type Registration – File system Handling - Namespaces - Mounting – Unmounting - Implementation of VFS System Calls.
UNIT-IV:
Windows Operating system - versions, Concepts and tools, Windows internals, System Architecture, Requirements and design goals, Operating system model, Architecture overview. Key system components. System mechanisms - Trap dispatching, object manager, Synchronization, System worker threads, Windows global flags, Local procedural calls, Kernelevent tracing.
UNIT-V:
what is android, basic building blocks – activities, services, broadcast receivers & content, ui components- views & notifications, components for communication - intents & intent filters, android api levels launching emulator editing emulator settings emulator shortcuts log cat usage, Applications of Android.

Textbooks:

1. Daniel P. Bovet and Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, O'Reilly Publications, 2005.
2. 2. Harold Abelson, Gerald Jay Sussman and Julie Sussman, ―Structure and Interpretation of Computer Programs‖, Second Edition, Universities Press, 2013.

Reference Books:

1. Mark E. Russinovich and David A. Solomon, Microsoft Windows Internals, 4th Edition, Microsoft Press, 2004.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

INTERNET OF THINGS

M.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58202	PC	3	0	0	3	40	60	100

Course Objectives:

- Expose the student to a variety of embedded boards and IoT Platforms
- Create a basic understanding of the communication protocols in IoT communications.
- Familiarize the student with application program interfaces for IoT.
- Enable students to create simple IoT applications.

Course Out comes: A student after completion of the course will be able to

CO1:	Choose the sensors and actuators for an IoT application
CO2:	Select protocols for a specific IoT application
CO3:	Utilize the cloud platform and APIs for IoT applications
CO4:	Experiment with embedded boards for creating IoT prototypes .
CO5:	Design a solution for a given IoT application
CO6:	Establish a startup

UNIT-I:
The Internet of Things: An Overview, The Flavor of the Internet of Things, The "Internet" of "Things", The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things? Design Principles for Connected Devices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances. Prototyping: Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open source Vs Close source, Tapping into the community.
UNIT II:
Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things
UNIT-III:
Communication in the IoT: Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols Prototyping Online Components: Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol
UNIT-IV:
Business Models: A short history of business models, The business model canvas, Who is the business model for, Models, Funding an Internet of Things startup, Lean Startups. Manufacturing: What are you producing, Designing kits, Designing printed circuit boards.
UNIT-V:
Manufacturing continued: Manufacturing printed circuit boards, Mass-producing the case and other fixtures, Certification, Costs, Scaling up software. Ethics: Characterizing the Internet of Things, Privacy, Control, Environment, Solutions.

Textbooks:

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012

Reference Books:

1. Haider Raad Fundamentals of IoT and Wearable Technology Design, Wiley Publications2020.
2. Kashish Ara Shakil, Samiya Khan, Internet of Things (IoT) Concepts and Applications, Springer Publications 2020.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

DEEP LEARNING

M.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58203a	PE-III	3	0	0	3	40	60	100

Course Objectives:

- To present the mathematical, statistical and computational challenges of building neural networks.
- To teach the concepts of deep learning.
- To introduce dimensionality reduction techniques.
- To enable the students to know deep learning techniques to support real-time applications.
- To explain the case studies of deep learning techniques.

Course Out comes: A student after completion of the course will be able to

CO1:	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
CO2:	Implement deep learning algorithms and solve real-world problems.

UNIT-I:
Introduction: Introduction to machine learning- Linear models (SVMs and Perceptron's, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates.
UNIT II:
Deep Networks: History of Deep Learning- A Probabilistic Theory of Deep Learning- Back propagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks Convolutional Networks - Generative Adversarial Networks (GAN), Semi- supervised Learning .
UNIT-III:
Dimensionality Reduction: Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyper parameter optimization.
UNIT-IV:
Optimization and Generalization: Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience.
UNIT-V:
Case Study and Applications: Image net- Detection-Audio Wave Net-Natural Language Processing Word2Vec - Joint Detection Bioinformatics- Face Recognition- Scene Understanding- Gathering Image Captions.

Textbooks:

1. Deep Learning", Ian Goodfellow, YoshuaBengio , Aaron Courville, MIT Press 2016.

Reference Books:

1. "Neural Networks and Deep Learning A Text Book", Charu C Aggarwal, Springer International Publishing AG, Part of Springer Nature 2018

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

SERVICE ORIENTED ARCHITECTURE

M.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58203b	PE-III	3	0	0	3	40	60	100

Course Objectives:

- Understand SOA and evolution of SOA.
- Understand web services and primitive, contemporary SOA.
- Understand various service layers.
- Understand service-oriented analysis and design based on guidelines.

Course Out comes: A student after completion of the course will be able to

CO1:	Comprehend the need for SOA and its systematic evolution
CO2:	Apply SOA technologies to enterprise domain
CO3:	Design and analyse various SOA patterns and techniques
CO4:	Compare and evaluate best strategies and practices of SOA.

UNIT-I:
Introducing SOA: Fundamental SOA, Common Characteristics of Contemporary SOA, Common Tangible Benefits of SOA, and Common Pitfalls of Adopting SOA. The Evolution of SOA: An SOA Timeline, The Continuing Evolution of SOA, The Roots of SOA.
UNIT II:
Web Services and Primitive SOA: The Web Services Frame Work, Services, Service Descriptions, Messaging. Web Services and Contemporary SOA (Part I-Activity management and Composition): Message Exchange Patterns, Service Activity, Coordination, Atomic Transactions, Orchestration, and Choreography. Web Services and Contemporary SOA (Part-II-Advanced Messaging, Metadata and Security): Addressing, Reliable Messaging, Correlation, Policies, Metadata exchange, Security.
UNIT-III:
Principles of Service-Orientation: Service–Orientation and the Enterprise, Anatomy of SOA, Common Principles of Service–Orientation, Interrelation between Principles of Service- Orientation, Service Orientation and Object Orientation, Native Web Services Support for Principles of Service-Orientation. Service Layers: Service-Orientation and Contemporary SOA, Service Layer abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services, Service Layer Configuration Scenarios.
UNIT-IV:
SOA Delivery Strategies: SOA Delivery Lifecycle Phases, The Top-Down Strategy, The Bottom-up Strategy, The Agile Strategy. Service Oriented Analysis (Part I-Introduction): Introduction to Service Oriented Analysis, Benefits of a Business Centric SOA, Deriving Business Services. Service Oriented Analysis (Part-II-Service Modelling): Service Modelling, Service Modelling Guidelines, Classifying Service Model Logic, Contrasting Service Modelling Approaches. Service Oriented Design (Part I-Introduction): Introduction to Service-Oriented Design, WSDL Related XML Schema Language Basics, WSDL Language Basics, Service Interface Design Tools. Service Oriented Design (Part II-SOA Composition Guidelines): SOA Composing Steps, Considerations for Choosing Service Layers, Considerations for Positioning Core SOA Standards, Considerations for Choosing SOA Extensions.
UNIT-V:

Service Oriented Design (Part III- Service Design): Service Design Overview, Entity-Centric Business Service Design, Application Service Design, Task-Centric Business Service Design, Service Design Guidelines.
Service Oriented Design (Part IV-Business Process Design): WS-BPEL Language Basics, WS- Coordination Overview, Service Oriented Business Process Design.

Textbooks:

1. Service-Oriented Architecture-Concepts, Technology, and Design, Thomas Erl, Pearson Education, 2006.
2. Understanding SOA with Web Services, Eric Newcomer, Greg Lomow, Pearson Education, 2005

Reference Books:

1. Thomas Erl; Service Oriented Architecture Concepts Technology & Design, Pearson Education Limited; 2015, ISBN-13: 9788131714904.
2 Guido Schmutz, Peter Welkenbach, Daniel Liebhart; Service Oriented Architecture An Integration Blueprint; Shroff Publishers & Distributors; 2010, ISBN-13: 9789350231081

Online Learning Resources:

- https://www.worldscientific.com/worldscibooks/10.1142/5700#t=toc

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

COMPUTER VISION

M.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58203c	PE-III	3	0	0	3	40	60	100

Course Objectives:

- Be familiar with both the theoretical and practical aspects of computing with images.
- Have described the foundation of image formation, measurement, and analysis.
- Understand the geometric relationships between 2D images and the 3D world.
- Grasp the principles of state-of-the-art deep neural networks

Course Out comes: A student after completion of the course will be able to

CO1:	Develop the practical skills necessary to build computer vision applications.
CO2:	To have gained exposure to object and scene recognition and categorization from images

UNIT-I:
Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis
UNIT II:
Edge detection, Edge detection performance, Hough transform, corner detection
UNIT-III:
Segmentation, Morphological filtering, Fourier transform
UNIT-IV:
Feature extraction, shape, histogram, colour, spectral, texture, using CVIPtools, Feature analysis, feature vectors, distance /similarity measures, data pre-processing
UNIT-V:
Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi supervised Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods

Textbooks:

1. Computer Vision: Algorithms and Applications by Richard Szeliski.

Reference Books:

1. Deep Learning, by Goodfellow, Bengio, and Courville.
2. Dictionary of Computer Vision and Image Processing, by Fisher et al.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

DATA VISUALIZATION TECHNIQUES

M.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58204a	PE-IV	3	0	0	3	40	60	100

Course Objectives:

- To develop skills to both design and critique visualizations.
- To introduce visual perception and core skills for visual analysis.
- To understand visualization for time-series analysis.
- To understand visualization for ranking analysis.
- To understand visualization for deviation analysis..

Course Out comes: A student after completion of the course will be able to

CO1:	Explain principles of visual perception
CO2:	Apply core skills for visual analysis
CO3:	Apply visualization techniques for various data analysis tasks
CO4:	Design information dashboard

UNIT-I:
Information visualization – effective data analysis – traits of meaningful data – visual perception making abstract data visible – building blocks of information visualization – analytical interaction – analytical navigation – optimal quantitative scales – reference lines and regions – trellises and crosstabs – multiple concurrent views – focus and context – details on demand – over-plotting reduction – analytical patterns – pattern examples.
UNIT II:
Distribution analysis – describing distributions – distribution patterns – distribution displays – distribution analysis best practices – correlation analysis – describing correlations – correlation patterns – correlation displays – correlation analysis techniques and best practices – multivariate analysis – multivariate patterns – multivariate displays – multivariate analysis techniques and best practices.
UNIT-III:
Information dashboard – Introduction– dashboard design issues and assessment of needs – Considerations for designing dashboard-visual perception – Achieving eloquence.
UNIT-IV:
Advantages of Graphics _Library of Graphs – Designing Bullet Graphs – Designing Sparklines – Dashboard Display Media –Critical Design Practices – Putting it all together- Unveiling the dashboard.
UNIT-V:
Plotting Geospatial Data: Introduction to Geoplotlib, Design Principles of Geoplotlib, Geospatial Visualizations, Plotting Geospatial Data on a Map Web-Based Visualizations: Concepts of Bokeh, Interfaces-Plotting and Model Interfaces, Output, Bokeh Server, Presentation, Integrating – HTML Document and Bokeh Applications

Textbooks:

1. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment",
2. O'Reilly, 2008. Mario Dobler, Tim Grobmann, “Data Visualization with Python”, O’Reilly, First Edition, 2019

Reference Books:

1. Stephen Few, "Information dashboard design: Displaying data for at-a-glance monitoring", second edition, Analytics Press, 2013.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

DISTRIBUTED SYSTEMS

M.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58204b	PE-IV	3	0	0	3	40	60	100

Course Objectives:

- To introduce the fundamental concepts and issues of managing large volume of shared data in a parallel and distributed environment, and to provide insight into related research problems

Course Out comes: A student after completion of the course will be able to

CO1:	Design trends in distributed systems.
CO2:	Apply network virtualization.
CO3:	Apply remote method invocation and objects

UNIT-I:
Distributed data processing; What is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database and computer network concepts DISTRIBUTED DATABASE MANAGEMENT SYSTEM ARCHITECTURE Transparencies in a distributed DBMS; Distributed DBMS architecture; Global directory issues
UNIT II:
DISTRIBUTED DATABASE DESIGN Alternative design strategies; Distributed design issues; Fragmentation; Data Allocation SEMANTICS DATA CONTROL View management; Data security; Semantic Integrity Control QUERY PROCESSING ISSUES Objectives of query processing; Characterization of query processors; Layers of query processing; Query decomposition; Localization of distributed data
UNIT-III:
Factors governing query optimization; Centralized query optimization; Ordering of fragment queries; Distributed query optimization algorithms TRANSACTION MANAGEMENT The transaction concept; Goals of transaction management; Characteristics of transactions; Taxonomy of transaction models CONCURRENCY CONTROL Concurrency control in centralized database systems; Concurrency control in DDBSs; Distributed concurrency control algorithms; Deadlock management
UNIT-IV:
Reliability issues in DDBSs; Types of failures; Reliability techniques; Commit protocols; Recovery protocols
UNIT-V:
PARALLEL DATABASE SYSTEMS Parallel architectures; parallel query processing and optimization; load balancing ADVANCED TOPICS Mobile Databases, Distributed Object Management, Multi-databases

Textbooks:

1. Principles of Distributed Database Systems, M.T. Ozsu and P. Valduriez, Prentice-Hall, 1991.

Reference Books:

1. Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley, 1992.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

PRIVACY PRESERVING DATA PUBLISHING

M.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58204c	PE-IV	3	0	0	3	40	60	100

Course Objectives:

- Will be able to decide, given an application, if it should be formulated as a data privacy problem. If yes, the students will be able to formally define the problem and state what properties can be guaranteed by applying differential privacy.
- Will have understanding of how (and why) randomness (or uncertainty) provides privacy protection.
- Will be able to analyse real-world privacy problems, identify which privacy-preserving methods are appropriate, and implement the private algorithms in code.
- Will be able to evaluate and compare privacy-preserving algorithms.

Course Out comes: A student after completion of the course will be able to

CO1:	Apply anonymization methods for sensitive data protection
CO2:	Apply state-of-art techniques for data privacy protection
CO3:	Design privacy preserving algorithms for real-world applications
CO4:	Identify security and privacy issues in OLAP systems .
CO5:	Apply information metrics for Maximizing the preservation of information in the anonymization process

UNIT-I:
Fundamentals of defining privacy and developing efficient algorithms for enforcing privacy, challenges in developing privacy preserving algorithms in real-world applications, privacy issues, privacy models.
UNIT II:
Anonymization operations, information metrics, Anonymization methods for the transaction data, trajectory data, social networks data, and textual data, Collaborative Anonymization,
UNIT-III:
Access control of outsourced data, Use of Fragmentation and Encryption to Protect Data Privacy, Security and Privacy in OLAP systems.
UNIT-IV:
Extended Data publishing Scenarios, Anonymization for Data Mining, publishing social science data,
UNIT-V:
Continuous user activity monitoring (like in search logs, location traces, energy monitoring), social networks, recommendation engines and targeted advertising.

Textbooks:

1). Benjamin C.M. Fung, Ke Wang, Ada Wai-Chee Fu and Philip S. Yu, Introduction to Privacy Preserving Data Publishing: Concepts and Techniques, 1st Edition, Chapman & Hall/CRC, 2010.

Reference Books:

1.Bee-Chung Chen, Daniel Kifer, AshwinMachanavajjhala, Kristen LeFevre Privacy Preserving Data Publishing ,Now Publishers Inc, 2009

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

ADVANCED OPERATING SYSTEMS LAB

M.Tech– II Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
24G3D58205	**PC**	0	0	4	2	40	60	100

Course Objectives:

- To study Linux memory management data structures and algorithms.
- To acquire the knowledge in the implementation of interprocess communication.
- To understand how program execution happens in Linux.

Course Outcomes: After the completion of the course students will be able to

CO1:	To revise any algorithm present in a system.
CO2:	To design a new algorithm to replace an existing one.
CO3:	To appropriately modify and use the data structures of the linux kernel for a different software system

List of Experiments

S.No.	Title of the Experiment
1.	Write programs using the following system calls of UNIX operating system: 40 fork, exec, getpid, exit, wait, close, stat, opendir, readdir
2.	Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
3.	Write C programs to simulate UNIX commands like ls, grep, etc.
4.	Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. (2 sessions)
5.	Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. (2 sessions)
6.	Developing Application using Inter Process communication (using shared memory, pipes or message queues)
7.	Implement the Producer – Consumer problem using semaphores (using UNIX system calls).

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

INTERNET OF THINGS LAB

M.Tech– II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58206	PC	0	0	4	2	40	60	100

Course Objectives:

- The main objective IOT applications is to know the different real time sensors used to measure the different electrical parameters and to control the different devices from anywhere through IOT.

Course Outcomes: After the completion of the course students will be able to

CO1:	The students will be thorough about the technology behind the IoT and associated technologies
CO2:	The students will be able to use the IoT technologies in practical domains of society
CO3:	The students will be able to gain knowledge about the state of the art methodologies in IoT application domains..

List of Experiments

S.No.	Title of the Experiment
1.	Exercise on Eclipse IoT Project.
2.	Experiments on few Eclipse IoT Projects.
3.	Any Experiment on architecture of Iot Toolkit.
4.	Exercise on smart object API Gateway service reference implementation in IoT Toolkit.
5.	Experiment on HTTP-to-CoAP semantic mapping Proxy in IoT Toolkit.
6.	Experiment on Gate way as a service deployment in IoT Toolkit.
7.	Experiment on application framework and embedded software agents for IoT Toolkit

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

PEDAGOGY STUDIES

AUDIT COURSE-II

M.Tech – II Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3DAC201a	AC	2	0	0	0	40	00	40

Course Objectives:

- Review existing evidence on their view topic to inform programme design and policy making undertaken by the Df ID, other agencies and researchers.
- Identify critical evidence gaps to guide the development

Course Out comes: A student after completion of the course will be able to

CO1:	What pedagogical practices are being used by teachers inform a land informal classrooms in developing countries?
CO2:	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
CO3:	How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?
CO4:	Understanding Technical concepts of Engineering

UNIT-I: Introduction and Methodology
Introduction and Methodology: Aims and rationale, Policy back ground, Conceptual frame work and Terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.
UNIT II: Thematic overview
Thematic overview: Pedagogical practices are being used by teacher's informal and informal classrooms in developing countries. Curriculum, Teacher education.
UNIT-III: Evidence on the effectiveness of pedagogical practices
Evidence on the effectiveness of pedagogical practices, Methodology for the in-depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' Attitudes and beliefs and Pedagogic strategies.
UNIT-IV: Professional development
Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: Limited resources and large classsizes
UNIT-V: Research gaps and future directions
Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Suggested Reading

1.AckersJ, Hardman F(2001)Classroom interaction in Kenyan primary schools, Compare, 31(2):245-261.
2. Agrawal M(2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies,36(3):361-379.
4. Akyeampong K(2003)Teacher training in Ghana-does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
5. Akyeampong K, Lussier K, Pryor J, West brook J(2013)Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
6. Alexander RJ(2001) Culture and pedagogy: International comparisons in primary education.Oxford and Boston: Blackwell Chavan M(2003)Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

STRESS MANAGEMENT BY YOGA

AUDIT COURSE-II

M.Tech – II Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
24G3DAC201b	**AC**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		2	0	0	0	40	00	40

Course Objectives:

- To achieve overall health of body and mind
- To overcome stress

Course Out comes: A student after completion of the course will be able to

CO1:	Develop healthy mind in a healthy body thus improving social health also
CO2:	Improve efficiency
CO3:	Do`s and Don't's in life.
CO4:	Asan and Pranayam
	Various yoga poses and their benefits for mind & body

UNIT-I:
Definitions of Eight parts of yoga.(Ashtanga)
UNIT II:
Yam and Niyam.
UNIT-III:
Do`s and Don't's in life. i)Ahinsa, satya, astheya, bramhacharya and aparigraha ii)Shaucha, santosh, tapa, swadhya, ishwar pranidhan
UNIT-IV:
Asana and Pranayam
UNIT-V:
i) Various yogposes and their benefits form ind & body ii) Regularization of breathing techniques and its effects-Types of pranayam

Suggested Reading

1. 'Yogic Asanas for Group Tarining-Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature "by Swami Vivekananda, Advaita Ashrama (Publication Department),Kolkata

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

PERSONALITY DEVELOPMENT THROUGH LIFEENLIGHTENMENT SKILLS

AUDIT COURSE-II

M.Tech – II Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
24G3DAC201c	**AC**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		2	0	0	0	40	00	40

Course Objectives:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and Determination
- To awaken wisdom in students

Course Out comes: A student after completion of the course will be able to

CO1:	Study of Shrimad- Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
CO2:	The person who has studied Geeta will lead the nation and mankind to peace and prosperity
CO3:	Study of Neetishatakam will help in developing versatile personality of students
CO4:	Problem-solving: Students develop problem- solving kills
CO5:	Decision-making: Students learn effective decision-making skills

UNIT-I:
Neeti satakam-Holistic development of personality Verses-19,20,21,22(wisdom) Verses-29,31,32(pride & heroism) Verses-26,28,63,65(virtue)
UNIT II:
Neeti satakam-Holistic development of Personality Verses-52,53,59(dont's) Verses-71,73,75,78(do's)
UNIT-III:
Approach to day to day work and duties. ShrimadBhagwadGeeta:Chapter2-Verses41,47,48,Chapter3-Verses13,21,27,35,Chapter6-Verses5,13,17,23,35, Chapter18-Verses45,46,48.
UNIT-IV:
Statements of basic knowledge. Shrimad Bhagwad Geeta:Chapter2-Verses 56,62,68 Chapter12 -Verses13,14,15,16,17,18 Personality of Role model. Shrimad BhagwadGeeta:
UNIT-V:
Chapter 2-Verses17,Chapter 3-Verses 36,37,42, Chapter 4-Verses18,38,39 Chapter 18–Verses37,38,63

Suggested Reading

1. "Srimad Bhagavad Gita"by Swami Swarupananda Advaita Ashram(Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by .Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

SOFTWARE DEFINED NETWORKS

M.Tech– III Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58301a	PE-V	3	0	0	3	40	60	100

Course Objectives:

- This course introduces about software defined networking, an emerging paradigm in computer networking that allows a logically centralized software program to control the behavior of an entire network.

Course Out comes: A student after completion of the course will be able to

CO1:	Differentiate between traditional networks and software defined networks and understand the key benefits and use cases of SDN.
CO2:	Interpret the SDN data plane devices and OpenFlow Protocols
CO3:	Implement the operation of SDN control plane with different controllers
CO4:	Apply techniques that enable applications to control the underlying network using SDN
CO5:	Evaluate Network Functions Virtualization components and their roles in SDN

UNIT-I:
Evolving network requirements-The SDN Approach: Requirements, SDN Architecture, Characteristics of Software-Defined Networking, SDN and NFV-Related Standards: Standards-Developing Organizations, Industry Consortia, Open Development Initiatives.
UNIT II:
SDN data plane: Data plane Functions, Data plane protocols, Open flow logical network Device: Flow table Structure, Flow Table Pipeline, The Use of Multiple Tables, Group Table- Open Flow Protocol.
UNIT-III:
SDN Control Plane Architecture: Control Plane Functions, Southbound Interface, Northbound Interface, Routing, ITU-T Model- OpenDaylight-REST- Cooperation and Coordination Among Controllers
UNIT-IV:
SDN Application Plane Architecture: Northbound Interface, Network Applications, User Interface- Network Services Abstraction Layer: Abstractions in SDN, Frenetic- Traffic Engineering Measurement and Monitoring Security- Data CentreNetworking- Mobility and Wireless.
UNIT-V:
Background and Motivation for NFV- Virtual Machines- NFV Concepts: Simple Example of the Use of NFV, NFV Principles, High-Level NFV Framework, NFV Benefits and Requirements- NFV Reference Architecture: NFV Management and Orchestration

Textbooks:

1.Paul Goransson Chuck Black Timothy Culver: Software Defined Networks: A Comprehensive Approach, Morgan Kaufmann, 2016.

2. Ken Gray Thomas Nadeau: Network Function Virtualization, Morgan Kaufmann, 2016. .

Reference Books:

1.Larry Peterson , Carmelo Cascone , Bruce Davie: Software-Defined Networks: A Systems Approach, Systems Approach, 2021

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

REINFORCEMENT LEARNING

M.Tech– III Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58301b	PE-V	3	0	0	3	40	60	100

Course Objectives:

- Reinforcement Learning is a subfield of Machine Learning, but is also a general-purpose formalism for automated decision-making and AI. This course introduces you to statistical learning techniques where an agent explicitly takes actions and interacts with the world.

Course Out comes: A student after completion of the course will be able to

CO1:	Formulate Reinforcement Learning problems
CO2:	Apply various Tabular Solution Methods to Markov Reward Process Problems
CO3:	Apply various Iterative Solution methods to Markov Decision Process Problems
CO4:	Comprehend Function approximation methods .

UNIT-I:
Introduction: Introduction to Reinforcement Learning (RL) – Difference between RL and Supervised Learning, RL and Unsupervised Learning. Elements of RL, Markov property, Markov chains, Markov reward process (MRP).
UNIT II:
Evaluative Feedback - Multi-Arm Bandit Problem: An n-Armed Bandit Problem, Exploration vs Exploitation principles, Action value methods, Incremental Implementation, tracking a non-stationary problem, optimistic initial values, upper-confidence-bound action selection, Gradient Bandits. Introduction to and proof of Bellman equations for MRPs
UNIT-III:
Introduction to Markov decision process (MDP), state and action value functions, Bellman expectation equations, optimality of value functions and policies, Bellman optimality equations. Dynamic Programming (DP): Overview of dynamic programming for MDP, principle of optimality, Policy Evaluation, Policy Improvement, policy iteration, value iteration, asynchronous DP , Generalized Policy Iteration.
UNIT-IV:
Monte Carlo Methods for Prediction and Control: Overview of Monte Carlo methods for model free RL, Monte Carlo Prediction, Monte Carlo estimation of action values, Monto Carlo Control, On policy and off policy learning, Importance sampling. Temporal Difference Methods: TD Prediction, Optimality of TD(0), TD Control methods - SARSA, Q-Learning and their variants.
UNIT-V:
Eligibility traces: n-Step TD Prediction, Forward and Backward view of TD(λ), Equivalence of forward and backward view, Sarsa(λ),, Watkins's Q(λ), Off policy eligibility traces using importance of sampling. Function Approximation Methods: Value prediction with function approximation, gradient descent methods, Linear methods, control with function approximation.

Textbooks:

1. Richard S. Sutton and Andrew G. Barto, Reinforcement Learning: An Introduction", 2nd Edition, The MIT Press.
2. Csaba Szepesvari – Algorithms for Reinforcement Learning – Morgan & Claypool, 2010.

Reference Books:

1. Reinforcement Learning By Richard S. (University Of Alberta) Sutton,Andrew G. (Co-Director Autonomous Learning Laboratory) Barto

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

DATA ANALYTICS

M.Tech– III Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3D58301c		3	0	0	3	40	60	100

Course Objectives:

- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis
- Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
- To understand the various search methods and visualization techniques.

Course Out comes: A student after completion of the course will be able to

CO1:	Understand the ideas of statistical approaches to learning
CO2:	Understand the significance of exploratory data analysis (EDA) in data science and apply basic tools (plots, graphs, summary statistics) to perform EDA
CO3:	Apply basic machine learning algorithms (Linear Regression, k-Nearest Neighbors (k-NN), k-means, Naive Bayes) for predictive modeling. Explore the merits of Naive Bayes technique
CO4:	Recognize the characteristics of machine learning techniques that are useful to solve real-world problems

UNIT-I:
Introduction: What is Data Science? Big Data and Data Science hype and getting past the hype, Why now?, Datafication, Current landscape of perspectives, Skill sets, Life cycle of Data Science, Different phases.
UNIT II:
Exploratory Data Analysis and the Data Science Process: Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process, Case Study: RealDirect (online real estate firm), Three Basic Machine Learning Algorithms: Linear Regression, k-Nearest Neighbours (k-NN), k-means.
UNIT-III:
One More Machine Learning Algorithm and Usage in Applications: Motivating application: Filtering Spam, Why Linear Regression and k-NN are poor choices for Filtering Spam, Naive Bayes and why it works for Filtering Spam, Data Wrangling: APIs and other tools for scrapping the Web, Feature Generation and Feature Selection (Extracting Meaning From Data), Motivating application: user (customer) retention,
UNIT-IV:
Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms: Filters; Wrappers; Decision Trees; Random Forests, Recommendation Systems: Building a UserFacing Data Product: Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, Principal Component Analysis, Exercise: build your own recommendation system.
UNIT-V:
Data Visualization: Basic principles, ideas and tools for data visualization, Case study on industry projects, Exercise: create your own visualization of a complex dataset, Data Science and Ethical Issues: Discussions on privacy, security, ethics, A look back at Data Science, Next-generation data scientists.

Textbooks:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly, 2014.
2. Jure Leskovek, AnandRajaraman and Jerey Ullman. Mining of Massive Datasets, Cambridge University Press, 2014.

Reference Books:

1. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. MIT Press, 2013.
2. Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. O'Reilly, 2013.
3. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, Second Edition. Springer, 2009.
4. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.2018.
5. Mohammed J. Zaki and Wagner Miera Jr. Data Mining and Analysis: Fundamental Concepts and Algorithms. Cambridge University Press, 2014.
6. Jiawei Han, MichelineKamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. Morgan Kaufmann, 2011.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

INDUSTRIAL SAFETY

OPEN ELECTIVE

M.Tech – III Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
24G3DOE301b	**OE**	3	0	0	3	40	60	100

Course Objectives:

- To know about Industrial safety programs and toxicology, Industrial laws, regulations and source models
- To understand about fire and explosion, preventive methods, relief and its sizing methods
- To analyse industrial hazards and its risk assessment.

Course Out comes: A student after completion of the course will be able to

CO1:	To list out important legislations related to health, Safety and Environment.
CO2:	To list out requirements mentioned in factories act for the prevention of accidents.
CO3:	To understand the health and welfare provisions given in factories act.

UNIT-I:
Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire Prevention and fire fighting, equipment and methods.
UNIT II:
Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and application soft tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment
UNIT-III:
Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants- types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.
UNIT-IV:
Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.
UNIT-V:
Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air

compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Text books:

1 Maintenance Engineering Hand book, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H.P. Garg, S. Chand and Company.

Reference Books:

1 Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
2. Foundation Engineering Hand book, Winterkorn, Hans, Chapman & Hall London.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

BUSINESS ANALYTICS

OPEN ELECTIVE

M.Tech – III Semester								SJCET-R24
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
24G3DOE301c	**OE**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	40	60	100

Course Objectives:

- The main objective of this course is to give the student a comprehensive understanding of business analytics methods.

Course Out comes: A student after completion of the course will be able to

CO1:	Students will demonstrate knowledge of data analytics.
CO2:	Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
CO3:	Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.

UNIT-I:
Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst. Stakeholders: the project team, management, and the front line, Handling Stakeholder Conflicts.
UNIT II:
Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.
UNIT-III:
Forming Requirements: Overview of Requirements Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents. Transforming Requirements: Stake holder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling
UNIT-IV:
Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements. Managing Requirements Assets: Change Control, Requirements Tools
UNIT-V:
Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.

Text books:

1. Business Analysis by James Cadleetal.
2. Project Management: The Managerial Process by Erik Larson and, Clifford Gray Approach)", 1stEdition, VPT, 2014.

Reference Books:

1. Business analytics Principles, Concepts ,and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.

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DEPARTMENTOF M.TECH. IN REFRIGERATION & AIR-CONDITIONING

OPTIMIZATION TECHNIQUES

OPEN ELECTIVE

M.Tech – III Semester								SJCET-R24
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
24G3DOE301f	OE	3	0	0	3	40	60	100

Course Objectives:

- Enumerate the fundamental knowledge of Linear Programming and Dynamic Programming problems.
- Learn classical optimization techniques and numerical methods of optimization. Know the basics of different evolutionary algorithms.
- Explain Integer programming techniques and apply different optimization techniques to solve various models arising from engineering areas.

Course Out comes: A student after completion of the course will be able to

CO1:	Explain the fundamental knowledge of Linear Programming and Dynamic Programming problems.
CO2:	Use classical optimization techniques and numerical methods of optimization. Describe the basics of different evolutionary algorithms.
CO3:	Enumerate fundamentals of Integer programming technique and apply different techniques to solve various optimization problems arising from engineering areas.

UNIT-I:

LINER PROGRAMMING (L.P): Revised Simplex Method, Duel simplex Method, Sensitivity Analysis DYNAMIC PROGRAMMING (D.P):Multistage decision processes. Concepts of sub optimization, Recursive Relation-calculus method, tabular method, LP as a case of D.P.

UNIT II:

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization without constraints, Multi variable optimization without constraints, multivariable optimization with constraints - method of Lagrange multipliers, Kuhn-Tucker conditions.

NUMERICAL METHODS FOR OPTIMIZATION: Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method

UNIT-III:

MODERNMETHODSOFOPTIMIZATION:

GENETICALGORITHM(GA): Differences and similarities between conventional and evolutionary algorithms, working principle, Genetic Operators- reproduction, crossover, mutation

GENETIC PROGRAMMING (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA &GP, Random population generation. Fuzzy Systems: Fuzzy set Theory, Optimization of Fuzzy systems

UNIT-IV:

INTEGER PROGRAMMING:

Graphical Representation, Gomory's Cutting Plane Method, Balas' Algorithm for Zero-One Programming, Branch-and-Bound Method

UNIT-V:

APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS:

Formulation of model- optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in

optimizing machining operations sequence.

Text books:

1. Engineering Optimization (4th Edition) by S.S. Rao, New Age International,

Reference Books:

1. Optimization for Engineering Design by Kalyanmoy Deb, PHI Publishers
2. Genetic algorithms in Search, Optimization, and Machine learning - D.E.Goldberg, Addison-Wesley Publishers
3. Operations Research by Hillar and Liberman, TMH Publishers.
4. Optimal design – Jasbir Arora, McGraw Hill (International) Publisher