KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

COURSE STRUCTURE & SYLLABUS – R20 Regulation

SEMESTER -I

S. No	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20SH1T06	Differential Equations	3	0	0	3	30	70	100
2	20SH1T04	Applied Chemistry	3	0	0	3	30	70	100
3	20CS1T01	Problem Solving and Programming Using C	3	0	0	3	30	70	100
4	20ME1T01	Engineering Graphics	1	0	4	3	30	70	100
5	20EE1T02	Basics of Electrical & Electronics Engineering	3	0	0	3	30	70	100
PRACTICAL									
6	20SH1L04	Applied Chemistry Lab	0	0	3	1.5	15	35	50
7	20CS1L01	Problem Solving and Programming Using C Lab	0	0	3	1.5	15	35	50
8	20CS1L02	IT Workshop	0	0	3	1.5	15	35	50
		Total Credits				**19.5**	**195**	**455**	**650**

Theory: BSC-2, ESC-3 **Practical:**BSC-1, ESC-2

SEMESTER-II

S. No	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20SH2T07	Linear Algebra & Vector Calculus	3	0	0	3	30	70	100
2	20SH2T02	Applied Physics	3	0	0	3	30	70	100
3	20SH2T01	Communicative English	3	0	0	3	30	70	100
4	20EC2T01	Digital Logic Design	3	0	0	3	30	70	100
5	20CS2T01	Python Programming	3	0	0	3	30	70	100
6	20GE2M01	Environmental Sciences	2	0	0	0	--	--	--
PRACTICAL									
7	20SH2L01	English Communicative Skills Lab	0	0	3	1.5	15	35	50
8	20SH2L02	Applied Physics Lab	0	0	3	1.5	15	35	50
9	20CS2L01	Python Programming Lab	0	0	3	1.5	15	35	50
		Total Credits				**19.5**	**195**	**455**	**650**

Theory: BSC-2, HSMC-1, ESC-2 **Practical:** MC-1, BSC-1, HSMC-1, ESC-1

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER-III

S. No	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20CS3T03	Software Engineering	3	0	0	3	30	70	100
2	20CS3T05	Data Structures & Algorithms	3	0	0	3	30	70	100
3	20IT3T01	Object Oriented Programming through Java	3	0	0	3	30	70	100
4	20IT3T03	Discrete Mathematics	3	0	0	3	30	70	100
5	20CS3T02	Computer Organization and Architecture	3	0	0	3	30	70	100
6	20GE3M01	Constitution of India	2	0	0	0	--	--	--
PRACTICAL									
7	20CS3L02	Object Oriented Analysis and Design Lab	0	0	3	1.5	15	35	50
8	20CS3L03	Data Structures & Algorithms Lab	0	0	3	1.5	15	35	50
9	20IT3L01	Object Oriented Programming through Java lab	0	0	3	1.5	15	35	50
10	20CS3S01	Mobile App Development	1	0	2	2.0	15	35	50
		Total Credits				**21.5**	**210**	**490**	**700**

Theory: PCC-5, MC-1 **Practical:** PCC-3, SC-1

SEMESTER-IV

S. No	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20SH4T05	Probability & Statistics	3	0	0	3	30	70	100
2	20CS4T02	Formal Languages and Automata Theory	3	0	0	3	30	70	100
3	20CS4T01	Database Management Systems	3	0	0	3	30	70	100
4	20IT4T02	Web Technologies	3	0	0	3	30	70	100
5	20SH4T01	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
PRACTICAL									
6	20CS4L01	Database Management Systems Lab	0	0	3	1.5	15	35	50
7	20IT4L02	Web Technologies Lab	0	0	3	1.5	15	35	50
8	20CS4L02	Data Visualization Lab	0	0	3	1.5	15	35	50
9	20CS4S01	Mongo DB	1	0	2	2.0	15	35	50
Total Credits						**21.5**	**210**	**490**	**700**
10		Honor/Minor Courses	3	1	0	4	30	70	100

Theory: BSC-1, PCC-3, HSMS-01 **Practical:** PCC-3, SC-1

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER-V

S.No	Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20CS5T01	Computer Networks	3	0	0	3	30	70	100
2	20IT5T02	Design and Analysis of Algorithms	3	0	0	3	30	70	100
3	20IT5T01	Operating systems	3	0	0	3	30	70	100
4	20EC5OXX	**Open Elective-I**	3	0	0	3	30	70	100
5	20CS5EXX	**Professional Elective - I** 1. Data warehousing and Data Mining 2. Software Project Management 3. Object Oriented Analysis and Design 4. Advanced Unix Programming 5. Advanced Computer Architecture	3	0	0	3	30	70	100
6	20GE5M01	Professional Ethics and Human Values	2	0	0	0	----	---	---
PRACTICAL									
7	20CS5L01	Computer Networks Lab	0	0	3	1.5	15	35	50
8	20IT5L02	Unix Operating Systems Lab	0	0	3	1.5	15	35	50
9	20CS5S01	**Skill Oriented CourseIII/Soft Skill Course**	1	0	2	2.0	15	35	50
10		**Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)**	0	0	0	1.5	---	50	50
Total Credits						**21.5**	**195**	**505**	**700**
11		Honor/Minor Courses	3	1	0	4	30	70	100

Theory: PCC-4, OE-1, HSMS-1 **Practical:** PCC-2, SC-1

SEMESTER -VI

S.No	Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20CS6T01	Cryptography and Network Security	3	0	0	3	30	70	100
2	20CS6T02	Compiler Design	3	0	0	3	30	70	100
3	20CS6T03	Artificial Intelligence	3	0	0	3	30	70	100
4	20EC6OXX	**Open Elective-II**	3	0	0	3	30	70	100
5	20CS6EXX	**Professional Elective - II** 1. Cloud Computing 2. Big Data Analytics 3. Machine Learning 4. Network Programming 5. Internet of Things	3	0	0	3	30	70	100

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

6	20GE6M04	IPR & PATENTS	2	0	0	0			
PRACTICAL									
7	20CS6L01	Cryptography and Network Security Lab	0	0	3	1.5	15	35	50
8	20CS6L02	Compiler Design Lab	0	0	3	1.5	15	35	50
9	20CS6L03	Artificial Intelligence Lab using Python	0	0	3	1.5	15	35	50
10	20SH6S01	Soft Skills	1	0	2	2.0	--	50	50
Total Credits						**21.5**	**195**	**505**	**700**
11		Honor/Minor Courses	3	1	0	4	30	70	100

Theory: PCC-4, OE-1, HSMS-1 **Practical:** PCC-3, SC-1

SEMESTER-VII

SNo	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20CS7EXX	**Professional Elective - III** 1. Mobile Computing 2. Neural Networks and Soft Computing 3. Ad-hoc and Sensor Networks 4. Deep Learning Techniques 5. Information Retrieval System	3	0	0	3	30	70	100
2	20CS7EXX	**Professional Elective - IV** 1. Distributed systems 2. Social Networks & Semantic Web 3. Computer Vision 4. MOOCS-NPTEL / SWAYAM 5. Game Theory	3	0	0	3	30	70	100
3	20CS7EXX	**Professional Elective - V** 1. Block Chain Technologies 2. Quantum Computing 3. Ethical Hacking 4. MOOCS-NPTEL / SWAYAM 5. Parallel Algorithms	3	0	0	3	30	70	100
4	20ME7O3X	**Open Elective-III**	3	0	0	3	30	70	100
5	20CS704X	**Open Elective-IV**	3	0	0	3	30	70	100
6	20SH70XX	**Management Science**	3	0	0	3	30	70	100
PRACTICAL									
7	PR	**Industrial / Research Internship 2 months (Mandatory) after third year (to be evaluated during VII**	0	0	0	3	----	50	50

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

		semester)							
8	20CS7S01	Skill Oriented Course (Advanced) **Devops**	1	0	2	2	15	35	50
						Total Credits	**23**	**195**	**505**	**700**
9		Honor /Minor Courses	3	1	0	4	30	70	100

Theory: PCC-3, OE-2, HSMS-1 **Practical:** PR-1, SC-1

SEMESTER-VIII

S No	Course Code	Course Title	L	T	P	C	IM	EM	TM
		THEORY							
1	20CS8P01	Major Project Work, Seminar, Internship in industry	0	0	0	12	60	140	200
		Total Credits				12	60	140	200
2		Honor/Minor Courses (MOOCS-I)	-	-	-	2	-	-	-
3		Honor/Minor Courses (MOOCS-II)	-	-	-	2	-	-	-

Practical: PROJ-1,Honor/Minor Courses-2, MOOCS-I & II*,(*– Equivalent grades will be given by BOS)

LIST OF OPEN ELECTIVE COURSES

S. No.	Course Code	Course Title	Offering Dept.
1	20CEXO01	Elements of Civil Engineering	CE
2	20CEXO02	Disaster Management	
3	20CEXO03	Intelligent Transport Systems	
4	20CEXO04	Remote sensing & Geographical Information systems	
5	20EEXO01	Electrical Safety Management	EEE
6	20EEXO02	Non-conventional Energy sources	
7	20EEXO03	Electrical and Hybrid Vehicle	
8	20EEXO04	Electrical Energy Conservation and Auditing	
9	20EEXO05	Industrial Robotics	
10	20MEXO01	Optimization Techniques	ME
11	20MEXO02	Robotics	
12	20MEXO03	Industrial Management Sciences	
13	20MEXO04	Automation in Manufacturing	
14	20ECXO01	Principles of Communication	ECE
15	20ECXO02	Digital image Processing	
16	20ECXO03	Bio Medical Engineering	
17	20ECXO04	Introduction to Internet of Things	
18	20ECXO05	MEMS	
19	20ECXO06	Mechatronics	
20	20CSXO01	Computer Graphics	CSE
21	20CSXO02	Cloud Computing	
22	20CSXO03	Computer Networks	
23	20CSXO04	Cryptography and Network Security	

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

24	20ITXO01	Data Base Management systems (DBMS)	IT
25	20ITXO02	Java Programming	
26	20ITXO03	Principle of software Engineering (PSE)	
27	20ITXO04	Introduction to Machine Learning	
28	20CIXO01	Python Programming	CAI
29	20CIXO02	Fundamentals of Artificial Intelligence	
30	20CIXO03	Human Computer Interaction	
31	20CIXO04	Applications of AI	
32	20CDXO01	Object Oriented Programming (C++)	CSD
33	20CDXO02	Data Structures	
34	20CDXO03	Data warehouse and Mining	
35	20CDXO04	Big Data Analysis	

HUMANITIES AND SOCIAL SCIENCE ELECTIVE

S. No.	Course Code	Course Title
1	20SH7E01	Entrepreneurship Development
2	20SH7E02	Business Environment
3	20SH7E03	Digital Marking
4	20SH7E04	Human Resource development and OB

LIST OF HONORS COURSES

S. No	Course Code	Course Name
Year/Sem: II-II (Pool-1) Data Science		
1	20CS4H01	Introduction to Data Science
2	20CS4H02	Statistical Foundations for Data Science
3	20CS4H03	Data Analytics and Visualization
4	20CS4H04	Python for Data Science
Year/Sem: III-I (Pool-2) AI & ML		
1	20CS5H01	Mathematics for Machine Learning
2	20CS5H02	Text Mining and Time Series Analysis
3	20CS5H03	Natural Language Processing
4	20CS5H04	Reinforcement Learning
Year/Sem: III-II (Pool-3) Cyber Security		
1	20CS6H01	Cyber Security Essentials
2	20CS6H02	Secure Coding
3	20CS6H03	Vulnerability Assessment & Penetration Testing
4	20CS6H04	Malware Analysis
Year/Sem: IV-I (Pool-4) Systems Engineering		
1	20CS7H01	Data Communications and Information Coding Theory
2	20CS7H02	Service Oriented Architectures
3	20CS7H03	Design of Secure Protocols
4	20CS7H04	Network Coding

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

LIST OF MINORS COURSE (GENERAL)

S. No	Course Code	Course Name
1	20CS4M01	Fundamentals of Data Structures
2	20CS5M01	Programming with JAVA
3	20CS6M01	Operating Systems
4	20CS7M01	Computer Networks
5	20CS7M02	Database Management Systems

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -V

Course Code	Course Name	L	T	P	C
20CS5T01	COMPUTER NETWORKS	3	0	0	3

Course Objectives:

The main objectives are

- Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model
- Study data link layer concepts, design issues, and protocols
- Gain core knowledge of Network layer routing protocols and IP addressing
- Study Session layer design issues, Transport layer services, and protocols
- Acquire knowledge of Application layer and Presentation layer paradigms and protocols

Course Outcomes:

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

CO-1: Illustrate the OSI and TCP/IP reference model
CO-2: Analyze MAC layer protocols and LAN technologies
CO-3: Summarize various Routing algorithms and Congestion control principles.
CO-4: Describe Transport layer protocols.
CO-5: Develop application layer protocols

UNIT I

Introduction: History and development of computer networks, Basic Network Architectures: OSI reference model, TCP/IP reference model, and Networks topologies, types of networks (LAN, MAN, WAN)

Physical layer: Different types of transmission media Guided and unguided, Multiplexing methods : TDM, FDM

UNIT II

Data Link Layer: Design Issues and services: framing, error control, flow control, medium access control. Error & Flow control mechanisms: sliding window protocols: stop and wait, Go back N and selective repeat.

MAC Sub Layer: MAC protocols: Aloha, slotted aloha, CSMA, CSMA/CD, CSMA/CA, polling, token passing, scheduling.

UNIT III

Network Layer: Network Layer Services, packet switching, Network Layer Performance, IPv4 addresses, Forwarding of IP packets, Internet Protocol (IP), IPv6 Protocol and addressing, Transition from IPv4 to IPv6, Mobile IP.

Routing Algorithms: Least Cost Routing, Distance vector Routing, Link-State Routing, and Hierarchical Routing.

Congestion control: Approaches to Congestion Control, Traffic-Aware Routing, Traffic

Throttling, Load shedding, traffic shaping.
Internet Control Protocols: ARP, RARP, ICMP and DHCP.

UNIT IV

Transport Layer: The Transport Service-Services Provided to the Upper Layers, Transport Service Primitives, Elements of Transport Protocols –Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Congestion control-Desirable Bandwidth allocation, Regulating the sending rate, The Internet Transport Protocols: Introduction to UDP, Remote procedure call, Real-Time transport protocols, Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, SCTP.

UNIT V

Application Layer: Domain Name Space (DNS), SNMP, Electronic mail: MIME,SMTP, IMAP, WWW, FTP, HTTP

Text Books:

1) Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, Pearson Education India; 5th Edition, 2013
2) Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill, 5th Edition, 2012

Reference Books:

1) Computer Networks: A Systems Approach, LL Peterson, BS Davie, Morgan-Kauffman, 5th Edition, 2011.
2) Computer Networking: A Top-Down Approach JF Kurose, KW Ross, Addison-Wesley, 5th Edition, 2009
3) Data and Computer Communications, William Stallings, Pearson, 8th Edition, 2007

E-Resources:

1)https://nptel.ac.in/courses/106/105/106105183/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -V

Course Code	Course Name	L	T	P	C
20IT5T02	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3

Course Objectives:

• To provide an introduction to formalisms to understand, analyze and denote time complexities of algorithms

• To introduce the different algorithmic approaches for problem solving through numerous example problems

• To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness

Course Outcomes:

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

CO-1: Describe asymptotic notation used for analyze the performance of algorithms, denote its time complexity, apply sets and graph search algorithms to real world problems

CO-2: Solve problems using divide and conquer and greedy method algorithmic approaches

CO-3: Solve problems using dynamic programming algorithmic approaches

CO-4: Solve problems using backtracking and branch and bound algorithmic approaches

CO-5: Demonstrate an understanding of NP- Completeness theory and string matching

UNIT-I

Introduction: Algorithm Definition, Algorithm Specification, Pseudo code for expressing algorithm, performance Analysis, asymptotic notation.

Sets & Disjoint set union: introduction, union and find operations.

Basic Traversal & Search Techniques: Techniques for Graphs, connected components and Spanning Trees, Bi-connected components and DFS.

UNIT-II

Divide and Conquer: General Method, Defective chessboard, Binary Search, finding the maximum and minimum, Merge sort, Quick sort.

The Greedy Method: The general Method, container loading, knapsack problem, Job sequencing with deadlines, minimum-cost spanning Trees.

UNIT-III

Dynamic Programming: The general method, multistage graphs, All pairs-shortest paths, single-source shortest paths: general weights, optimal Binary search trees, 0/1 knapsack, reliability Design, The traveling salesperson problem

UNIT-IV

Backtracking: The General Method, The 8-Queens problem, sum of subsets, Graph coloring,

Hamiltonian cycles

Branch and Bound: FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1 Knapsack problem, Traveling salesperson problem.

UNIT-V

NP-Hard and NP-Complete problems: Basic concepts, Cook's Theorem.

String Matching: Introduction, String Matching-Meaning and Application, Naive String Matching Algorithm, Rabin-Karp Algorithm, Knuth-Morris-Pratt Automata.

Text Books:

1) Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press.
2) Harsh Bhasin, "Algorithms Design & Analysis", Oxford University Press.

Reference Books:

1) Horowitz E. Sahani S: "Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Publications, 2008.
2) S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press.

E-Resources:

1)http://nptel.ac.in/courses/106101060/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -V

Course Code	Course Name	L	T	P	C
20IT5T01	OPERATING SYSTEMS	3	0	0	3

Course Objectives:

The objectives of this course are to

- Introduce to the internal operation of modern operating systems
- Define, explain, processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems
- Understand File Systems in Operating System like UNIX/Linux and Windows
- Understand Input Output Management and use of Device Driver and Secondary Storage (Disk) Mechanism
- Analyze Security and Protection Mechanism in Operating System

Course Outcomes:

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

CO-1: Describe various generations of Operating System and functions of Operating System

CO-2: Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance

CO-3: Solve Inter Process Communication problems using Mathematical Equations by various methods

CO-4: Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques

CO-5: Outline File Systems in Operating System like UNIX/Linux and Windows

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, Open-Source Operating Systems.

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls.

UNIT II

Process Concept: Process scheduling, Operations on processes, Inter-process communication. Multithreaded Programming: Multithreading models, Thread libraries, threading issues. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Thread scheduling.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Classical IPC Problems - Dining philosopher's problem.

UNIT III

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation,

Paging, Segmentation.
Virtual Memory Management: Introduction, Demand paging, Page replacement Algorithms.

UNIT IV
Deadlocks: Resources, Conditions for resource deadlocks, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.
File Systems: Files, Directories, File system implementation.
Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling.

UNIT V
System Protection: Goals of protection, Principles and domain of protection, Access control.
System Security: Introduction, Program threats, System and network threats, Cryptography for security, User authentication, implementing security defenses, Firewalling to protect systems and networks.
Case Studies: Linux, Microsoft Windows.

Text Books:
1) Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2) Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Inter process Communication and File systems.)

Reference Books:
1) Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
2) Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
3) Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

E-Resources:
1)https://nptel.ac.in/courses/106/105/106105214/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

Course Code	Course Name	L	T	P	C
20CS5E01	PROFESSIONAL ELECTIVE-I 1. DATA WAREHOUSING AND DATA MINING	3	0	0	3

Course Objectives:

- To understand data warehouse concepts, architecture, business analysis and tools
- To understand data pre-processing and data visualization techniques
- To study algorithms for finding hidden and interesting patterns in data
- To understand and apply various classification and clustering techniques using tools

Course Outcomes:

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

CO-1: Design a Data warehouse system and perform business analysis with OLAP tools
CO-2: Apply suitable pre-processing and visualization techniques for data analysis
CO-3: Apply frequent pattern and association rule mining techniques for data analysis
CO-4: Apply appropriate classification techniques for data analysis
CO-5: Apply appropriate clustering techniques for data analysis.

UNIT I

Data Warehousing, Business Analysis and On-Line Analytical Processing (OLAP): Basic Concepts, Data Warehousing Components, Building a Data Warehouse, Database Architectures for Parallel Processing, Parallel DBMS Vendors, Multidimensional Data Model, Data Warehouse Schemas for Decision Support, Concept Hierarchies, Characteristics of OLAP Systems, Typical OLAP Operations, OLAP and OLTP.

UNIT II

Data Mining – Introduction: Introduction to Data Mining Systems, Knowledge Discovery Process, Data Mining Techniques, Issues, applications, Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT III

Data Mining - Frequent Pattern Analysis: Mining Frequent Patterns, Associations and Correlations, Mining Methods, Pattern Evaluation Method, Pattern Mining in Multilevel, Multi-Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns.

UNIT IV

Classification: Decision Tree Induction, Bayesian Classification, Rule Based Classification, Classification by Back Propagation, Support Vector Machines, Lazy Learners, Model Evaluation and Selection, Techniques to improve Classification Accuracy.

UNIT V

Clustering: Clustering Techniques, Cluster analysis, Partitioning Methods, Hierarchical methods, Density Based Methods, Grid Based Methods, Evaluation of clustering, Clustering high dimensional data, Clustering with constraints, Outlier analysis, outlier detection methods.

Text Books:

1) Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.
2) Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining, Pearson, 2016.

Reference Books:

1) Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAP||, Tata McGraw – Hill Edition, 35th Reprint 2016.
2) K.P. Soman, ShyamDiwakar and V. Ajay, —Insight into Data Mining Theory and Practice||, Eastern Economy Edition, Prentice Hall of India, 2006.
3) Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.

E-Resources:

1) https://www.saedsayad.com/data_mining_map.htm
2) https://nptel.ac.in/courses/106/105/106105174/
3) (NPTEL course by Prof.PabitraMitra) http://onlinecourses.nptel.ac.in/noc17_mg24/preview
4) (NPTEL course by Dr. Nandan Sudarshanam) http://www.saedsayad.com/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -V

Course Code	Course Name	L	T	P	C
20CS5E02	PROFESSIONAL ELECTIVE-I 2. SOFTWARE PROJECT MANAGEMENT	3	0	0	3

Course Objectives:

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

•To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project

•To compare and differentiate organization structures and project structures

•To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

Course Outcomes:

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

CO-1: Apply the process to be followed in the software development life-cycle models.

CO-2: Apply the concepts of project management & planning.

CO-3: Implement the project plans through managing people, communications and change

CO-4: Conduct activities necessary to successfully complete and close the Software projects

CO-5: Implement communication, modeling, and construction & deployment practices in software development.

UNIT I

Conventional Software Management: The waterfall model, conventional software Management performance.

Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT II

The Old Way and The New: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT III

Model Based Software Architectures: A Management perspective and technical

perspective.

Work Flows of the Process: Software process workflows, Iteration workflows. **Checkpoints of the Process**: Major mile stones, Minor Milestones, Periodic status assessments.

UNIT IV

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT V

Process Automation: Automation Building blocks, The Project Environment.

Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Project Estimation and Management: COCOMO model, Critical Path Analysis, PERT technique, Monte Carlo approach (Text book 2)

Text Books:

1) Software Project Management, Walker Royce, Pearson Education, 2005.
2) Software Project Management, Bob Hughes, 4th edition, Mike Cotterell, TMH.

Reference Books:

1) Software Project Management, Joel Henry, Pearson Education.
2) Software Project Management in practice, PankajJalote, Pearson Education, 2005.
3) Effective Software Project Management, Robert K.Wysocki, Wiley, 2006.

E-Resources

1. https://archive.nptel.ac.in/courses/106/105/106105218/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -V

Course Code	Course Name	L	T	P	C
20CS5E03	PROFESSIONAL ELECTIVE-I 3. OBJECT ORIENTED ANALYSIS AND DESIGN	3	0	0	3

Course Objectives:

- To understand how to solve complex problems
- Analyze and design solutions to problems using object-oriented approach
- Study the notations of Unified Modeling Language

Course Outcomes:

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

CO-1: Find solutions to the complex problems using object-oriented approach
CO-2: Represent classes, responsibilities and states using UML notation
CO-3: Identify classes and responsibilities of the problem domain
CO-4: Develop and explore the behavioral model
CO-5: Apply the concepts of architectural design for deploying the code for software

UNIT-I:

Introduction: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

UNIT-II:

Classes and Objects: Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

UNIT-III:

Introduction to UML: Why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

UNIT-IV:

Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams.
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT-V:

Architectural Modeling: Component, Deployment, Component diagrams and Deployment

diagrams. Case Study: The Unified Library application.

TEXT BOOKS:

1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON.
2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012, PEARSON.

REFERENCE BOOKS:

1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI
2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O Reilly
3. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
4. "The Unified modeling language Reference manual", James Rumbaugh, Ivar Jacobson, Grady Booch, Addison

E-Resources:

1. https://archive.nptel.ac.in/courses/106/105/106105153/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -V

Course Code	Course Name	L	T	P	C
20CS5E04	Professional Elective-I 4. Advanced Unix Programming	3	0	0	3

Course Objectives:

- To provide introduction to UNIX commands File System
- To gain an understanding of important aspects related to the SHELL and the process
- To provide a comprehensive introduction to SHELL programming, services and utilities

Course Outcomes:

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

CO-1: Understanding the basic set of commands and utilities in Linux/UNIX systems
CO-2: To learn to develop software for Linux/UNIX systems and file system
CO-3: To learn the important Linux/UNIX library functions and system calls and shell
CO-4: To understand the inner workings of filters.
CO-5: To obtain a foundation for an Shell Programming

UNIT-I

Introduction to Unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrep Command Changing the Group of a File.

UNIT-III

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection Looping in Shell Programs.

UNIT-IV

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $?

Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command Debugging Scripts-The Script Command-The Eval Command-The Exec Command. The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command The Kill Command-Job Control.

TEXT BOOKS:

1. The UNIX programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to UNIX Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:

1. Unix and shell programming by B.M. Harwani, OXFORD university press.

E-Resources

1. **https://nptel.ac.in/courses/117106113**

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -V

Course Code	Course Name	L	T	P	C
20CS5E05	Professional Elective-I 5. Advanced Computer Architecture	3	0	0	3

Course Objectives:

- Understand the Concept of Parallel Processing and its applications
- Implement the Hardware for Arithmetic Operations
- Analyze the performance of different scalar Computers
- Develop the Pipelining Concept for a given set of Instructions
- Distinguish the performance of pipelining and non-pipelining environment in a processor

Course Outcomes:

After the completion of the course, student will be able to

CO-1: Illustrate the types of computers, and new trends and developments in computer architecture

CO-2: Outline pipelining, instruction set architectures, memory addressing

CO-3: Apply ILP using dynamic scheduling, multiple issue, and speculation

CO-4: Illustrate the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges

CO-5: Apply multithreading by using ILP and supporting thread-level parallelism (TLP)

UNIT I

Computer Abstractions and Technology: Introduction, Eight Great Ideas in Computer Architecture, Below Your Program, Under the Covers, Technologies for Building Processors and Memory, Performance, The Power Wall, The Sea Change: The Switch from Uni-processors to Multiprocessors, Benchmarking the Intel Core i7, Fallacies and Pitfalls.

UNIT II

Instructions: Language of the Computer: Operations of the Computer Hardware, Operands of the Computer Hardware, Signed and Unsigned Numbers, Representing Instructions in the Computer, Logical Operations, Instructions for Making Decisions, Supporting Procedures in Computer Hardware, Communicating with People, MIPS Addressing for 32-Bit Immediates and Addresses, Parallelism and Instructions: Synchronization, Translating and Starting a Program, A C Sort Example to Put It All Together, Arrays versus Pointers, ARMv7 (32-bit) Instructions, x86 Instructions, ARMv8 (64-bit) Instructions.

UNIT III

Arithmetic for Computers: Introduction, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Sub word Parallelism, Streaming SIMD Extensions and Advanced Vector Extensions in x86, Sub word Parallelism and Matrix Multiply.

UNIT IV

The Processor: Introduction, Logic Design Conventions, building a Datapath, A Simple Implementation Scheme, An Overview of Pipelining, Pipelined Datapath and Control, Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions, The ARM Cortex-A8 and Intel Core i7 Pipelines.

UNIT V

Large and Fast: Exploiting Memory Hierarchy: Introduction, Memory Technologies, The Basics of Caches, Measuring and Improving Cache Performance, Dependable Memory Hierarchy, Virtual Machines, Virtual Memory, A Common Framework for Memory Hierarchy, Using a Finite-State Machine to Control a Simple Cache, Parallelism and Memory Hierarchies: Cache Coherence, Parallelism and Memory Hierarchy: Redundant Arrays of Inexpensive Disks, **Advanced Material:** Implementing Cache Controllers, The ARM Cortex-A8 and Intel Core i7 Memory Hierarchies.

Text Books:

1) Computer Organization and Design: The hardware and Software Interface, David A Patterson, John L Hennessy, 5th edition, MK.
2) Computer Architecture and Parallel Processing – Kai Hwang, Faye A.Brigs, Mc Graw Hill.

Reference Books:

1) Modern Processor Design: Fundamentals of Super Scalar Processors, John P. Shen and Miikko H. Lipasti, Mc Graw Hill.
2) Advanced Computer Architecture – A Design Space Approach – Dezso Sima, Terence Fountain, Peter Kacsuk , Pearson.

e-Resources:

1) https://nptel.ac.in/courses/106/105/106105163/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -V

Course Code	Course Name	L	T	P	C
20GE5M01	Employability skills-I Professional Ethics and Human Values	2	0	0	0

Course Objectives:

- To give basic insights and inputs to the student to inculcate Human values to growas a responsible human being with proper personality.
- Professional Ethics instills the student to maintain ethical conduct and dischargetheir professional duties.

COURSE OUTCOMES:

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

CO 1: Student can be able to Define, Civic Values, Ethics, Behavior, Honesty, Co-Operation& Commitment

CO 2: Student can be able to Discuss Engineering Ethics and Social Experimentation for the benefit of stakeholders

CO 3: Analyze the responsibilities of Engineers towards Safety & risk, to improve the Safety and minimize the risk.

CO 4: Present the duties & rights of Engineers

CO 5: Elucidate the role of Engineers in the ever changing the global Marketing

UNIT I:

Human Values & Principles for Harmony: Morals, Values and Ethics – Integrity - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment–Self-confidence – Spirituality- Character. Truthfulness – Customs and Traditions -Value Education –Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence.

UNIT II:

Engineering Ethics and Social Experimentation:

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism ––Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument –Heinz's Dilemma - Comparison with Standard Experiments –– Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT III:

Engineers' Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/s Involuntary Risk –

Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/s Immediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT IV:

Engineers' Duties and Rights:

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality - Professional and Individual Rights –Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving- Occupational Crimes- Industrial Espionage- Price Fixing-Whistle Blowing.

UNIT V:

Global Issues:

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

Text Books:

1. Professional Ethics, R. Subramaniam – Oxford Publications, New Delhi.
2. Professional Ethics and Morals, A. R. Aryasri, Dharanikota Suyodhana – Maruthi Publications.

References:

1. Engineering Ethics, Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
2. Engineering Ethics & Human Values, M. Govindarajan, S. Natarajan and V. S. SenthilKumar- PHI Learning Pvt. Ltd – 2009.
3. Professional Ethics and Human Values, A. Alavudeen, R.Kalil Rahman and M. Jayakumaran – University Science Press.
4. Professional Ethics and Human Values, D. R. Kiran-Tata McGraw-Hill – 2013

E-Resources:

1. https://nptel.ac.in/courses/109106117

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER- V

Course Code	Course Name	L	T	P	C
20CS5L01	COMPUTER NETWORKS LAB	0	0	3	1.5

Course Objectives:

• Understand and apply different network commands

• Analyze different networking functions and features for implementing optimal solutions Apply different networking concepts for implementing network solution

• Implement different network protocols

Course Outcomes:

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

CO-1: Apply the basics of Physical layer in real time applications

CO-2: Apply data link layer concepts, design issues, and protocols

CO-3: Apply Network layer routing protocols and IP addressing

CO-4: Implement the functions of Application layer paradigms and protocols

CO-5: Implement the functions of Presentation layer paradigms and Protocols

Experiments:

1) Implement the data link layer framing methods such as character stuffing and bit stuffing.

2) Write a C program to develop a DNS client server to resolve the given hostname.

3) Implement on a data set of characters the three CRC polynomials – CRC-12, CRC-16 and CRC-CCIP.

4) Implement Dijkstra's algorithm to compute the Shortest path in a graph.

5) Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm

6) Take an example subnet of hosts. Obtain broadcast tree for it.

7) Write a client-server application for chat using UDP

8) Implement programs using raw sockets (like packet capturing and filtering)

9) Write a C program to perform sliding window protocol.

10) Get the MAC or Physical address of the system using Address Resolution Protocol.

11) Simulate the Implementing Routing Protocols using border gateway protocol(BGP)

12) Simulate the OPEN SHORTEST PATH FIRST routing protocol based on the cost assigned to the path.

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER- V

Course Code	Course Name	L	T	P	C
20IT5L02	UNIX OPERATING SYSTEM LAB	0	0	3	1.5

Course Objectives:

- To understand the design aspects of operating system
- To study the process management concepts & Techniques
- To study the storage management concepts
- To familiarize students with the Linux environment
- To learn the fundamentals of shell scripting/programming

Course Outcomes:

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

CO-1: To use UNIX utilities and perform basic shell control of the utilities
CO-2: To use the UNIX file system and file access control
CO-3: To use of an operating system to develop software
CO-4: Students will be able to use Linux environment efficiently
CO-5: Solve problems using bash for shell scripting

1) a) Study of Unix/Linux general purpose utility command list: man,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.
b) Study of vi editor
c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system
d) Study of Unix/Linux files system (tree structure)
e) Study of .bashrc, /etc/bashrc and Environment variables.

2) Write a C program that makes a copy of a file using standard I/O, and system calls

3) Write a C program to emulate the UNIX ls –l command.

4) Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: - ls –l | sort

5) Simulate the following CPU scheduling algorithms:
(a) Round Robin (b) SJF (c) FCFS (d) Priority

6) Multiprogramming-Memory management-Implementation of fork (), wait (), exec() and exit (), System calls

7) Simulate the following:
a) Multiprogramming with a fixed number of tasks (MFT)
b) Multiprogramming with a variable number of tasks (MVT)

8) Simulate Bankers Algorithm for Dead Lock Avoidance

9) Simulate Bankers Algorithm for Dead Lock Prevention.

10) Simulate the following page replacement algorithms:
a) FIFO b) LRU c) LFU

11) Simulate the following File allocation strategies
(a) Sequenced (b) Indexed (c) Linked

12) Write a C program that illustrates two processes communicating using shared memory

13) Write a C program to simulate producer and consumer problem using semaphores

14) Write C program to create a thread using pthreads library and let it run its function

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER –VI

Course Code	Course Name	L	T	P	C
20CS6T01	Cryptography and Network Security	3	0	0	3

Course Objectives:

This course aims at training students to master the:

- The concepts of classical encryption techniques and concepts of finite fields and number theory
- Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
- Design issues and working principles of various authentication protocols, PKI standards
- Various secure communication standards including Kerberos, IPsec, and SSL/TLS and email
- Concepts of cryptographic utilities and authentication mechanisms to design secure applications

Course Outcomes:

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

CO-1: Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory

CO-2: Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication

CO-3: Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.

CO-4: Apply different digital signature algorithms to achieve authentication and create secure applications

CO-5: Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP

UNIT I

Classical Encryption Techniques: Classical Encryption Techniques-Substitution techniques, Transposition techniques, Security Attacks, Services & Mechanisms, Symmetric Cipher Model, Cyber Threats, Phishing Attack, Web Based Attacks.

Block Ciphers: Traditional Block Cipher Structure, Block Cipher Design Principles.

UNIT II

Symmetric Key Cryptography: Data Encryption Standard (DES), Advanced Encryption

Standard (AES), Blowfish, IDEA, Block Cipher Modes of Operations.
Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, the Chinese Remainder Theorem, Discrete Logarithms.

UNIT III

Public Key Cryptography: Principles, Public Key Cryptography Algorithms, RSA Algorithm, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography. **Cryptographic Hash Functions**: Application of Cryptographic Hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC.
Digital Signatures: NIST Digital Signature Algorithm, Key Management and Distribution.

UNIT IV

User Authentication: Remote User Authentication Principles, Kerberos. ElectronicMail Security: Pretty Good Privacy (PGP) And S/MIME.
IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and KeyManagement.

UNIT V

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell (SSH)
Firewalls: Characteristics, Types of Firewalls, Placement of Firewalls, Firewall Configuration, Trusted Systems.

Text Books:

1) Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition.
2) Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition.

Reference Books:

1) Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyaya, Mc-GrawHill, 3rd Edition, 2015.
2) Network Security Illustrated, Jason Albanese and Wes Sonnenreich, MGH Publishers, 2003.

E-Resources:

1)https://nptel.ac.in/courses/106/105/106105031/lecture by Dr.Debdeep Mukhopadhyay IIT Kharagpur [Video Lecture]
2) https://nptel.ac.in/courses/106/105/106105162/

lecture by Dr. Sourav Mukhopadhyay IIT Kharagpur [Video Lecture]
3)https://www.mitel.com/articles/web-communication-cryptography-and-network-security
web articles by Mitel Power Connections.

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER-VI

Course Code	Course Name	L	T	P	C
20CS6T02	**Compiler Design**	**3**	**0**	**0**	**3**

Course Objectives:

- To study the various phases in the design of a compiler
- To understand the design of top-down and bottom-up parsers
- To understand syntax directed translation schemes
- To learn to develop algorithms to generate code for a target machine
- To develop algorithms to Optimize code

Course Outcomes:

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

CO-1: Design, develop, and implement a compiler for any language
CO-2: Use LEX and YACC tools for developing a scanner and a parser
CO-3: Design and implement LL and LR parsers
CO-4: Apply algorithms to generate machine code
CO-5: Develop Machine Dependent and Independent code optimization Algorithms

UNIT I

Introduction: Overview of compilation, Language Processors, The structure of a Compiler, Pass and Phases of translation, Interpretation and bootstrapping.
Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers, The Lexical-Analyzer Generator(LEX) tool.

UNIT II

Syntax Analysis: Introduction, Context free Grammars, Writing a Grammar.
Top down Parsing: Backtracking, Recursive descent parsing, Predictive parsing, LL(1) grammars.
Bottom up Parsing: Introduction to LR parsing, Shift reduce parsing, Simple LR, LR(0) items, SLR table construction, Algorithm, More powerful LR Parsers: LR(1) items, CLR table constructions, LALR table constructions, Error recovery in Parsing, YACC-automatic parser generator tool.

UNIT III

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Application of Syntax-Directed Translation, Syntax Directed Translation Schemes, Implementing L-Attributed SDD's.
Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Codes,

Types and Declarations, Type checking, Control Flow, Back Patching, Switch Statements, Intermediate Code for Procedures.

UNIT IV

Run Time Environments: Symbol table entries & operations, Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management

Code Generation: Issues in the design of a Code Generator , The target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, A simple Code generator, Register Allocation and Assignment.

UNIT V

Machine Independent Optimization: Function preserving Optimization: Common Sub expression elimination, Folding, Dead code elimination, Copy Propagation.

Machine-dependent Optimizations: Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

Text Books:

1) Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson.
2) Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.

Reference Books:

1) Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
2) The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
3) Writing compilers and interpreters, R. Mak, 3rd edition, Wiley student edition.

E-Resources:

1) https://nptel.ac.in/courses/106/104/106104123/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER-VI

Course Code	Course Name	L	T	P	C
20CS6T03	**Artificial Intelligence**	**3**	**0**	**0**	**3**

Course Objectives:

• To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language

• To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs

• To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

Course Outcomes:

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

CO-1: Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem

CO-2: Apply the language/framework of different AI methods for a given problem

CO-3: Implement basic AI algorithms- standard search algorithms or dynamic programming

CO-4: Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

CO-5: Outline various uncertainty measures, fuzzy sets and fuzzy logic applications.

UNIT I

Introduction: history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT II

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction.

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT III

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic,

resolution refutation in proportional logic, predicate logic.

UNIT IV

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

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web

UNIT V

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory.

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Text Books:

1) Artificial Intelligence- SarojKaushik, CENGAGE Learning
2) Artificial intelligence, A modern Approach, 2nded, Stuart Russel, Peter Norvig, PEA

Reference Books:

1) Artificial Intelligence- Deepak Khemani, TMH, 2013
2) Introduction to Artificial Intelligence, Patterson, PHI
3) Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5thed, PEA

E-Resources:

1) https://nptel.ac.in/courses/106/105/106105077/
2) http://aima.cs.berkeley.edu/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20CS6E01	PROFESSIONAL ELECTIVE- II 1. CLOUD COMPUTING	3	0	0	3

OBJECTIVES:

• The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud-based software applications on top of cloud platforms.

COURSE OUTCOMES:

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

CO-1: Understanding the key dimensions of the challenge of Cloud Computing

CO-2: Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization

CO-3: Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.

CO-4: Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas.

CO-5: Outline the cloud resource management and scheduling policies.

UNIT -I:

Systems modeling, Clustering and virtualization Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security and Energy Efficiency

UNIT- II:

Virtual Machines and Virtualization of Clusters and Data Centers Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT- III:

Cloud Platform Architecture Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT -IV:

Cloud Programming and Software Environments Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

UNIT- V:

Cloud Resource Management and Scheduling Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines.

TEXT BOOKS:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands-on approach, Arshadeep Bahga, Vijay Madisetti, University Press

REFERNCE BOOKS:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH

E-Resources:

1. https://archive.nptel.ac.in/courses/106/105/106105167/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20CS6E02	PROFESSIONAL ELECTIVE-II 2. BIG DATA ANALYTICS	3	0	0	3

Course Objectives:

- To optimize business decisions and create competitive advantage with Big Data analytics
- To learn to analyze the big data using intelligent techniques
- To introduce programming tools PIG & HIVE in Hadoop echo system

Course Outcomes:

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

CO-1: Illustrate big data challenges in different domains including social media, transportation, finance and medicine

CO-2: Use various techniques for mining data stream

CO-3: Design and develop Hadoop

CO-4: Identify the characteristics of datasets and compare the trivial data and big data for various applications

CO-5: Explore the various search methods and visualization techniques

UNIT I

Introduction: Introduction to big data: Introduction to Big Data Platform, Challenges of Conventional Systems, Intelligent data analysis, Nature of Data, Analytic Processes and Tools, Analysis vs Reporting.

UNIT II

Stream Processing: Mining data streams: Introduction to Streams Concepts, Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Oneness in a Window, Decaying Window, Real time Analytics Platform (RTAP) Applications, Case Studies - Real Time Sentiment Analysis - Stock Market Predictions.

UNIT III

Introduction to Hadoop: Hadoop: History of Hadoop, the Hadoop Distributed File System, Components of Hadoop Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Design of HDFS, Java interfaces to HDFS Basics, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run, Failures, Job Scheduling, Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features Hadoop environment.

UNIT IV

Frameworks and Applications: Frameworks: Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL, Querying Data in Hive, fundamentals of HBase and ZooKeeper.

UNIT V

Predictive Analytics and Visualizations: Predictive Analytics, Simple linear regression, Multiple linear regression, Interpretation of regression coefficients, Visualizations, Visual data analysis techniques, interaction techniques, Systems and application.

Text Books:

1) Tom White, "Hadoop: The Definitive Guide", Third Edition, O'reilly Media, Fourth Edition, 2015.
2) Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill Publishing, 2012.
3) Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP, 2012

Reference Books:

1) Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley& sons, 2012.
2) Paul Zikopoulos, DirkdeRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, "Harness the Power of Big Data: The IBM Big Data Platform", Tata McGraw Hill Publications, 2012.
3) Arshdeep Bahga and Vijay Madisetti, "Big Data Science & Analytics: A Hands On Approach ", VPT, 2016.
4) Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley & Sons, 2014.

E-Resources:

1. https://archive.nptel.ac.in/courses/106/104/106104189/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20CS6E03	PROFESSIONAL ELECTIVE- II 3. MACHINE LEARNING	3	0	0	3

Course Objectives:

The course is introduced for students to

- Gain knowledge about basic concepts of Machine Learning
- Study about different learning algorithms
- Learn about of evaluation of learning algorithms
- Learn about Dimensionality reduction

Course Outcomes:

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

CO-1: Identify machine learning techniques suitable for a given problem
CO-2: Solve the problems using various machine learning techniques
CO-3: Apply Dimensionality reduction techniques
CO-4: Design application using machine learning techniques.
CO-5: Develop solutions for decision problems using Bayesian and instance-based learning.

UNIT I

Introduction: Definition of learning systems, Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation.

Inductive Classification: The concept learning task, Concept learning as search through a hypothesis space, General-to-specific ordering of hypotheses, finding maximally specific hypotheses, Version spaces and the candidate elimination algorithm, learning conjunctive concepts, the importance of inductive bias.

UNIT II

Decision Tree Learning: Representing concepts as decision trees, Recursive induction of decision trees, Picking the best splitting attribute: entropy and information gain, searching for simple trees and computational complexity, Occam's razor, Over fitting, noisy data, and pruning.

Experimental Evaluation of Learning Algorithms: Measuring the accuracy of learned hypotheses.

Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.

UNIT III

Computational Learning Theory: Models of learnability: learning in the limit;

probably approximately correct (PAC) learning. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension.

Rule Learning: Propositional and First-Order, translating decision trees into rules, Heuristic rule induction using separate and conquer and information gain, First-order Horn-clause induction (Inductive Logic Programming) and Foil, Learning recursive rules, Inverse resolution, Golem, and Progol.

UNIT IV

Artificial Neural Networks: Neurons and biological motivation, linear threshold units. Perceptrons: representational limitation and gradient descent training, Multilayer networks and back propagation, Hidden layers and constructing intermediate, distributed representations. Over fitting, learning network structure, recurrent networks.

Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.

UNIT V

Bayesian Learning: Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logisitic regression. Bayes nets and Markov nets for representing dependencies.

Instance-Based Learning: Constructing explicit generalizations versus comparing to past specific examples. K-Nearest-neighbor algorithm. Case-based learning.

Text Books:

1) T.M. Mitchell, “Machine Learning”, McGraw-Hill, 1997.
2) Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

Reference Books:

1) Ethern Alpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2) Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
3) Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Oreilly.

E-Resources:

1) Andrew Ng, “Machine Learning Yearning”
https://www.deeplearning.ai/machine-learning- yearning/
2) ShaiShalev-Shwartz ,Shai Ben-David, “Understanding Machine Learning: From Theory to Algorithms” , Cambridge University Press
https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20CS6E04	PROFESSIONAL ELECTIVE-II 4. NETWORK PROGRAMMING	3	0	0	3

Course Objectives:

- To understand to Linux utilities
- To understand file handling, signals
- To understand IPC, network programming in Java
- To understand processes to communicate with each other across a Computer Network

Course Outcomes:

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

CO-1: Demonstrate functional layering of network software architectures
CO-2: Write your own socket-based network application programs
CO-3: Apply software tools for network troubleshooting
CO-4: Acquire the knowledge of Shared Memory concepts
CO-5: Demonstrate the concepts of Files and Signals

UNIT I

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking utilities, Filters, Text processing utilities and Backup utilities. Bourne again shell(bash) – Introduction, pipes and redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples. Review of C programming concepts-arrays, strings (library functions), pointers, function pointers,
structures, unions, libraries in C.

UNIT II

Files-File Concept, File types File System Structure, Inodes, File Attributes, file I/O in C using system calls, kernel support for files, file status information-stat family, file and record locking-lockf and fcntl functions, file permissions-chmod fchmod,\ file ownership-chown, lchown , fchown, links-soft links and hard links – sym link, link, unlink. File and Directory management – Directory contents, Scanning Directories-Directory file APIs. Process- Process concept, Kernel support for process, process attributes, process control – process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process.

UNIT III

Signals- Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions. Inter process Communication – Introduction to IPC mechanisms, Pipes- creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs(Named pipes),differences between unnamed and named pipes, popen and pclose library functions, Introduction to message queues, semaphores and shared memory. Message Queues- Kernel support for messages, UNIX system V APIs for messages, client/server example. Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores.

UNIT IV

Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, client/server example. Network IPC – Introduction to Unix Sockets, IPC over a network, Client-Server model ,Address formats(Unix domain and Internet domain), Socket system calls for Connection Oriented – Communication, Socket system calls for Connectionless-Communication, Example-Client/Server Programs- Single Server-Client connection, Multiple simultaneous clients, Socket options – setsockopt, getsockopt, fcntl.

UNIT V

Network Programming in Java-Network basics, TCP sockets, UDP sockets (datagram sockets), Server programs that can handle one connection at a time and multiple connections (using multithreaded server), Remote Method Invocation (Java RMI)-Basic RMI Process, Implementation details-Client- Server Application.

Text Books:

1) Unix System Programming using C++, T.Chan, PHI.(Units II,III,IV)
2) Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.(Unit I)
3) An Introduction to Network Programming with Java, Jan Graba, Springer, rp 2010.(Unit V)
4) Unix Network Programming, W.R. Stevens, PHI.(Units II,III,IV)
5) Java Network Programming,3rd edition, E.R. Harold, SPD, O'Reilly.(Unit V)

Reference Books:

1) Linux System Programming, Robert Love, O'Reilly, SPD.
2) Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.
3) UNIX for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson

Education.
4) Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
5) Unix Network Programming The Sockets Networking API, Vol.-I,W.R.Stevens, Bill Fenner, A.M.Rudoff, Pearson Education.
6) Unix Internals, U.Vahalia, Pearson Education.

E-Resources:

1. https://archive.nptel.ac.in/courses/106/105/106105183/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20CS6E05	PROFESSIONAL ELECTIVE-II 5. Internet of Things	3	0	0	3

Course Objectives:

• Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem

• Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc)

• Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming)

• Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

Course Outcomes:

CO-1: Describe the usage of the term 'the internet of things' in different contexts

CO-2: Discover the various network protocols used in IoTand familiar with the key wireless technologies used in IoT systems, such as Wi-Fi, 6LoWPAN, Bluetooth and ZigBee

CO-3: Define the role of big data, cloud computing and data analytics in a typical IoT system Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software

CO-4: Build and test a complete working IoT system.

UNIT I

The Internet of Things: An Overview of Internet of Things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles For Connected Devices.

UNIT II

Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability.

UNIT III

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT IV

Data link layer of IoT, Wireless Communication Technologies, Wired Communication Technologies, Manet Networks: Network Layer of IoT, 6lowPAN adaptation layer for devices with limited resources, Dynamic routing protocols for wireless adhoc networks Communication protocols for IoT, Service oriented protocol(COAP), Communication protocols based on the exchange of messages(MQTT), Service discovery protocols.

UNIT V

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/ Services/ Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

Text Books:

1) Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education.
2) Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015.

Reference Books:

1) An Introduction to Internet of Things, Connecting devices, Edge Gateway and Cloud with Applications, Rahul Dubey, Cengage, 2019.
2) IoT Fundamentals, Networking Technologies, Protocols and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetette, rob Barton, Jerome Henry, CISCO, Pearson, 2018.
3) Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley.

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20GE6M01	INTELLECTUAL PROPERTY RIGHTS AND PATENTS (IPR& P)	2	0	0	0

Course Objectives:

- To know the importance of Intellectual property rights, which plays a vital role in Advanced Technical and Scientific disciplines.

- Imparting IPR protections and regulations for further advancement, so that the Students can familiarize with the latest developments.

Course Outcomes:

CO-1: Identify different types of intellectual property rights may be prescribed by an output with supporting agencies internationally.
CO-2: Explain the ways to protect literary and artistic works of the authors.
CO-3: Illustrate the process of registering innovative products i.e., Patents
CO-4: Analyze the ways to maintain of Trade Marks
CO-5: Suggest the ways to protect trade secrets in the organizations Explain different laws available related to cybercrimes.

UNIT – I: Introduction to Intellectual property:

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II: Law of Copyrights:

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

UNIT – III: Law of Patents:

Foundation of patent law, patent searching process, ownership rights and transfer. Patent litigation. Dilution of patent rights, patent registration.

UNIT – IV: Trade Marks:

Purpose and function of trademarks, acquisition of trade mark rights, protectable matter (strength and categories of trade marks), selecting, and evaluating trade mark, trade mark registration processes.

UNIT - V: Trade Secrets and Cyber law:

Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, and protection for submission, trade secretes

litigation. Introduction to Cyber Law – Information Technology Act 2000 & Cyber Crimes & its types.

Real time examples must be added to the concepts requires.

REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, Cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, Prabuddha Ganguli, Tata Mc- Graw Hill Publishing Company Ltd.
3. Kompal Bansal & Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
4. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.

E-Resources:

https://archive.nptel.ac.in/courses/110/105/110105139/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20CS6L01	CRYPTOGRAPHY AND NETWORK SECURITY LAB	0	0	3	1.5

Course Objectives:

- The concepts of classical encryption techniques and concepts of finite fields and number theory.
- Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms.
- Design issues and working principles of various authentication protocols, PKI standards.

Course Outcomes:

- Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
- Apply different digital signature algorithms to achieve authentication and create secure applications

List of Experiments:

1) Write a C program that contains a string (char pointer) with a value 'Hello world'.The program should XOR each character in this string with 0 and displays the result.
2) Write a C program that contains a string (char pointer) with a value 'Hello world'.The program should AND or and XOR each character in this string with 127 and display the result.
3) Write a Java program to perform encryption and decryption using the following algorithms:
   a. Ceaser cipher b. Substitution cipher
4) Write a C/JAVA program to implement the DES algorithm logic.
5) Write a C/JAVA program to implement the Blowfish algorithm logic.
6) Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world"using Blowfish. Create your own key using Java key tool.
7) Write a Java program to implement RSA algorithm.
8) Implement the Diffie-Hellman Key Exchange mechanism using HTML andJavaScript.
9) Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
10) Calculate the message digest of a text using the MD5 algorithm in JAVA.

E-Resources:

1) https://www.geeksforgeeks.org/caesar-cipher-in-cryptography/
   https://www.javatpoint.com/hill-cipher-program-in-java

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20CS6L02	COMPILER DESIGN LAB	0	0	3	1.5

Course Objectives:

To enlighten the student with knowledge base in compiler design and its applications

Course Outcomes:

Demonstrate a working understanding of the process of lexical analysis, parsing and other compiler design aspects.

Lab Experiments:

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines
2. Simulate First and Follow of a Grammar.
3. Develop an operator precedence parser for a given language.
4. Construct a recursive descent parser for an expression.
5. Construct a LL(1) parser for an expression
6. Design predictive parser for the given language
7. Implementation of shift reduce parsing algorithm.
8. Design a LALR bottom-up parser for the given language.
9. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools
10. Write a program to perform loop unrolling.
11. Convert the BNF rules into YACC form and write code to generate abstract syntax tree.
12. Write a program for constant propagation.

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20CS6L03	**Artificial Intelligence Lab Using Python**	**0**	**0**	**3**	**1.5**

Course Objectives:

- Study the concepts of Artificial Intelligence
- Learn the methods of solving problems using Artificial Intelligence
- Introduce the concepts of machine learning

Course Outcomes:

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

CO-1: Identify problems that are amenable to solution by AI methods
CO-2: Identify appropriate AI methods to solve a given problem
CO-3: Use language/framework of different AI methods for solving problems
CO-4: Implement basic AI algorithms
CO-5: Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports

Experiments:

1) Study of Prolog.
2) Write simple fact for the statements using PROLOG.
3) Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing
4) Write a program to solve the Monkey Banana problem.
5) Write a program in turbo prolog for medical diagnosis and show the advantage and disadvantage of green and red cuts
6) Write a program to implement factorial, Fibonacci of a given number
7) Write a program to solve 4-Queen and 8-puzzle problem.
8) Write a program to solve traveling salesman problem.
9) Write a program to solve water jug problem using LISP
10) Implementation of A* Algorithm using LISP /PROLOG
11) Implementation of Hill Climbing Algorithm using LISP /PROLOG
12) Implementation of DFS and BFS for water jug problem using LISP /PROLOG
13) Implementation of Towers of Hanoi Problem using LISP /PROLOG

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E01	PROFESSIONAL ELECTIVE-III 1. MOBILE COMPUTING	3	0	0	3

Course Objectives:

- To study the emerging technologies in the context of wireless networks
- To understand the mobile computing environment
- To learn about pervasive computing environment

Course Outcomes:

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

CO-1: Interpret Wireless local area networks (WLAN): MAC design principles, 802.11 WIFI

CO-2: Discuss fundamental challenges in mobile communications and potential Techniques in GSM

CO-3: Demonstrate Mobile IP in Network layer

CO-4: Illustrate different data delivery methods and synchronization protocols

CO-5: Develop applications that are mobile-device specific and demonstrate current Practice in mobile computing contexts.

UNIT I

Mobile Communications: An Overview- Mobile Communication-guided transmission, unguided transmission- signal propagation frequencies, antennae, modulation, modulation methods and standards for voice-oriented data communication standards, modulation methods and standards for data and voice communication, mobile computing- novel applications and limitations, mobile computing architecture, mobile system networks.

Mobile devices and systems: Cellular networks and frequency reuse, Mobile smart phones, Smart mobiles and systems, handheld pocket computers, Handheld devices, Smart systems, Limitations of mobile devices.

UNIT II

GSM and other 2G Architectures: GSM-services and system architecture, Radio interfaces of GSM, Protocols of GSM, Localization, Call handling, GPRS system architecture. Wireless medium access control, CDMA, 3G, 4G and 5G Communication: Modulation, Multiplexing, Controlling the medium access, Spread spectrum, Coding methods, IMT-20003G wireless communication standards, WCDMA3G communication standards, CDMA 3G communication standards, Broadband wireless access, 4G networks, 5G Networks.

UNIT III

Mobile IP Network layer: IP and Mobile IP network layers: OSI layer functions, TCP/IP and Internet protocol, Mobile internet protocol; Packet delivery and Handover Management; Location Management: Agent Discovery; Mobile TCP Introduction to Mobile Adhoc network: fixed infrastructure architecture, MANET infrastructure architecture; MANET: properties, spectrum, applications; Security in Ad-hoc network; Wireless sensor networks; sensor network applications.

UNIT IV

Synchronization: Synchronization in mobile computing systems, Usage models for Synchronization in mobile application, Domain-dependent specific rules for data synchronization, Personal information manager, synchronization and conflict resolution strategies, synchronizer; Mobile agent: mobile agent design, aglets; Application Server.

UNIT V

Mobile Wireless Short Range Networks and Mobile Internet: Wireless networking and wireless LAN, Wireless LAN (WLAN) architecture, IEEE 802.11protocol layers, Wireless application protocol(WAP)-WAP1.1 architecture, wireless datagram protocol (WDP), Wireless Transport Layer Security (WTLS), wireless transaction and session layers, wireless application environment.

Text Books:

1) Mobile Computing, 2nd edition, Raj kamal, Oxford,2011
2) Mobile Computing, Technology Applications and Service Creation, 2nd Edition, Asoke K Talukder, Hasanahmed, Roopa R Yavagal, McGraw Hill,2017

Reference Books:

1) “Principles of Mobile Computing,” 2nd Edition, UWE Hansmann, LotherMerk, Martin S.
Nocklous, Thomas Stober, Springer.2003

E-Resources:

1) https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

Course Code	Course Name	L	T	P	C
20CS7E02	PROFESSIONAL ELECTIVE- III 2. NEURAL NETWORKS AND SOFT COMPUTING	3	0	0	3

Course Objectives:

- To have a detailed study of neural networks, Fuzzy Logic and uses of Heuristics based on human experience.
- To Familiarize with Soft computing concepts.
- To introduce the concepts of genetic algorithm and its applications to soft computing using some applications

Course Outcomes:

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

CO-1: Identify and describe soft computing techniques and their roles in building intelligent machines.

CO-2: Recognize the feasibility of applying a soft computing methodology for a particular problem.

CO-3: Elaborate various Learning Algorithms used in neural networks.

CO-4: Outline fuzzy set operations and compare them with classical sets.

CO-5: Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.

UNIT I:

INTRODUCTION: what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural

UNIT II:

LEARNING PROCESS: Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT III:

CLASSICAL & FUZZY SETS: Introduction to classical sets – properties, operations and relations; Fuzzy sets – memberships, uncertainty, operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT IV:

FUZZY LOGIC SYSTEM COMPONENTS: Fuzzification, Membership value assignment,

development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods

UNIT V:

CONCEPT LEARNING: Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm

DECISION TREE LEARNING: Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning

TEXT BOOKS:

1. Neural networks A comprehensive foundations, Simon Hhaykin, Pearson Education 2nd edition 2004
2. Neural Networks, Fuzzy Logic, Genetic Algorithms: Sysnthesis and Applications by Rajasekharan and Pai, PHI Publications
3. Machine Learning, Tom M. Mitchell, MGH

REFERENCE BOOKS:

1. Principles of Soft Computing, Deepa, S.N.S.S.N, Wiley india private limited, 2007.
2. Introduction to Soft Commputing: Neuro-Fuzzy and Genetic Algorithms, Samir Roy, Udit Chakraborty, Pearson India.

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/106/105/106105173/
2. https://nptel.ac.in/courses/117105084

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E03	Professional Elective- III 3. Ad-hoc and Sensor Networks	3	0	0	3

Course Objectives:

From the course the student will learn

- Architect sensor networks for various application setups
- Devise appropriate data dissemination protocols and model links cost
- Understanding of the fundamental concepts of wireless sensor networks and has a basic knowledge of the various protocols at various layers
- Evaluate the performance of sensor networks and identify bottlenecks

Course Outcomes:

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

CO-1: Evaluate the principles and characteristics of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks

CO-2: Determine the principles and characteristics of wireless sensor networks

CO-3: Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc sensor networks

CO-4: Illustrate the various sensor network Platforms, tools and applications

CO-5: Demonstrate the issues and challenges in security provisioning and also familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs

UNIT I

Introduction to Ad Hoc Wireless Networks- Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet, MAC protocols for Ad hoc Wireless Networks-Issues, Design Goals and Classifications of the MAC Protocols.

UNIT II

Routing Protocols for Ad Hoc Wireless Networks- Issues in Designing a Routing Protocol, Classifications of Routing Protocols, Topology-based versus Position-based Approaches, Issues and design goals of a Transport layer protocol, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Solutions for TCP over Ad Hoc Wireless Networks, Other Transport layer protocols.

UNIT III

Security protocols for Ad hoc Wireless Networks- Security in Ad hoc Wireless

Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT IV

Basics of Wireless Sensors and Applications- The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High- level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT V

Security in WSNs- Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Sensor Network Hardware-Components of Sensor Mote, Sensor Network Operating Systems–TinyOS, LA-TinyOS, SOS, RETOS, Imperative Language-nesC, Dataflow Style Language- TinyGALS, Node-Level Simulators, NS-2 and its sensor network extension, TOSSIM.

Text Books:

1) Ad Hoc Wireless Networks – Architectures and Protocols, C. Siva Ram Murthy, B. S. Murthy, Pearson Education, 2004.
2) Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P.Aggarwal, World Scientific Publications / Cambridge University Press, March 2006.
3) Wireless Sensor Networks – Principles and Practice, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010.

Reference Books:

1) Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009.
2) Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008.
3) Ad hoc Networking, Charles E.Perkins, Pearson Education, 2001.
4) Wireless Ad hoc Networking, Shih-Lin Wu, Yu-Chee Tseng, Auerbach Publications, Taylor & Francis Group, 2007.

E-Resources:

1. https://archive.nptel.ac.in/courses/106/105/106105160/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

Course Code	Course Name	L	T	P	C
20CS7E04	PROFESSIONAL ELECTIVE- III 4. DEEP LEARNING TECHNIQUES	3	0	0	3

Course Objectives:

- Demonstrate the major technology trends driving Deep Learning
- Build, train and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyper parameters in a neural network's architecture

Course Outcomes:

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

CO-1: Demonstrate the mathematical foundation of neural network
CO-2: Describe the machine learning basics
CO-3: Differentiate architecture of deep neural network
CO-4: Build a convolutional neural network
CO-5: Build and train RNN and LSTMs

UNIT I

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.

Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory.

Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

UNIT II

Machine Learning: Basics and Under fitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning.

Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

UNIT III

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning,

Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier.

Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

UNIT IV

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

UNIT V

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

Text Books:

1) Ian Goodfellow, YoshuaBengio, Aaron Courville, “Deep Learning”, MIT Press,2016.
2) Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017.

Reference Books:

1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O’Reilly, Shroff Publishers, 2019.
2) Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O’Reilly, Shroff Publishers, 2019.

E-Resources:

1) https://keras.io/datasets/
2) http://deeplearning.net/tutorial/deeplearning.pdf
3) https://arxiv.org/pdf/1404.7828v4.pdf

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E05	PROFESSIONAL ELECTIVE- III 5. INFORMATION RETRIEVAL SYSTEM	3	0	0	3

COURSE OBJECTIVES

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

COURSE OUTCOMES

CO-1: Identify basic theories in information retrieval systems
CO-2: Identify the analysis tools as they apply to information retrieval systems
CO-3: Understand the problems solved in current IR systems
CO-4: Describe the advantages of current IR systems
CO-5: Understand the difficulty of representing and retrieving documents.

UNIT - I:

Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms

UNIT- II:

Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

UNIT -III:

Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT- IV:

New Indices for Text: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

UNIT- V:

Stemming Algorithms: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files.

TEXT BOOK:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2 Modern Information Retrieval by Yates Pearson Education.
3 Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.

REFERENCES:

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. Information retrieval Algorithms and Heuristics, 2ed, Springer

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E06	PROFESSIONAL ELECTIVE-IV 1. DISTRIBUTED SYSTEMS	3	0	0	3

Course Objectives:

- To understand the foundations of distributed systems.
- To learn issues related to availability of facilities for data transmission, IPC Mechanism.
- To learn distributed Objects and Remote Invocation and the operating system layer Protection.
- To understand the significance Distributed System File Service Architecture, Characteristics of peer-to-peer Systems, Group Communication & concurrency in Distributed System.
- To learn the Mutual exclusion and deadlock detection algorithms.

Course Outcomes:

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

CO-1: Elucidate the foundations and issues of distributed systems

CO-2: Illustrate the various Interposes Communication techniques and Message ordering.

CO-3: Understand the concepts of Distributed Objects and Remote Invocation Techniques.

CO-4: Describe the Distributed File systems and the features of peer-to-peer System.

CO-5: Illustrate the Mutual Exclusion and Deadlock detection algorithms in distributed systems.

UNIT I

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

UNIT II

Inter process Communication: Introduction, The API for the Internet Protocols- The Characteristics of Inter process communication, Sockets, UDP Datagram Communication, TCP Stream Communication, Client-Server Communication.

Message Ordering & Snapshots: Message ordering and group communication, Group communication, Causal order (CO), Total order.

UNIT III

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects-Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications.

Operating System Support: Introduction, the Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

UNIT IV

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays. Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

UNIT V

Distributed Mutex & Deadlock: Distributed mutual exclusion algorithms: Introduction – Preliminaries – Lamport's algorithm – Ricart- Agrawala algorithm – Maekawa's algorithm – Suzuki–Kasami's broadcast algorithm.

Deadlock detection in distributed systems: Introduction – System model – Preliminaries – Models of deadlocks – Knapp's classification – Algorithms for the single resource model, the AND model and the OR model.

Text Books:

1) Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore and Tim Kindberg, Fifth Edition, Pearson Education, 2012.
2) Distributed computing: Principles, algorithms, and systems, Ajay D Kshemkalyani and MukeshSinghal, Cambridge University Press, 2011.

Reference Books:

1) Distributed Operating Systems: Concepts and Design, Pradeep K Sinha, Prentice Hall of India, 2007.
2) Advanced concepts in operating systems. MukeshSinghal and Niranjan G. Shivaratri, McGraw-Hill, 1994.
3) Distributed Systems: Principles and Paradigms, Tanenbaum A.S., Van Steen M.,Pearson Education, 2007.

E-Resources:

1)https://nptel.ac.in/courses/106/106/106106168/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E07	PROFESSIONAL ELECTIVE- IV 2. SOCIAL NETWORKS & SEMANTIC WEB	3	0	0	3

Course Objectives:

- To understand semantic web
- To understand the role of ontology and inference engines in semantic web

Course Outcomes:

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

CO-1: demonstrate knowledge and be able to explain the three different "named" generations of the web.

CO-2: demonstrate the ability to anticipate materially in projects that develop programs relating to Web applications and the analysis of Web data.

CO-3: be able to understand and analyze key Web applications including search engines and social networking sites.

CO-4: be able to understand and explain the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.

CO-5: be able to develop "linked data" applications using Semantic Web technologies.

UNIT-I:

The Semantic web: Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

UNIT-II:

Social Network Analysis: What is network analysis?, Development of Social Network Analysis, Key concepts and measures in network analysis.

Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks.

UNIT-III:

Knowledge Representation on the Semantic Web: Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

UNIT-IV:

Modeling and Aggregating Social Network Data: State of the art in network data representation, Ontological representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

UNIT-V:

Developing social semantic applications: Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

Text Book:

1. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.
2. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer, Paul Warren, John Wiley & Sons.

Reference Books:

1. Semantic Web and Semantic Web Services –Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
2. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications

E-Resources:

1. https://archive.nptel.ac.in/courses/106/106/106106169/
2. https://nptel.ac.in/courses/106105078

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E08	PROFESSIONAL ELECTIVE- IV 3. COMPUTER VISION	3	0	0	3

Course Objectives:

- Understanding basic concepts of image processing and their development.
- Knowledge of various configurations of image processing techniques used in industry, role in industry
- To know the application areas

Course Outcomes:

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

CO-1: To implement fundamental image processing techniques required for computer vision
CO-2: Understand Image formation process
CO-3: To perform shape analysis
CO-4: Extract features form Images and do analysis of Images
CO-5: To develop applications using computer vision techniques

UNIT I

Introduction: Image Processing, Computer Vision and Computer Graphics, what is Computer Vision - Low-level, Mid-level, High-level, Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia, Virtual Reality and Augmented Reality.

UNIT II

Image Formation Models: Monocular imaging system, Radiosity: The 'Physics' of Image Formation, Radiance, Irradiance, BRDF, color etc, orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination. shape from shading, Photometric Stereo, Depth from Defocus, Construction of 3D model from images.

UNIT III

Shape Representation and Segmentation: Contour based representation, Region based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multi resolution analysis.

UNIT IV

Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching Principal component analysis, Shape priors for recognition Image Understanding: Pattern recognition methods, HMM, GMM and EM.

UNIT V

Applications: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters –Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

Text Books:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.

Reference Books:

1. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
2. D. H. Ballard, C. M. Brown. Computer Vision.Prentice-Hall, Englewood Cliffs, 1982.
3. Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA). Springer, 2010
4. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
5. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
6. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012
7. Mark Nixon and Alberto S. Aquado, Feature Extraction & Image Processing for Computer Vision, Third Edition, Academic Press, 2012.

E-Resources:

1. https://www.digimat.in/nptel/courses/video/108103174/L19.html

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VI

Course Code	Course Name	L	T	P	C
20CS7T09	PROFESSIONAL ELECTIVE- IV 5. GAME THEORY	3	0	0	3

OBJECTIVES:

- To familiarize with the process of game design and development
- To learn the processes, mechanics, issues in game design
- To understand the architecture of game programming
- To know about game engine development, modeling, techniques and frameworks.

OUTCOME:

Upon completion of the course, the students will:

CO-1: Develop basic gaming problems
CO-2: Develop game programming skills
CO-3: Understand gaming engine design
CO-4: Create interactive games
CO-5: Apply solution concepts to examples of games and explain them precisely.

UNIT I - INTRODUCTION

Elements of Game Play – Artificial Intelligence – Getting Input from the Player - Sprite Programming – Sprite Animation - Multithreading – Importance of Game Design – Game Loop.

UNIT II - 3D GRAPHICS FOR GAME PROGRAMMING

Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces.

UNIT III - GAME DESIGN PRINCIPLES

Character Development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding, Case study : Tetris.

UNIT IV - GAMING ENGINE DESIGN

Renderers, Software Rendering, Hardware Rendering, and Controller Based Animation, Spatial Sorting, Level of Detail, Collision Detection, Standard Objects, and Physics, Case study : The Sims

UNIT V - GAME DEVELOPMENT

Developing 2D and 3D Interactive Games Using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle Games, Single Player Games, Multi-Player Games. Case study: Mine craft.

TEXT BOOKS:

1. David H. Eberly, —"3D Game Engine Design: A Practical Approach to Real-Time Computer Graphics", Second Edition, Morgan Kaufmann, 2010.
2. Jung Hyun Han, —"3D Graphics for Game Programming", First Edition, Chapman and Hall/CRC, 2011.

REFERENCES:

1 Jonathan S. Harbour, —Beginning Game Programming, Course Technology, Third Edition PTR, 2009.
2. Ernest Adams and Andrew Rollings, —Fundamentals of Game Design, Third Edition, Pearson Education, 2014.
3. Scott Rogers, —Level Up: The Guide to Great Video Game Design, First Edition, Wiley, 2010.
4. Jim Thompson, Barnaby Berbank-Green, and Nic Cusworth, —Game Design: Principles, Practice, and Techniques - The Ultimate Guide for the Aspiring Game Designer, First
Edition, Wiley, 2008.

E-Resources:

https://nptel.ac.in/courses/110104063

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E11	PROFESSIONAL ELECTIVE- V 1. BLOCK CHAIN TECHNOLOGIES	3	0	0	3

Course Objectives:

By the end of the course, students will be able to

- Understand how block chain systems (mainly Bit coin and Ethereum) work and to securely interact with them,
- Design, build, and deploy smart contracts and distributed applications
- Integrate ideas from block chain technology into their own projects.

Course Outcomes:

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

CO-1: At the end of the course, student will be able to

CO-2: Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.

CO-3: Identify the risks involved in building Block chain applications.

CO-4: Review of legal implications using smart contracts.

CO-5: Choose the present landscape of Blockchain implementations and Understand Crypto currency markets

UNIT I

Introduction: Scenarios, Challenges Articulated, Blockchain, Blockchain Characteristics, Opportunities Using Blockchain, History of Blockchain.

Evolution of Blockchain: Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Blockchain Evolution, Consortia, Forks, Public Blockchain Environments, Type of Players in Blockchain Ecosystem, Players in Market.

UNIT II

Blockchain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on blockchain, data storage on blockchain, wallets, coding on blockchain: smart contracts, peer-to-peer network, types of blockchain nodes, risk associated with blockchain solutions, life cycle of blockchain transaction.

UNIT III

Architecting Blockchain solutions: Introduction, Obstacles for Use of Blockchain, Blockchain Relevance Evaluation Framework, Blockchain Solutions Reference

Architecture, Types of Blockchain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Blockchain Solutions, Architecture Considerations, Architecture with Blockchain Platforms, Approach for Designing Blockchain Applications.

UNIT IV

Ethereum Blockchain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, MyEtherWallet, Ethereum Networks/Environments, Infura, Etherscan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, OpenZeppelin Contracts

UNIT V

Hyperledger Blockchain Implementation, Introduction, Use Case – Car Ownership Tracking, Hyperledger Fabric, Hyperledger Fabric Transaction Flow, FabCar Use Case Implementation, Invoking Chain code Functions Using Client Application. Advanced Concepts in Blockchain: Introduction, Inter Planetary File System (IPFS), Zero-Knowledge Proofs, Oracles, Self-Sovereign Identity, Blockchain with IoT and AI/ML Quantum Computing and Blockchain, Initial Coin Offering, Blockchain Cloud Offerings, Blockchain and its Future Potential.

Text Books:

1) Ambadas, ArshadSarfarzAriff, Sham "Blockchain for Enterprise Application Developers", Wiley
2) Andreas M. Antonpoulos, "Mastering Bitcoin: Programming the Open Blockchain" , O'Reilly.

Reference Books:

1) Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, McGraw Hill.
2) Blockchain: Blueprint for a New Economy, Melanie Swan, O'Reilly.

E-Resources:

1) https://github.com/blockchainedindia/resources

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E12	PROFESSIONAL ELECTIVE- V 2. QUANTUM COMPUTING	3	0	0	3

Course Objectives:

• This course teaches the fundamentals of quantum information processing, including quantum computation, quantum cryptography, and quantum information theory.

Course Outcomes:

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

CO-1: Analyze the behavior of basic quantum algorithms

CO-2: Implement simple quantum algorithms and information channels in the quantum circuit model

CO-3: Simulate a simple quantum error-correcting code

CO-4: Prove basic facts about quantum information channels

CO-5: Demonstrate the knowledge of various quantum computing models

UNIT I

Introduction: Quantum Measurements Density Matrices, Positive-Operator Valued Measure, Fragility of quantum information: Decoherence, Quantum Superposition and Entanglement, Quantum Gates and Circuits.

UNIT II

Quantum Basics and Principles: No cloning theorem & Quantum Teleportation, Bell's inequality and its implications, Quantum Algorithms & Circuits.

UNIT III

Algorithms: Deutsch and Deutsch–Jozsa algorithms, Grover's Search Algorithm, Quantum Fourier Transform, Shore's Factorization Algorithm.

UNIT IV

Performance, Security and Scalability: Quantum Error Correction: Fault tolerance; Quantum Cryptography, Implementing Quantum Computing: issues of fidelity; Scalability in quantum computing.

UNIT V

Quantum Computing Models: NMR Quantum Computing, Spintronics and QED MODEL, Linear Optical MODEL, Nonlinear Optical Approaches; Limits of all the discussed approaches, Future of Quantum computing.

Text Books:

1) Eric R. Johnston, NicHarrigan, Mercedes and Gimeno-Segovia "Programming Quantum Computers: Essential Algorithms And Code Samples, SHROFF/ O'Reilly.
2) Dr. Christine Corbett Moran, Mastering Quantum Computing with IBM QX: Explore the world of quantum computing using the Quantum Composer and Qiskit, Kindle Edition Packt
3) V.K Sahni, Quantum Computing (with CD), TATA McGrawHill.

Reference Books:

1) Chris Bernhardt, Quantum Computing for Everyone (The MIT Press).
2) Michael A. Nielsen and Issac L. Chuang, "Quantum Computation and Information", Cambridge (2002).
3) Riley Tipton Perry, "Quantum Computing from the Ground Up", World Scientific Publishing Ltd (2012).
4) Scott Aaronson, "Quantum Computing since Democritus", Cambridge (2013).
5) P. Kok, B. Lovett, "Introduction to Optical Quantum Information Processing", Cambridge.

E-Resources:

1) https://nptel.ac.in/courses/104104082/
2) https://swayam.gov.in/nd1_noc19_cy31/preview

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E13	PROFESSIONAL ELECTIVE- V 3. ETHICAL HACKING	3	0	0	3

Course Objectives

The objective of this Course is to help the students to master an ethical hacking practice.

Course Outcomes:

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

CO-1: Gain the knowledge of the use and availability of tools to support an ethical hack
CO-2: Gain the knowledge of interpreting the results of a controlled attack
CO-3: Understand the role of politics, inherent and imposed limitations and metrics for planning of a test
CO-4: Comprehend the dangers associated with penetration testing.
CO-5: Acquire the knowledge of defense planning and security policies.

UNIT- I

Introduction: Hacking Impacts, The Hacker Framework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration Information Security Models: Computer Security, Network Security, Service Security, Application Security, Security Architecture Information Security Program: The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking

UNIT - II

The Business Perspective: Business Objectives, Security Policy, Previous Test Results, Business Challenges Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, Timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, Law Enforcement.

UNIT - III

Preparing for a Hack: Technical Preparation, Managing the Engagement Reconnaissance: Social Engineering, Physical Security, Internet Reconnaissance.

UNIT - IV

Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase Exploitation: Intutive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, RootKits,

applications, Wardialing, Network, Services and Areas of Concern

UNIT - V

Deliverable: The Deliverable, the Document, Overal Structure, Aligning Findings, Presentation

Integration: Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy, Conclusion

TEXTBOOK:

1. James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing", Auerbach Publications, CRC Press.

REFERENCE BOOKS:

1. EC-Council, "Ethical Hacking and Countermeasures Attack Phases", Cengage Learning
2. Michael Simpson, Kent Backman, James Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learning.

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/106/105/106105217/

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20CS7E14	PROFESSIONAL ELECTIVE- V 5. PARALLEL ALGORITHMS	3	0	0	3

OBJECTIVES:

- To understand different parallel architectures and models of computation.
- To introduce the various classes of parallel algorithms.
- To study parallel algorithms for basic problems.

OUTCOMES:

Upon completion of this course, the students should be able to

CO-1: Develop parallel algorithms for standard problems and applications.
CO-2: Use message passing Models
CO-3: Analyse efficiency of different parallel algorithms.
CO-4: Understand SIMD Algorithms
CO-5: Apply MIMD Algorithms

UNIT I

INTRODUCTION: Need for Parallel Processing - Data and Temporal Parallelism - Models of Computation - RAM and PRAM Model – Shared Memory and Message Passing Models- Processor Organisations - PRAM Algorithm – Analysis of PRAM Algorithms- Parallel Programming Languages.

UNIT II

PRAM ALGORITHMS: Parallel Algorithms for Reduction – Prefix Sum – List Ranking – Preorder Tree Traversal – Searching -Sorting - Merging Two Sorted Lists – Matrix Multiplication - Graph Coloring - Graph Searching.

UNIT III

SIMD ALGORITHMS -I: 2D Mesh SIMD Model - Parallel Algorithms for Reduction - Prefix Computation - Selection - Odd-Even Merge Sorting - Matrix Multiplication

UNIT IV

SIMD ALGORITHMS -II: Hypercube SIMD Model - Parallel Algorithms for Selection- Odd-Even Merge Sort- Bitonic Sort- Matrix Multiplication Shuffle Exchange SIMD Model - Parallel Algorithms for Reduction -Bitonic Merge Sort - Matrix Multiplication - Minimum Cost Spanning Tree

UNIT V

MIMD ALGORITHMS: UMA Multiprocessor Model -Parallel Summing on

Multiprocessor- Matrix Multiplication on Multiprocessors and Multicomputer - Parallel Quick Sort - Mapping Data to Processors.

TEXT BOOKS:

1. Michael J. Quinn, "Parallel Computing : Theory & Practice", Tata McGraw Hill Edition, Second edition, 2017.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", University press, Second edition , 2011.
3. V Rajaraman, C Siva Ram Murthy, " Parallel computers- Architecture and Programming ", PHI learning, 2016.

REFERENCES

1. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, "Introduction to Parallel Computing", 2nd Edition, Addison Wesley, 2003.
2. M Sasikumar, Dinesh Shikhare and P Ravi Prakash , " Introduction to Parallel Processing", PHI learning , 2013.
3. S.G.Akl, "The Design and Analysis of Parallel Algorithms", PHI, 1989.

E-RESOURCES:

https://nptel.ac.in/courses/106103188

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

SEMESTER -VII

Course Code	Course Name	L	T	P	C
20SH70xx	MANAGEMENT SCIENCE	3	0	0	3

Course Objectives:

- To familiarize with the process of management and to provide basic insight into organizational behavior
- To provide conceptual knowledge on functional management and project management

Course Outcome:

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

CO 1: Apply the concept of Management, Motivational theories, and designing different organizational structures in business organizations.

CO 2: Examine the quality of products using SQC and also maintain Inventory.

CO 3: Analyze different functions of an organization and strategies of product life cycles and channels of distribution

CO 4: Designing project schedules with the help of network analysis.

CO 5: Understanding the essential elements of acceptable organizational behavior.

UNIT - I:

Introduction to Management: Concept–nature and importance of Management –– Generic Functions of Management- Administration vs. Management –Evolution of Management thought-Decision making process- organization structure: Principles of organization & its types.

UNIT - II:

Operations Management: production & its types, plant layout, Work study- method study and work measurement – Statistical Quality Control-Control charts –Simple problems

Material Management: Need for Inventory control- EOQ (simple problems), ABC analysis and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT - III:

Human Resource Management: Concept of HRM, HRD - Functions of HR Manager-types of Wage payment plans – Job Evaluation and Merit Rating - Grievance & redressal mechanism,

Marketing Management: Functions of Marketing– Marketing Mix-Marketing strategies based on product Life Cycle, Channels of distribution.

UNIT - IV:

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path-Probability-Project Crashing (Simple Problems)

UNIT - V:

Organizational behavior:

Attitude & behavior; Leadership styles; motivation- significance, theories; Perception-Perceptual process-Group Dynamics: Types of Groups, Stages of Group Development, Group Behavior and Group Performance Factors.

Text Books

1. Dr.P.VijayaKumar & Dr.N.AppaRao, '*Management Science*' Cengage, Delhi,2 012.
2. Dr.A.R.Aryasri, *Management Science*' TMH 2011.
3. L. M. Prasad, '*Organizational Behavior*' Sultan Chand Publications.

Reference Books:

1. Koontz & Weihrich: 'Essentials *of management*' TMH 2011
2. Anil Bhat & Arya Kumar: Principles of Management, Oxford University Press, New Delhi, 2015.
3. Robbins: Organizational Behavior, Pearson publications, 2011
4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
5. Philip Kotler& Armstrong: Principles of Marketing, Pearson publications
6. K. Aswatappa: 'Human Resource Management – text & cases', TMH.

E-Resources:

1. https://nptel.ac.in/courses/122102007

KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCE(AUTONOMOUS)
Department of Computer Science and Engineering

OPEN ELECTIVES OFFERED TO OTHER DEPARTMENTS	
1.	Computer Graphics
2.	Cloud Computing
3.	Computer Networks
4.	Cryptography and Network Security

Course Code	Course Name	L	T	P	C
20CSXO01	**1. Computer Graphics**		**0**	**0**	**3**

Course Objectives:

- To develop, design and implement two- and three-dimensional graphical structures
- To enable students to acquire knowledge Multimedia compression and animations
- To learn Creation, Management and Transmission of Multimedia objects.

Course Outcome:

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

CO 1: Understand basics and primitives of computer graphics

CO 2: Describe the general software architecture of programs that use 2D computer graphics.

CO 3: Describe the general software architecture of programs that use 3D computer graphics.

CO 4: Know about visible surface detection methods

CO 5: Understanding the essential elements of computer animation behavior.

UNIT I:

Introduction: Application of Computer Graphics, raster scan systems, random scan systems, raster scan display processors.

Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Line derivations and algorithms), mid-point circle and ellipse algorithms.

UNIT II:

Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms. Inside and outside tests.

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms,
transformations between coordinate systems.

UNIT III:

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-

beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT IV:

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces.

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections(Parallel and Perspective).

UNIT V:

Visible surface detection methods: Classification, back-face detection, depthbuffer, scan-line, depth sorting, BSPtree methods, area sub-division and octree methods.

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

TEXT BOOKS:

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson
2. Computer Graphics with Virtual Reality Systems, Rajesh K Maurya, Wiley
3. Introduction to Computer Graphics, Using Java 2D and 3D, Frank Klawonn, Springer
4. Computer Graphics, Steven Harrington, TMH
5. Computer Graphics, Amarendra N Sinha, Arun Udai, TMH.

REFERENCE BOOKS:

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson
2. Computer Graphics, Peter, Shirley, CENGAGE.
3. Principles of Interactive Computer Graphics, Neuman , Sproul, TMH.