



SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JNTUK, Kakinada), (Recognized by AICTE, New Delhi)

UG Programmes CE,CSE,ECE,EEE,IT & ME are Accredited by NBA, Accredited by NAAC with A+

CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204

Estd:1980

Regulation: R20		III / IV - B.Tech. I - Semester							
COMPUTER SCIENCE AND DESIGN									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2021-22 admitted Batch onwards)									
Course Code	Course Name	Category	Cr	L	T	P	Int. Marks	Ext. Marks	Total Marks
B20CS3101	Data Warehousing and Data Mining	PC	3	3	0	0	30	70	100
B20CD3101	Computer Aided Design	PC	3	3	0	0	30	70	100
B20AM3103	Machine Learning	PC	3	3	0	0	30	70	100
#PE-I	Professional Elective -I	PE	3	3	0	0	30	70	100
#OE-I	Open Elective-I	OE	3	3	0	0	30	70	100
B20CS3108	Data Mining Lab	PC	1.5	0	0	3	15	35	50
B20CD3105	Advance Data Structures Lab	PC	1.5	0	0	3	15	35	50
B20HS3102	Soft Skills (Skill Oriented Course)	SOC	2	1	0	2	--	50	50
B20MC3105	Digital Marketing Lab	MC	0	0	0	3	--	--	--
B20CD3106	Summer Internship	PR	1.5	--	--	--	--	50	50
TOTAL			21.5	19	0	8	180	520	700

	Course Code	Course
#PE-I	B20CS3104	Artificial Intelligence
	B20CD3102	Object Oriented Analysis and Design
	B20CD3103	Human Computer Interaction
	B20CD3104	Visual Design and Communication
	B20AM3104	Internet of Things
#OE-I	Student has to study one Open Elective offered by CE or ECE or EEE or ME or S&H from the list enclosed.	

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3101	PC	3	--	--	3	30	70	3 Hrs.

DATA WAREHOUSING AND DATA MINING

(Common to CSE & CSD)

Course Objectives: Students are expected to

1	The data warehouse concepts, architecture and data mining techniques.
2	The types of data, their characteristics, cleaning and transformation of data for analysis.
3	The principles of statistics, information theory, databases, machine learning and other areas for design and implementation of data mining techniques.
4	Association rule mining, classification and clustering techniques.

Course Outcomes: At the end of the course students will be able to

S. No	Outcome	Knowledge Level
1.	Identify the importance of data mining and able to interpret the data.	K3
2	Explain the concepts of data warehousing & OLAP technology and apply data pre processing techniques.	K3
3	Formulate and apply association rule mining algorithms and their performance evaluation metrics on sample datasets.	K3
4	Formulate and apply classification algorithms and their performance evaluation metrics on sample datasets.	K3
5	Apply and compare partitioning, hierarchical, density based and grid based clustering algorithms.	K4

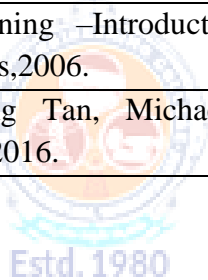
SYLLABUS

UNIT-I (10 Hrs)	<p>Introduction to Data Mining: What is Data Mining? Importance of Data Mining, kinds of Data and Patterns to be Mined, Data Mining Applications, Major Issues in Data Mining.</p> <p>Getting to Know Your Data: Data Objects and Attribute Types, Statistical Descriptions of Data, Estimating Data Similarity and Dissimilarity.</p>
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UNIT-II (10 Hrs)	<p>Data Preprocessing: Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.</p> <p>Data Warehousing and Online Analytical Processing: Basic Concepts of Data warehouse, Data Warehouse Modeling using Data Cube and OLAP, Data warehouse Design and Usage, Data warehouse Implementation.</p>
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UNIT-III (10 Hrs)	<p>Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods: Apriori Algorithm, Association Rule Generation, Improvements to Apriori, FP- Growth Approach, Mining Frequent Itemsets Using Vertical Data Format, Closed and Max Patterns, Pattern Evaluation Methods: Mining in multilevel, multi-</p>
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	dimensional space.
UNIT-IV (10 Hrs)	Classification: Basic Concepts, Decision Tree Induction, Bayes Classification, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy, Advanced Methods: Classification by Back Propagation.
UNIT-V (12 Hrs)	Cluster Analysis: Basic Concepts, Partitioning Methods: K-Means, K-Medoids, Hierarchical Methods: Agglomerative versus Divisive Hierarchical Clustering, Distance Measures in Algorithmic Methods, BIRCH, Density Based Methods: DBSCAN, OPTICS, Grid Based Methods: STING.
Textbook:	
1.	Data Mining Concepts and Techniques by Jiawei Han, Micheline Kamber and Jian Pei –Morgan Kaufmann publishers –3 rd Edition,2012.
Reference Books:	
1.	Introduction to Data Mining, Adriaan, Addison Wesley Publication,2016
2.	Data Mining Techniques, A.K.Pujari, University Press Data mining concepts by Tan, Steinbech, and Vipin Kumar - Pearson Edu publishers,2001.
3.	Data Mining –Introductory and Advanced by Margaret Dunham -- Pearson Education publishers,2006.
4.	Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining, Pearson,2016.



SRKR
ENGINEERING COLLEGE
AUTONOMOUS

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3101	PC	3	--	--	3	30	70	3 Hrs.
COMPUTER AIDED DESIGN								
(For CSD)								
Course Objectives: The objective of the course is to enable students to								
1.	Provide basic foundation in computer aided design							
2.	Understand the fundamentals used to create and manipulate geometric models							
3.	Get acquainted with the basic CAD software designed for geometric modeling							
Course Outcomes: At the end of the course students will be able to								
S. No	Outcome							Knowledge Level
1.	Apply the fundamentals of CAD and Computer Systems							K3
2.	Understand CAD system hardware and software.							K2
3.	Apply geometric modelling techniques for complex part and shape design.							K3
4.	Apply 2D & 3D transformations for part and shape alterations.							K3
5.	Apply the applications of Artificial Intelligence and Expert Systems in CAD							K3
SYLLABUS								
UNIT-I (10Hrs)	Fundamental of CAD Introduction, The CAD system, Reasons for implementing CAD, Design Process, Applications of Computers in Design, Benefits of Computer Aided Design Computer Systems Introduction, Hardware Components, Mass Storage Devices, Input/output Devices.							
UNIT-II (10 Hrs)	CAD System Hardware Introduction, The Design Workstation, Graphics Terminal, Graphics Terminal for CAD, CAD System Configuration CAD System Software Introduction, Functions of a Graphics Package, Operating System, Graphics Standards, Standards for Graphics Programming, Standard for the Exchange of Product Model Data (STEP), Drawing Exchange Format (DXF)							
UNIT-III (10 Hrs)	Geometric Modelling Introduction, Importance of Geometric Modelling, Requirements of Geometric Modelling, Types of Models Wire Frame Modelling: Wire Frame Entities, Representation of Curves, Limitations. Surface Modelling: Introduction, Surface Entities, Surface Representations, Limitations. Solid Modelling: Introduction, Solid Entities, Solid Modelling Techniques, Boundary Representation, Constructive Solid Geometry.							

UNIT-IV (10 Hrs)	Transformation Systems Introduction, Transformation Principles, Two-Dimensional Geometric Transformations: Scaling, Translation, Rotation; Three-Dimensional Geometric Transformations: Scaling, Translation, Rotation, Windowing and Clipping
UNIT-V (10 Hrs)	Artificial Intelligence and Expert System Introduction, Artificial Intelligence in CAD, Applications of AI in Design, Expert Systems, Structure of an Expert System, Development of an Expert System, Knowledge Representation, Inference Engine, Characteristics of an Expert System, Example of Expert Systems, Benefits of Expert System
Textbooks:	
1.	CAD/CAM- Computer Aided Design & Manufacturing, by M.D.Groover & E.W.Zimmer.
2.	CAD / CAM Theory and Practice / Ibrahim Zeid / TMH
Reference Books:	
1.	CAD/CAM by P.N. Rao/TMH.
2.	Computer Aided Design and Manufacturing by K. Lalit Narayan, K. Mallikarjuna Rao, M.M.M.Sarcar.
3.	CAD/CAM/CIM by Radhakrishna, New age international
e-Resources	
1.	https://nptel.ac.in/courses/112102101
2.	https://nptel.ac.in/courses/112104031
3.	https://onlinecourses.swayam2.ac.in/nou20_cs15/preview

Code	Category	L	T	P	C	I.M	E.M	Exam
B20AM3103	PC	3	--	--	3	30	70	3 Hrs.
MACHINE LEARNING								
(Common to AIML & CSD)								
Course Objectives: Students are expected to								
1	Explain the basic concepts and techniques of Machine Learning							
2	Demonstrate regression, classification methods.							
3	Illustrate the concepts of dimensionality reduction, artificial neural networks and reinforcement learning							
4	Show the application of machine learning model evaluation and optimization techniques							
Course Outcomes: At the end of the course students will be able to								
S. No	Outcome							Knowledge Level
1	Explain the concepts of ingredients and preliminaries of machine learning							K2
2	Apply tree models, linear models and distance-based models							K3
3	Identify and construct features and ensemble models							K3
4	Demonstrate the concepts of dimensionality reduction techniques, model evaluation and selection techniques							K3
5	Apply the concepts of artificial neural networks, reinforcement learning							K3
SYLLABUS								
UNIT-I (12 Hrs)	<p>The ingredients of machine learning: Basic concepts, designing a learning system, Issues in machine learning, Types of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning.</p> <p>Preliminaries: The curse of dimensionality, Overfitting, Training, Test and Validation sets, The confusion matrix, The accuracy metrics: Accuracy, sensitivity, specificity, precision, recall, F1 measure, ROC curve, Unbalanced datasets, Naïve Bayes Classifier, Some basic statistics: variance, covariance, bias-variance tradeoff.</p>							
UNIT-II (10 Hrs)	<p>Tree Models: Decision Trees.</p> <p>Distance Based Models: Introduction, Nearest Neighbors classification.</p> <p>Linear Models: The least-squares method: Univariate linear regression, Logistic Regression, Support Vector Machines: Linear SVM Classification, Nonlinear SVM Classification, SVM Regression (Textbook 4)</p>							
UNIT-III (10 Hrs)	<p>Features: Kinds of feature, Feature transformations: Thresholding and discretization, Normalization, Incomplete Features, Feature construction and selection.</p> <p>Model ensembles: Voting Classifier, Bagging, random forests, Boosting: AdaBoost, Gradient Boosting. XGBoost</p>							

UNIT-IV (08 Hrs)	Dimensionality Reduction: PCA, Kernel PCA (Textbook 4), LDA Model Evaluation and Optimization: Cross Validation, Grid Search, Regularization
UNIT-V (10 Hrs)	Neurons, NNs, Linear Discriminants: The Neuron, Neural Networks, The perceptron, Multilayer perceptron's: Going forwards, Going backwards: Backpropagation of error, Multilayer perceptron in practice, Examples of using MLP. Reinforcement Learning: Overview, Example, Markov Decision Process, Uses of Reinforcement Learning
TEXTBOOKS:	
1.	Introduction to Machine Learning, Alpaydin E, MIT Press (2014) 3rd Edition
2.	Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge, 2012
3.	Machine Learning: An algorithmic perspective, Stephen Marsland, 2nd edition, CRC press, 2014.
4.	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, Aurélien Géron, 2nd Edition, O'Reilly Publications, 2019
REFERENCE BOOKS:	
1.	The elements of statistical learning, Data Mining, Inference and Prediction, Trevor Hastie, Robert Tibshirani, Jerome Friedman, Second edition, Springer, 2009.
2.	Machine Learning in Action, Peter Harington, 2012, Cengage.
3.	Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, Tensorflow, Sebastian Raschka, Vahid Mirjalili, Second edition, 2020
Online MOOC Courses:	
1.	"Machine Learning" course by Andrew Ng on Coursera
2.	"Introduction to Machine Learning (IITKGP)" by Prof. Sudeshna Sarkar, on Swayam
3.	"Machine Learning A-Z (Python & R in Data Science Course)" on Udemy
Useful Reference Links:	
1.	"Linear Discriminant Analysis", https://sebastianraschka.com/Articles/2014_python_lda.html
2.	Python Machine Learning Cookbook-Practical Solutions from Preprocessing to Deep Learning, Chris Albon, Oreilly, 2018.
3.	"Principal Component Analysis versus Linear Discriminant Analysis", https://medium.com/analytics-vidhya/illustrative-example-of-principal-component-analysis-pcavs-linear-discriminant-analysis-lda-is-105c431e8907
4.	"A gentle introduction to K-fold cross-validation", https://machinelearningmastery.com/k-fold-cross-validation/
5.	Grid search for model tuning", https://medium.com/analyticsvidhya/illustrative-example-of-principal-component-analysis-pca-vs-linear-discriminant-analysis-lda-is-105c431e8907
6.	"Regularization in Machine Learning", https://towardsdatascience.com/regularization-in-machine-learning76441ddcf99a

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3104	PE	3	--	--	3	30	70	3Hrs.
ARTIFICIAL INTELLIGENCE								
(Common to CSE & CSD)								
Course Objectives: Students are expected to								
1.	Know the methodology of Problem solving							
2.	Implement basic AI algorithms							
3.	Design and carry out an empirical evolution of different algorithms on a problem formalization							
Course Outcomes: Students will be able to								
S. No	Outcome							Knowledge Level
1.	Summarize different AI problems, characteristics and state space representation							K2
2.	Apply heuristic, uninformed and informed search strategies for solving AI problems.							K3
3.	Apply AI problem solving approaches to propositional and predicate logic and uncertainty							K3
4.	Interpret the given facts to different knowledge representational schemes, Prolog							K3
5.	Summarize NLP, Planning and development of Expert systems.							K3
SYLLABUS								
UNIT-I (10Hrs)	Introduction to Artificial Intelligence: what is Artificial Intelligence, AI Problems Defining the Problem as a State Space Search-Water jug problem, 8-puzzleproblem, Travelling Salesmen Problem, Turing Test, Production Systems, Problem Characteristics, Production System Characteristics.							
UNIT-II (10Hrs)	Search Techniques: Heuristic Search Techniques: Generate-And-Test, Hill Climbing, Problem Reduction, AO*Algorithm, Constraint Satisfaction, Means-Ends Analysis. Uninformed search-BFS & DFS, Informed Search algorithms- Best-FirstSearch & A*Algorithm.							
UNIT-III (10Hrs)	Symbolic Logic: Propositional Logic, First Order Predicate Logic, WFF representation, conversion Algorithms Clause, Unification algorithm, Resolution algorithm in propositional logic and Resolution algorithm in predicate logic. Reasoning under Uncertainty: Introduction to Non-Monotonic Reasoning, Truth Maintenance Systems.							
UNIT-IV (10Hrs)	Knowledge Representation using Rules: Procedural Vs Declarative Knowledge, Forward Vs Backward Reasoning, Matching, RETE Matching.							

	<p>PROLOG introduction, syntax and basic fields, key features, running queries, creating and updating prolog database, lists in prolog, Cut & Fail in prolog, advantages, disadvantages, applications of prolog. Bayesian Networks, Fuzzy Logic, Fuzzy Sets, Crisp Sets, Fuzzy inference and Fuzzy System. Dempster-Shafer theory.</p> <p>Structured Representations of Knowledge: Semantic Nets, Partitioned Semantic Nets, Frames, Conceptual Dependency and Scripts.</p>
UNIT-V (10 Hrs)	<p>Planning: Components of a Planning System, Goal Stack Planning, Nonlinear planning, hierarchical planning.</p> <p>Natural Language Processing: Steps in the Natural Language Processing, Augmented Transition Nets.</p> <p>Experts Systems: Overview of an Expert System (Examples, characteristics, advantages and limitations, applications, why expert system) Architecture of Expert Systems, Different Types of Expert Systems, Rule based expert system, Frame based, and Decision Tree based expert system.</p>
Text Books:	
1.	Artificial Intelligence, Elaine Rich and Kevin Knight, TataMcGraw-Hill Publications, 3 rd Edition, Year-2010
2.	Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI publications, First Edition, Year-2015
3.	Artificial Intelligence- Saroj Kaushik, CENGAGE Learning
Reference Books:	
1.	Artificial Intelligence, George FLuger, Pearson Education Publications, 5 th Edition, Year-2008
2.	Artificial Intelligence: A modern Approach, Russell and Norvig, Printice Hall, 3 rd Edition, Year-2015
3.	Artificial Intelligence, Robert Schalkoff, McGraw-Hill Publications, 3 rd Edition, Year-2002
4.	Artificial Intelligence and Machine Learning, Vinod ChandraS.S., Anand Hareendran S, First Edition, Year-2014

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3102	PE	3	0	0	3	30	70	3 Hrs.
OBJECT ORIENTED ANALYSIS AND DESIGN								
(For CSD)								
Course Objectives:								
1.	Understand the fundamentals of object modeling							
2.	Understand and differentiate Unified Process from other approaches							
3.	Design with static UML diagrams							
4.	Design with the UML dynamic and implementation diagrams							
5.	Improve the software design with design patterns							
Course Outcomes: At the end of the course, Students will be able to								
S. No	Course Outcomes							Knowledge Level
1.	Illustrate software development process							K3
2.	Illustrate Object Oriented Structural Modeling and Design Class & Object Diagrams							K3
3.	Design Basic Behavioral Modelings.							K4
4.	Design Advanced Behavioral Modeling							K4
5.	Design a system by selecting suitable pattern.							K4
SYLLABUS								
UNIT-I (12 Hrs)	Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.							
UNIT-II (10 Hrs)	Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.							
UNIT-III (10 Hrs)	Basic Behavioral Modeling: Interactions, Interaction diagrams, Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.							
UNIT-IV (8 Hrs)	Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.							

UNIT-V (10 Hrs)	Case Study: The Unified Library application, College Management.
TEXTBOOKS:	
1.	Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.
2.	Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY Dreamtech India Pvt. Ltd.
Reference Books:	
1.	Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2.	Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd
3.	Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4.	Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.
e-Resources:	
1.	https://www.tutorialspoint.com/design_pattern/design_pattern_quick_guide.html



Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3103	PE	3	0	0	3	30	70	3 Hrs.

HUMAN COMPUTER INTERACTION

(For CSD)

Course Objectives:

1.	Outline the importance of human computer interaction for a good design
2.	Develop a GUI application for Understanding of Users.
3.	Distinguish Online Vs Paper documentation in various development processes and social networking.
4.	Analyze screen design of various applications in GUI and Web
5.	Compare Device based and Screen based controls
6.	Summarize effective feedback guidance and assistance

Course Outcomes: At the end of the course Students will be able to

S. No	Course Outcomes	Knowledge Level
1.	Understand the importance of user interface and graphics-based systems.	K2
2.	Plan screen designs which are fast and pleasing compositions to satisfy user needs.	K3
3.	Understand business functions and design standards or style guides	K2
4.	Understand various screen components and determine the navigation of screens.	K2
5.	Summarize various screen devices and screen-based control components.	K2

SYLLABUS

UNIT-I (10Hrs)	The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design, History of Human Computer Interface The Graphical User Interface: popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.
UNIT-II (10.Hrs)	The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Principles of User Interface Design, Important Human Characteristics in Design, Human Consideration in Design
UNIT-III (10Hrs)	Understanding Business Functions: Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation

UNIT-IV (10 Hrs)	Principles of Good Screen Design: Human considerations in screen Design, interface design. goals, test for a good design, Technological considerations in Interface Design. System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing .and Selecting, Navigating of Menus, Kinds of Graphical Menus. Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window Management, Web systems.
UNIT-V (12 Hrs)	Device and Screen-Based Control: Device based controls, Operable Controls, Text entry/read-only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls.
Text Books:	
1.	The Essential Guide to User Interface Design, Wilbert O. Galitz, Wiley India Edition.
2.	Sharps Interaction Design, Prece, Rogers, Wiley India
Reference Books:	
1.	Designing the user interfaces, Ben Shneidermann, 3rd Edition, Pearson Education Asia
2.	User Interface Design, Soren Lauesen, Pearson Education
3.	Essentials of Interaction Design, Alan Cooper, Robert Riemann, David Cronin
4.	Human Computer Interaction, Alan Dix, Janet Finckay, GreGoryd, Abowd, Russell, Bealg Pearson Education
e-Resources:	
1.	https://onlinecourses.nptel.ac.in/noc18_cs23
2.	https://www.scribd.com/interest/Human-Computer-Interaction/docs
3.	https://www.interaction-design.org/courses/human-computer-interaction

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3104	PE	3	0	0	3	30	70	3 Hrs.

VISUAL DESIGN AND COMMUNICATION

(For CSD)

Course Objectives:

1.	Students will develop the ability to create visual compositions using basic elements and apply appropriate principles of visual composition to communicate ideas.
2.	Students will begin to understand the visual language and develop the ability to perceive, visualize and communicate using visual narratives.
3.	Students will develop the ability to apply the visual dynamics of visual language in Typography, Photography and Videography.
4.	Students will begin to understand the visual dynamics that exist in visual design as a visualization process to evolve mental imageries that represent solutions to simple communication problems.
5.	Students will be able to execute design solutions using appropriate software programmes

Course Outcomes: At the end of the course Students will be able to

S. No	Outcome	Knowledge Level
1.	Understand the visual language and its elements	K2
2.	Understand the principles of visual language	K2
3.	Understand the fundamentals of typography and its application as a means of visual communication	K2
4.	Use Photography and Videography to create content (gallery & short video) and use it for visual communication	K3
5.	Understanding communication theories, storytelling and other concepts for problem solving and communication	K2

SYLLABUS

UNIT-I (10 Hrs)	<p>INTRODUCTION TO VISUAL DESIGN: The importance of understanding visual language and its relation in context to nature and environment.</p> <p>ELEMENTS OF VISUAL LANGUAGE: Exploring and understanding Dots, Lines, Forms, Space, Pattern, Texture and Colour as an element of visual language.</p>
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UNIT-II (10 Hrs)	<p>INTRODUCTION TO THE PRINCIPLES OF VISUAL LANGUAGE: Visual explorations and experiments with Form, Colour, and Space, Texture, in relation to the context and environments – Concepts of harmony, balance, contrast, proportion, order, symmetry, asymmetry, rhythm, tension, juxtaposition, proximity, size, scale, proportion, orientation, alignment, variety, gradation, dominance, subordination, transition etc.</p>
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UNIT-III (10 Hrs)	INTRODUCTION TO FUNDAMENTALS OF TYPOGRAPHY: Introduces Typography as a means of Communication and engages in typographical explorations to understand the technicalities, nuances and aesthetics of types. Study of visual principles of text and image composition: Layouts, Grids, Content Development and Information Hierarchy. Application of Typography, Image and layouts in the design of signage systems, identity systems, social communications,
UNIT-IV (10 Hrs)	INTRODUCTION TO PHOTOGRAPHY: Study of photography as a medium to document, communicate and create photographic imagery. Exploring photo story as a narrative medium. INTRODUCTION TO VIDEOGRAPHY: Study of videography as a medium to document, communicate and create a short 2 minute video.
UNIT-V (10 Hrs)	COMMUNICATION THEORIES, SEMIOTICS AND VISUAL PERCEPTION: Understand the process of communication and the theories that make a difference to the development of a visual language. STORY TELLING, NARRATIVES AND ITS ROLE IN DESIGN: Understand storytelling and narratives as effective methods to scope problems and problem solving processes.
Text Books:	
1.	Walls chlaeger, Charles, & Busic - Synder, Cynthia, Basic Visual Concepts and Principles for Artists, Architects and Designers, McGraw-Hill, 1992.
References:	
1.	Buxton, Bill, Sketching User Experience: Getting the Design Right and the Right Design (Interactive Technologies), Morgan Kaufmann, 2007.
2.	Caplin, Steve; Banks, Adam, The Complete Guide to Digital Illustration, Publisher: Watson - Guptill Publications, 2003
3.	Demers, Owen, Digital Texturing & Painting, Publisher: New Riders Press; Bk & CD-ROM Edition,2001.
4.	Cairo, Alberto, The Functional Art. New Riders, 2013.

Code	Category	L	T	P	C	I.M	E.M	Exam
B20AM3104	PE	3	0	0	3	30	70	3 Hrs.

INTERNET OF THINGS
(Common to AIML & CSD)

Pre-requisites: Computer Networks

Course Objectives: Students are expected

1. To understand building blocks of IoT and their characteristics
2. To Know various architectures and protocols in IoT and security issues
3. To use cloud services for data analytics in IoT applications
4. To develop IoT applications using Arduino programming.

Course Outcomes: At the end of the course students will be able to

S. No	Outcome	Knowledge Level
1.	Discuss various Designs of IoT and IoT architectures	K2
2.	Illustrate various communication protocols in IoT	K3
3.	Use of various sensors and Actuators in IoT applications and Implement IoT applications using Arduino.	K3
4.	Analyse data in IoT applications.	K4
5.	Analyse various security issues IoT applications.	K4

SYLLABUS

UNIT-I (10 Hrs)	<p>Introduction to Internet of Things: Definition & Characteristics of IoT, Physical design of IoT-Things in IoT, IoT protocols, Logical Design of IoT- IoT Functional Blocks, IoT Communication Models & API's, IoT levels and deployment templates.</p> <p>IoT Network Architecture and Design: Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture.</p>
UNIT-II (10 Hrs)	<p>Communication Technologies: wired Communication Technologies, wireless Communication Technologies.</p> <p>IoT Access Technologies: PHY/MAC Layer (IEEE 802.15.4), LoRAWAN, RPL.</p> <p>Message Communication Protocols for Connected Devices - CoAP, XMPP, MQTT.</p>
UNIT-III (10 Hrs)	<p>IOT Physical devices and Endpoints: Basic building blocks of an IOT device.</p> <p>Sensors, Participatory sensing, RFIDs: Sensor Technology, Participatory sensing, Industrial IOT and Automotive IOT, Actuator, Radio Frequency Identification technology.</p> <p>Programming with Arduino: Features of Arduino, Components of Arduino board, Arduino IDE, Programming Elements, Case Studies: Traffic control system, DHT Sensor</p>

	with Arduino.
UNIT-IV (8 Hrs)	Data Acquiring, Organising, Processing and Analytics: Introduction, Data Acquiring and storage, Organising the Data, Transaction, Business Processes, Integration and Enterprise Systems, Analytics, Knowledge Acquiring, Managing and Storing Processes.
UNIT-V (8 Hrs)	IoT Privacy, Security and Vulnerabilities Solutions: Vulnerabilities, Security Requirements and Threat Analysis, IoT Security Tomography and Layered Attacker model, Identity management and establishment, Access control secure message communication, Security models, profiles and protocols for IoT. Case studies illustrating IoT Design: Home Automation, Environment, Agriculture
TEXTBOOK:	
1.	Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015.
2.	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things - David Hanes, Gonzalo Salgueiro, Patrick Grossetete Robert Barton, Jerome Henry. 24750 Copyright© 2017 Cisco Systems, Inc. Published by: Cisco Press 800 East 96th Street.
3.	Internet of Things: Architecture and Design Principles by Raj Kamal, McGraw Hill Education private limited, 2017.
4.	Internet of Things, Jeeva Jose, Khanna Publishing; First edition (2018).
REFERENCE BOOKS:	
1.	Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley, 2013
2.	Getting Started with the Internet of Things Cuno Pfister, Oreilly, 2011
3.	Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, Reilly (SPD), 2014.
E-Resources:	
1.	Introduction to Internet of Things, https://swayam.gov.in/nd1_noc20_cs66/preview
2.	An Introduction to Programming the Internet of Things(IoT) specialization, https://www.coursera.org/specializations/iot

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3108	PC	0	0	3	1.5	15	35	3 Hrs.
DATA MINING LAB								
(Common to CSE & CSD)								
Course Objectives: Students are expected to learn								
1	The basic statistical measures of data mining in order to prepare for real-world problems							
2	The ability to apply various data mining algorithm							
3	Packages and libraries of R and also familiar with functions used in R for visualization							
4	Using R environment to conduct analytics on large real life datasets							
Course Outcomes: At the end of the course students will be able to								
S. No	Outcome							Knowledge Level
1	Extend the functionality of R by using add-on packages							K3
2	Examine data from files and other sources and perform various data manipulation tasks on them							K4
3	Use R Graphics and Tables to apply and visualize results of various statistical operations on data							K3
4	Apply the knowledge of R gained to data analytics and data mining of real-life datasets							K3
SYLLABUS								
1	Implement all basic R commands.							
2	Interact data through .csv files (Import from and export to .csv files).							
3	Get and Clean data using swirl exercises. (Use 'swirl' package, library and install that topic from swirl).							
4	Visualize all Statistical measures (Mean, Mode, Median, Range, Inter Quartile Range etc., using Histograms, Box plots and Scatter Plots).							
5	Create a data frame with the following structure.							
	a.	EMP ID	EMP NAME	SALARY	START	DATE		
	b.	1	Satish	5000	01-11-2013			
	c.	2	Vani	7500	05-06-2011			
	d.	3	Ramesh	10000	21-09-1999			
e.	4	Praveen	9500	13-09-2005				
f.	5	Pallavi	4500	23-10-2000				
6	a. Extract two column names using column name.							
	b. Extract the first two rows and then all columns.							
	c. Extract 3rd and 5th row with 2nd and 4th column.							
	Write R Program using 'apply' group of functions to create and apply normalization function on each of the numeric variables/columns of iris dataset to transform them into							
a.	0 to 1 range with min-max normalization.							
b.	a value around 0 with z-score normalization.							

7	Create a data frame with 10 observations and 3 variables and add new rows and columns to it using 'rbind' and 'cbind' function
8	Write R program to implement linear and multiple regression on 'mtcars' dataset to estimate the value of 'mpg' variable, with best R2 and plot the original values in 'green' and predicted values in 'red'.
9	Implement k-means clustering using R.
10	Implement k-medoids clustering using R.
11	implement density based clustering on iris dataset.
12	implement decision trees using 'reading Skills' dataset.
13	Implement decision trees using 'iris' dataset using package party and 'rpart'.
14	Use a Corpus() function to create a data corpus then Build a term Matrix and Reveal word frequencies.

REFERENCE BOOKS:

1.	R and Data Mining: Examples and Case Studies, 1st ed, Yanchang Zhao, Springer, 2012.
2	R for Everyone, Advanced Analytics and Graphics, 2nd ed, Jared Lander, Pearson, 2018.

e-Resources:

1.	www.r-tutor.com
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Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3105	PC	0	--	3	1.5	15	35	3 Hrs.
ADVANCE DATA STRUCTURES LAB								
(For CSD)								
Course Objectives:								
1.	To develop skills to implement linked list, trees, graphs.							
2.	To gain experience with the implementation of basic Hash Tables and pattern matching algorithms.							
3.	To acquire comprehensive knowledge of advanced data structures and implement the same in different software applications.							
Course Outcomes: The students will be able to								
S. No.	Course Outcomes							Knowledge Level
1.	Obtain linked list and Trees knowledge in practical applications using different languages.							K3
2.	Implement graph algorithms to solve various real time applications							K3
3.	Implement different Hash Tables and Pattern Matching Algorithms.							K3
LIST OF EXPERIMENTS								
1.	Implementation of singly linked list							
2.	Implementation of doubly linked list							
3.	Program to reverse the nodes in a circular linked list							
4.	Program to perform operations on two polynomials using linked list							
5.	Implement traversal techniques in binary tree							
6.	Beginning with an empty binary search tree, construct binary search tree by inserting the values in the order given. After constructing a binary tree - <ul style="list-style-type: none"> ➤ Insert new node ➤ Find number of nodes in longest path ➤ Minimum data value found in the tree ➤ Change a tree so that the roles of the left and right pointers are wrapped at every node. ➤ Search a value 							
7.	Write a program to perform the following operations <ul style="list-style-type: none"> ➤ Insertion into an AVL-tree ➤ Deletion from an AVL-tree 							
8.	Program to implement priority queue using Heap <ul style="list-style-type: none"> ➤ Inserting new element ➤ Deletion of minimum element 							
9.	Write a program to implement DFS and BFS traversals.							

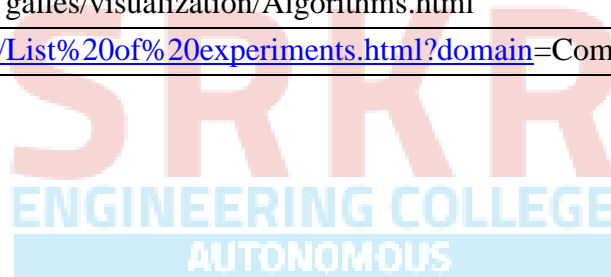
10.	Write a program to find minimum spanning tree using Prim's Algorithm
11.	Write a program to find the minimum spanning tree using Kruskal's Algorithm.
12.	Write a program to implement topological sort.
13.	Write a program for creating an Open Addressing Hash Table with linear probing and quadratic probing.
14.	Write a program to implement Naive Pattern Matching algorithm
15.	Write a program to identify the desired patterns with Knuth-Morris-Pratt (KMP) algorithm.
16.	Write a program to implement the Rabin Karp pattern matching algorithm.

Reference Books:

1.	Data Structures using C by Aaron M. Tenenbaum, Y. Langsam and M.J. Augenstein, Pearson Education, 2009.
2.	Data Structures with C by Seymour Lipschutz, Schaum Outline series, 2010.
3.	Data Structures using C by R. Krishna Moorthy G. Indirani Kumaravel, TMH, New Delhi, 2008.
4.	Data Structures and Algorithms: Concepts, Techniques and Applications – G.A.V.Pai, Tata Mc Graw Hill Publishers
5.	Advanced Data Structures – Peter Brass, Cambridge University Press, 2008

Reference links :

1.	https://www.cs.usfca.edu/~galles/visualization/Algorithms.html
2.	http://cse01-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Computer % 20 Science



Code	Category	L	T	P	C	I.M	E.M	Exam
B20HS3102	SOC	1	--	2	2	--	50	3Hrs.
SOFT SKILLS								
(Common to AIDS, AIML, CSBS, CSD, CSE, ECE, & IT)								
Course Objectives:								
1.	To familiarize students with soft skills and how they influence their professional growth.							
2.	To build/refine the professional qualities/skills necessary for a productive career and to instill Confidence through attitude building.							
Course Outcomes: At the end of the course students will be able to								
S.No	Outcome							Knowledge Level
1	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.							K3
2	Participate in group discussions/group activities, exhibit team spirit, use language effectively according to the situation, respond to their interviewer/employer with a positive mind, make answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process.							K3
SYLLABUS								
1.	Introduction to Soft Skills, Significance of Inter & Intra-Personal Communication							
2.	SWOT Analysis, Creativity & Problem Solving							
3.	LSRW, JAM, Presentation Skills							
4.	Building a positive attitude, Leadership & Team Work							
5.	Goal Setting – Guidelines for Goal Setting							
6.	Group Discussion: Essential guidelines							
7.	Telephone Etiquette, Telephonic Interview							
8.	Resume Preparation: Common resume blunders, tips for betterment, Resume Review							
9.	Employability Skills: Emotional Intelligence, Report Writing, Social Consciousness and Social Entrepreneurship, Stress Management.							
10.	Awareness about Industry, Companies, Importance of researching the prospective workplace, Knowing about Selection Process							
11.	Interview Skills: Types of Interviews, Mock Interview, Do's and Don'ts of Interview.							
Text Books:								
1	Soft Skills & Employability Skills by Samina Pillai and Agna Fernandez, Cambridge University Press India Pvt. Ltd.							
2	Soft Skills, by Dr. K. Alex, S. Chand & Company Ltd., New Delhi							
Reference Books:								
1	The Art of Public Speaking by Dale Carnegie							

2	The Leader in You by Dale Carnegie
3	Emotional Intelligence by Daniel Golman
4	Stay Hungry Stay Foolish by Rashmi Bansal
5	I have a Dream by Rashmi Bansal.

Additional Materials

1	https://www.youtube.com/watch?v=LTnI7cmpDZI
2	https://www.youtube.com/watch?v=ic5O2sxhH9M
3	https://www.youtube.com/watch?v=4ZQkYSpmOdU
4	https://www.youtube.com/watch?v=d8p-5WcXoRs
5	https://www.youtube.com/watch?v=yZOar04g4zk&t=94s



Code	Category	L	T	P	C	I.M	E.M	Exam
B20MC3105	MC	--	--	3	--	--	--	3 Hrs.
DIGITAL MARKETING LAB								
(For CSD)								
Course Objectives:								
1	To familiarize students to methodologies, tools and techniques involved in digital marketing.							
2	To provide students with specific knowledge and sufficient background that will allow them to pursue their careers in the digital marketing domain.							
3	To experiment and study how an online business is built and promoted digitally.							
4	To design and create ad campaigns on social media and other platforms.							
Course Outcomes								
S. No	Course Outcomes							Knowledge Level
1	Ability to build a sample online business and promote using digital marketing							K4
2	Ability to develop a digital marketing plan to address common marketing challenges							K4
3	Ability to use multi-channel marketing strategies using SEO, Paid Advertising, Social Media, Mobile, Email and other Display Media tools.							K3
4	Ability to devise strategies and study the impact on business objectives.							K3
LIST OF PROGRAMS								
1	Create a website and host - Personal / E-Commerce / Other							
2	Design an online business strategy for promotion							
3	Implement Search Engine Optimization (SEO) for your website							
4	Create an Ad using Search Engine Marketing (SEM)							
5	Advertise using Social Media Marketing on Facebook, Instagram and Youtube							
6	Content Marketing - Create a sample digital content in the form of a blog or multimedia content							
7	Implement Email and Whatsapp /SMS marketing to potential customers							
8	Implementing Web Analytics on your website and observe the data insights							
References:								
1.	"Digital Marketing All-In-One For Dummies" by Stephanie Diamond, Wiley Publications, 2020							
2.	https://learndigital.withgoogle.com/digitalgarage/course/digital-marketing							



SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JNTUK, Kakinada), (Recognized by AICTE, New Delhi)

UG Programmes CE,CSE,ECE,EEE,IT & ME are Accredited by NBA, Accredited by NAAC with A⁺

CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204

Regulation: R20		III / IV - B.Tech. II - Semester							
COMPUTER SCIENCE AND DESIGN									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2021-22 admitted Batch onwards)									
Course Code	Course Name	Category	Cr	L	T	P	Int. Marks	Ext. Marks	Total Marks
B20AM3201	Computer Networks	PC	3	3	0	0	30	70	100
B20CD3201	Automata theory and Compiler Design	PC	3	3	0	0	30	70	100
B20AM3203	Software Engineering	PC	3	3	0	0	30	70	100
#PE-II	Professional Elective -II	PE	3	3	0	0	30	70	100
#OE-II	Open Elective-II	OE	3	3	0	0	30	70	100
B20CD3204	Computer Networks Lab	PC	1.5	0	0	3	15	35	50
B20AM3209	Algorithms for Efficient Coding Lab	PC	1.5	0	0	3	15	35	50
B20CD3205	Internet Of Things Lab	PC	1.5	0	0	3	15	35	50
B20CD3206	MERN Stack Technologies- Module I (Skill oriented course)	SOC	2	1	0	2	--	50	50
B20MC3201	Employability Skills	MC	0	3	0	0	--	--	--
B20HS3204	*Gender Sensitization	HS	0	2	0	0	--	--	--
TOTAL			21.5	21	0	11	195	505	700

	Course Code	Course
#PE-II	B20CD3202	Deep Learning
	B20CD3203	CNS (Cryptography & Network Security)
	B20AM3206	Distributed Systems
	B20CS3207	Network Programming
#OE-II	Student has to study one Open Elective offered by CE or ECE or EEE or ME or S&H from the list enclosed.	

***Note:** Gender Sensitization is a Self-Learning noncredit Audit Course

Code	Category	L	T	P	C	I.M	E.M	Exam
B20AM3201	PC	3	--	--	3	30	70	3 Hrs.

COMPUTER NETWORKS

(Common to AIML & CSD)

Course Objectives: Students are expected

1	To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
2	To study data link layer concepts, design issues, and protocols.
3	To study MAC layer Random Access Protocols, LAN.
4	To gain knowledge on Network layer and Routing Algorithms.
5	To learn Transport layer services, and protocols.
6	To acquire knowledge of Application layer protocols.

Course Outcomes: At the end of the course students will be able to

S. No.	Outcome	Knowledge Level
1	Illustrate the OSI reference model, TCP/IP, and Digital transmission techniques	K3
2	Demonstrate Data Link Layer protocols	K3
3	Compare and contrast MAC protocols, various types of LANs	K3
4	Summarize various network layer services and Routing algorithms	K3
5	Implement Transport layer and application layer protocols	K3

SYLLABUS

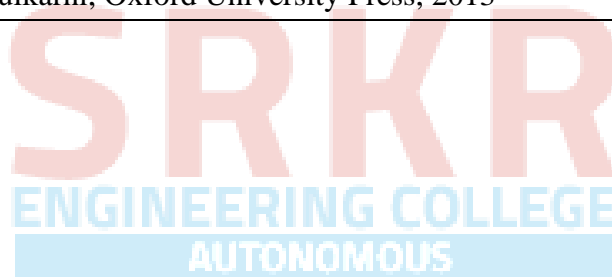
UNIT-I (10 Hrs)	Introduction: Introduction to Computer Networks, Network Models (protocols): OSI reference model, TCP/IP reference model. Network topologies, types of networks (LAN, MAN, WAN). Physical layer: Data and Signals, Digital signals, Digital transmission (Digital-to-Digital, Analog-to-Digital), multiplexing (FDM, TDM), Transmission media.
UNIT-II (8 Hrs)	Data Link Layer: Error Detection & Correction: types of errors, Error Detection (Parity, CRC, Check Sum), Error Correction (Using hamming distance), Data Link Layer services: framing, flow control, error control. Error & Flow control mechanisms: stop and wait, Go back N and selective repeat, High Level Data Link Control (HDLC).
UNIT-III (10 Hrs)	Medium access control: Random access: Aloha, Slotted Aloha, CSMA, CSMA/CD, and CSMA/CA, Local area networks: Ethernet, Types of ethernet (Token Ring, Fast Ethernet, Gigabit Ethernet), Personal Area Network: Bluetooth (Architecture), Wireless LANS: IEEE 802.11(Architecture, MAC sub layer).

UNIT-IV (8 Hrs)	Network layer: Network Layer Services, IPV4 Address, Subnetting, Super-netting, Classless addressing, Internet Protocol (IP, ARP, DHCP, ICMP), IPV6 Address format, Routing algorithms: Distance vector, Link state, Network Address Translation (NAT).
UNIT-V (8 Hrs)	Transport layer: UDP (User Datagram, Services, Applications), TCP (TCP Services, features, Segment, Connection establishment and termination, sliding window, flow, and congestion control), Application Layer: Application Layer services and protocols including www, DNS, SMTP, POP, FTP, Telnet, HTTP, Firewalls.
TEXTBOOK:	
1.	Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill, 5th Edition, 2017.
REFERENCE BOOKS:	
1.	Data and Computer Communications, William Stallings, Pearson, 10th Edition, 2013.
2.	Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, Pearson Education India; 5 th edition, 2013.
3.	Computer Networks: A Systems Approach, LL Peterson, BS Davie, Morgan-Kauffman, 5th Edition, 2011.
4.	Computer Networking: A Top-Down Approach JF Kurose, KW Ross, Addison-Wesley, 5th Edition, 2009.



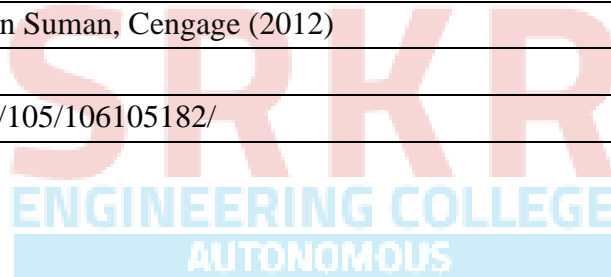
Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3201	PC	3	0	0	3	30	70	3 Hrs.
AUTOMATA THEORY AND COMPILER DESIGN								
(For CSD)								
Course Objectives:								
1	To learn fundamentals of Regular and Context Free Grammars and Languages.							
2	To understand the relation between Contexts free Languages, PDA.							
3	To study the various phases in the design of a compiler.							
4	To understand the design of top-down and bottom-up parsers.							
5	To understand syntax directed translation schemes and approaches to generate code for atarget machine.							
Course Outcomes: At the end of the course Students will be able to								
S. No	Outcomes							Knowledge level
1	Design an automata for given language and equality regular expressions							K4
2	Design various parse trees using parsing algorithms for the given grammar							K4
3	Construct various forms of intermediate code generation.							K3
4	Apply techniques to generate optimized and improve performance in code storage							K3
5	Design algorithms for code generation							K4
SYLLABUS								
UNIT-I (10 Hrs)	Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis							
UNIT-II (10 Hrs)	Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity LL(K) grammars and LL (1) parsing Bottom-up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.							
UNIT-III (10 Hrs)	Semantics: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow Statements Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.							

UNIT-IV (10 Hrs)	Run time storage: Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation. Code optimization: Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs.
UNIT-V (14Hrs)	Code generation: Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block.
Text Books:	
1.	Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R.Motwani and J. D. Ullman, 3rd Edition, Pearson, 2008.
2.	Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.
Reference Books:	
1.	Louden: “Compiler Construction, Principles & Practice”, 1st Edition, Thomson Press, 2006.
2.	Tremblay J P, Sorenson G P: “The Theory & Practice of Compiler writing”, 1st Edition, BSP publication, 2010.
3.	Theory of Computation, V. Kulkarni, Oxford University Press, 2013



Code	Category	L	T	P	C	I.M	E.M	Exam
B20AM3203	PC	3	0	0	3	30	70	3 Hrs.
SOFTWARE ENGINEERING								
(Common to AIML & CSD)								
Course Objectives:								
1.	Give exposure to phases of Software Development, common process models including Waterfall, the Unified Process, and elements of the Agile Process.							
2.	Give exposure to a variety of Software Engineering practices such as Requirements Analysis and Specification.							
3.	Give exposure to Software Design Techniques.							
4.	Give exposure to various Software Quality Assurance and Testing strategies.							
Course Outcomes: At the end of the course Students will be able								
S. No	Outcome							Knowledge Level
1.	Understand different software process models and their significance.							K2
2.	Distinguish various requirements identification procedures.							K3
3.	Demonstrate different methods for requirement analysis modeling.							K3
4.	Illustrate various aspects of system design and software architectures.							K2
5.	Apply software quality assurance and testing strategies.							K3
SYLLABUS								
UNIT-I (11 Hrs)	The Nature of Software, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths. A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Agility, Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models.							
UNIT-II (8 Hrs)	Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements, Requirements Analysis.							
UNIT-III (9 Hrs)	Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling, Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modeling, Requirements Modeling for Web Apps.							
UNIT-IV (13 Hrs)	Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model, Software Architecture, Architectural Genres, Architectural Styles,							

	Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow, Components, Designing Class-Based Components, Conducting Component-Level Design, Component-Level Design for Web Apps, Designing Traditional Components, Component- Based Development.
UNIT-V (9Hrs)	Elements of Software Quality Assurance, SQA Tasks, Goals & Metrics, Statistical SQA, Software Reliability, A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for Web Apps, Validation Testing, System Testing, The Art of Debugging, Software Testing Fundamentals, Internal and External Views off Testing, White-Box Testing, Basis Path Testing.
Text Books:	
1.	Software Engineering: A Practitioner’s approach, Roger S Pressman, 7th edition McGraw Hill Higher Education (2009)
2.	Software Engineering, Ian Sommerville, 9th edition. Pearson (2017)
Reference Books:	
1.	Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.
2.	Software Engineering, Ugrasen Suman, Cengage (2012)
e-Resources:	
1.	https://nptel.ac.in/courses/106/105/106105182/



Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3202	PE	3	--	--	3	30	70	3Hrs
DEEP LEARNING								
(For CSD)								
Course Objectives:								
1	Understand and recollect basic concepts of machine learning							
2	Understand concepts of deep feed forward network mechanisms							
3	Understand and analyze the concepts of CNN, RNN models							
4	Study the concepts of auto encoders and optimization techniques							
5	Study and analyze the different DNN architectures							
Course Outcomes: At the end of the course Students will be able to								
S. No	Outcome							Knowledge level
1	Utilize the basic concept of Machine learning							K3
2	Apply the concepts of deep feed forward networks.							K3
3	Apply the concepts of CNN & RNN models							K3
4	Explain and apply optimization techniques and auto encoders.							K3
5	Identify different DNN models and apply that knowledge to different applications..							K3
SYLLABUS								
UNIT-I (12 Hrs)	Fundamentals Concepts of Machine Learning: Historical Trends in Deep Learning-Machine Learning Basics: Learning Algorithms Supervised and Unsupervised Training, Linear Algebra for machine Learning, Testing, Cross-Validation, Dimensionality reduction, Over/Under-fitting, Hyper parameters and validation sets, Bias, Variance, Regularization							
UNIT-II (10Hrs)	Deep feed forward networks: Introduction, Gradient-Based Learning, Various Activation Functions, error functions, Differentiation algorithms, Regularization for Deep learning, Early Stopping, Drop out.							
UNIT-III (10 Hrs)	Convolutional Neural Networks And Sequence Modeling: Convolutional Networks: Convolutional operation, Motivation, Pooling, Normalization, Sequence Modeling: Recurrent Neural Networks, Bidirectional RNNs, Deep Recurrent Networks, Encoder-Decoder, Sequence-to-Sequence Architectures, the Long Short-Term Memory.							

UNIT-IV (8 Hrs)	Auto Encoders Auto encoders: under complete, regularized, stochastic, denoising, contractive, Optimization for Deep Learning
UNIT-V (10 Hrs)	More Deep Learning Architectures & Applications Alexnet, ResNet, Transfer learning, Image Segmentation, Sentiment Analysis using LSTM
Text Books:	
1.	Ian Good fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2016 (available at http://www.deeplearningbook.org)
2.	Charu C Agarwal, “Neural Networks and Deep Learning”, IBM T. J. Watson Research Center, International Business Machines, Springer, 2018
Reference Books:	
1.	Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012
2.	Michael Nielsen, “Neural Networks and Deep Learning”, Online book, 2016 (http://neuralnetworksanddeeplearning.com/)
3.	Li Deng, Dong Yu, “Deep Learning: Methods and Applications”, Foundations and Trends in Signal Processing, 2013.
4.	Christopher and M. Bishop, “Pattern Recognition and Machine Learning”, Springer Science Business Media, 2006.
5.	Jason Brownlee , “Deep Learning with Python” , ebook, 2016
6.	N. D. Lewis, “Deep Learning Step by Step with Python: A Very Gentle Introduction to Deep Neural Networks for Practical Data Science, 2016.
7.	Chris Albon, “Machine Learning with Python Cookbook-practical solutions from preprocessing to Deep learning”, O’REILLY Publisher,2018
e-Resources:	
1.	https://medium.com/nybles/create-your-first-image-recognition-classifier-using-cnn-keras-andtensorflow-backend-6eaab98d14dd
2.	https://www.analyticsvidhya.com/blog/2017/08/10-advanced-deep-learning-architectures-datascientists/
3.	https://www.geeksforgeeks.org/cross-validation-machine-learning/
4.	https://www.geeksforgeeks.org/activation-functions-neural-networks/
5.	https://towardsdatascience.com/sentiment-analysis-using-lstm-step-by-step-50d074f09948
6.	https://medium.com/@lamiae.hana/a-step-by-step-guide-on-sentiment-analysis-with-rnn-and-lstm3a293817e314
7.	https://towardsdatascience.com/common-loss-functions-in-machine-learning-46af0ffc4d23
8.	https://d2l.ai/chapter_natural-language-processing-applications/sentiment-analysis-rnn.html
Web-Links:	
1.	Swayam NPTEL: Deep Learning: https://onlinecourses.nptel.ac.in/noc22_cs22/preview

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3203	PC	3	0	0	3	30	70	3 Hrs
CNS (CRYPTOGRAPHY AND NETWORK SECURITY)								
(For CSD)								
Course Objectives: Students are expected to learn								
1.	Overview of the computer security and classical encryption techniques.							
2.	Working principles and utilities of various cryptographic algorithms including symmetric key cryptography and public key cryptography algorithms.							
3.	Design issues and working principles of hashing, message digest algorithms and various authentication protocols							
4.	Various secure communication protocols standards.							
5.	Concepts of firewalls and block chain technology.							
Course Outcomes: At the end of the course students will be able to								
S. No	Outcome							Knowledge level
1.	Understand Information Security goals, classical encryption techniques and acquire fundamental knowledge on the concepts related to cryptography.							K2
2.	Compare and apply different encryption and decryption techniques to solve problems related to confidentiality.							K3
3.	Apply the knowledge of cryptographic hash functions and Illustrate the performance of different message digest algorithms for verifying the integrity and authentication.							K3
4.	Describe various network security protocols.							K3
5.	Explore the Importance of system security through firewalls and block chain technology.							K3
SYLLABUS								
UNIT-I (08 Hrs)	Introduction to Cryptography: Security Attacks, Services & Mechanisms, Symmetric Cipher Model, Substitution and Transposition Techniques. Block Ciphers: Traditional Block Cipher Structure, Block Cipher Design Principles.							
UNIT-II (12Hrs)	Symmetric Key Cryptography: Data Encryption Standard (DES), Advanced Encryption Standard (AES), IDEA, Block Cipher Modes of Operations. Public Key Cryptography: Principles, Public Key Cryptography Algorithms, Euler's Theorem, RSA Algorithm, Diffie-Hellman Key Exchange.							
UNIT-III (12 Hrs)	Cryptographic Hash Functions: Application of Cryptographic Hash Functions, SHA and MD5 Algorithms, Message Authentication Functions, HMAC & CMAC. Digital Signatures: DSS,							

	DSS with RSA. User Authentication: Remote User Authentication Principles, Kerberos
UNIT-IV (10 Hrs)	Electronic Mail Security: Pretty Good Privacy (PGP) And S/MIME. IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload. Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS).
UNIT-V (10 Hrs)	Firewalls: Characteristics, Types of Firewalls, Placement of Firewalls, Firewall Configuration, Trusted Systems. Blockchain Technology: Introduction to Blockchain Technology Fundamentals, how blockchain works-Shared Ledger, Permissions, Consensus, Smart contracts
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.
3.	Computer Graphics: Principles and Practice, John F. Hughes, Andries van Dam, Morgan McGuire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley, 3rd Edition, Addison- Wesley Professional, 2013.
4.	Mathematical and computer programming techniques for computer graphics, Peter Comninos, Springer, 2010.
5.	Blockchain Fundamentals- Ravindhar vadapalli, https://www.researchgate.net/publication/345045424_
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.

Code	Category	L	T	P	C	I.M	E.M	Exam
B20AM3206	PE	3	--	--	3	30	70	3 Hrs.
DISTRIBUTED SYSTEMS								
(Common to AIML & CSD)								
Course Objectives: Students are expected								
1	To understand the foundations of distributed systems.							
2	To learn issues related to clock Synchronization and the need for global state in distributed systems							
3	To learn distributed mutual exclusion and deadlock detection algorithms							
4	To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems							
5	To learn the characteristics of peer-to-peer and distributed shared memory systems							
Course Outcomes: At the end of the course students will be able to								
S. No	Outcome							Knowledge Level
1	Elucidate the foundations and issues of distributed systems							K2
2	Illustrate the various synchronization issues and global state for distributed systems							K3
3	Illustrate the Mutual Exclusion and Deadlock detection algorithms in distributed systems							K3
4	Describe the agreement protocols and fault tolerance mechanisms in distributed systems							K3
5	Describe the features of peer-to-peer and distributed shared memory systems							K3
SYLLABUS								
UNIT-I (12 Hrs)	<p>Distributed Systems: Definition, Relation to computer system components, Motivation, Relation to parallel systems, Message-passing systems versus shared memory systems, Primitives for distributed communication, Synchronous versus asynchronous executions, Design issues and challenges.</p> <p>A model of distributed computations: A distributed program, A model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Models of process communications.</p> <p>Logical Time: A framework for a system of logical clocks, Scalar time, Vector time, Physical clock synchronization: NTP.</p>							
UNIT-II (10 Hrs)	<p>Message Ordering & Snapshots: Message ordering and group communication: Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order. Global state and snapshot recording algorithms: Introduction,</p>							

	System model and definitions, Snapshot algorithms for FIFO channels.
UNIT-III (10 Hrs)	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.
UNIT-IV (8 Hrs)	Recovery & Consensus: Check pointing and rollback recovery: Introduction – Background and definitions – Issues in failure recovery – Checkpoint-based recovery – Log-based rollback recovery – Coordinated check pointing algorithm – Algorithm for asynchronous check pointing and recovery. Consensus and agreement algorithms: Problem definition – Overview of results – Agreement in a failure – free system – Agreement in synchronous systems with failures.
UNIT-V (10 Hrs)	Peer-to-peer computing and overlay graphs: Introduction – Data indexing and overlays – Chord – Content addressable networks – Tapestry. Distributed shared memory: Abstraction and advantages – Memory consistency models – Shared memory Mutual Exclusion.
TEXTBOOKS:	
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 Mukesh Singhal, 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. Mukesh Singhal and Niranjana 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/

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3207	PE	3	--	--	3	30	70	3 Hrs.

NETWORK PROGRAMMING

(Common to CSE & CSD)

Course Objectives: Students are expected to

1	Learn understanding of core network programming by using sockets and transport layer protocols like TCP and UDP
2	Learn understanding of inter process communication and implementation of different forms of IPC in client-server environment
3	Get an exposure to various application layer protocols which are designed using sockets and transport layer protocols

Course Outcomes: At the end of the course students will be able to

S. No	Outcome	Knowledge Level
1	Explain the client-server paradigm and socket structures	K3
2	Describe the basic concepts of TCP sockets and TCP echo client-server programs.	K3
3	Discuss the UDP sockets and UDP echo client-server programs	K3
4	Explain Socket options and ability to understand IPC.	K3
5	Apply the applications of sockets and demonstrate skill to design simple applications like FTP, TELNET etc.	K3

SYLLABUS

UNIT-I (12 Hrs)	Introduction to Network Programming: OSI model-transport layer protocols: TCP, UDP and SCTP-network architecture: client-server and peer-to-peer systems, Sockets-socket Address structures: IPv4, IPv6 and Generic-value result arguments-Byte ordering functions-Byte manipulation functions-Address conversion functions
UNIT-II (10 Hrs)	TCP: introduction to TCP-TCP connection establishment and termination TIME_WAIT State. Elementary TCP sockets – Socket-connect-bind-listen-accept-fork-exec function-concurrent servers-Close function-read and write functions
UNIT-III (10 Hrs)	TCP echo client server program-getsockname and getpeername functions I/O multiplexing: I/O models-Select function-TCP echo server using select function-shutdown function-Poll function
UNIT-IV (08 Hrs)	UDP: Introduction to UDP-difference between TCP and UDP-recvfrom() and sendto() functions-UDP echo client server program-UDP echo client server using select function. Socket Options: IPv4 socket options-IPv6 socket options

UNIT-V (10 Hrs)	Socket Options: Generic socket options-TCP socket options. IPC: Introduction to IPC-forms of IPC-UNIX kernel support for pipes, FIFO, message queues, semaphores and shared memory Network programming concepts Implementation: FTP-ping-arp-SMTP-TELNET
Textbooks:	
1.	Unix Network programming, the socket networking API, W.Richard Stevens, bill fenner, Andrew m.rudoff ,PHI.
Reference Books:	
1.	Advanced programming in the UNIX environment, W.Richard Stevens ,pearson education



Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3204	PC	--	--	3	1.5	15	35	3Hrs
COMPUTER NETWORKS LAB								
(For CSD)								
Course Objectives: Students are expected								
1.	Understand and apply different network commands							
2.	Analyze different networking functions and features for implementing optimal solutions							
3.	Apply different networking concepts for implementing network solution							
4.	Implement different network protocols							
Course Outcomes: Students will be able to								
S. No	Outcome							Knowledge level
1.	Implement data link layer framing methods like error control and flow control.							K3
2.	Examines and implement the various Routing algorithms.							K3
3.	Develop client-server applications using sockets.							K3
LIST OF PROGRAMS								
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.	Write a C program to perform sliding window protocol.							
6.	Take an example subnet of hosts. Obtain broadcast tree for it							
7.	Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm.							
8.	Write a client-server application using TCP.							
9.	Get the MAC or Physical address of the system using Address Resolution Protocol?							
10.	Simulate the Open Shortest Path First (OSPF) routing protocol based on the cost assigned to the path.							
Textbooks:								
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, 2017.							
3.	“Java Network Programming”, Elliotte Rusty Harold , Fourth Edition, Orielly 2013.							
Reference Books:								
1.	“An Introduction to Computer Networking”, Kenneth C. Mansfield Jr and James L. Antonakos							

	Pearson Education Asia.
2.	“Computer Networking, A Top-Down Approach Featuring the Internet’James F. Kuross, Keith W. Ross, Third Edition, Addison Wesley, 2004.



Code	Category	L	T	P	C	I.M	E.M	Exam
B20AM3209	PC	0	0	3	1.5	15	35	3 Hrs.

ALGORITHMS FOR EFFICIENT CODING LAB
(Common to AIML & CSD)

Course Objective:

- To develop efficient coding for implementing advanced trees and algorithms with various inputs.

Course Outcomes: At the end of the course Students will be able to

S. No	Outcome	Knowledge Level
1.	Develop programs to find optimal solutions for various problems using different algorithm strategies.	K3
2.	Analyze time complexity of various algorithm design techniques	K4
3.	Develop programs to implement advanced trees and pattern matching algorithms	K3

List of Experiments:

Implement and analyze the following Algorithms using Divide and Conquer

- Binary Search
- Merge Sort
- Quick Sort

Implement following Algorithms using Greedy Method

- Minimum-cost spanning tree
- Single Source Shortest Path (Dijkstra's)

Implement following Algorithms using Dynamic programming

- Optimal binary search trees
- Traveling salesperson problem

Implement following Algorithms using Backtracking

- N-Queens problem
- Graph Coloring problem

Implement following Tree Operations

- AVL Tree
- Splay Tree

Implement following Pattern Matching Algorithms.

- KMP Algorithm
- RK Algorithm

TEXTBOOKS:

- Fundamentals of Computer Algorithms 2nd edition by Ellis Horowitz, SartajSahni, S. Rajasekharan, university press, 2008
- Advanced Data Structures – Peter Brass, Cambridge University Press, 2008

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3205	PC	--	--	3	1.5	15	35	3 Hrs.
INTERNET OF THINGS LAB								
(For CSD)								
Course Objectives:								
1.	To know how to use various hardware components and Protocols in IoT applications							
2.	To Know how to develop various IoT applications							
Course Outcomes: At the end of the course Students will be able to								
S. No	Outcome							Knowledge Level
1.	Use sensors, actuators, Arduino and Raspberry pi in IoT applications							K3
2.	Design and Develop various IoT applications.							K4
SYLLABUS								
1.	To interface Bluetooth with Raspberry Pi/Arduino and write a program to send sensor data to smart phone using Bluetooth.							
2.	To interface Bluetooth with Raspberry Pi/Arduino and write a program to to turn ON/OFF LED when '1'/'0' is received from smart phone using Bluetooth.							
3.	Application of WiFi in IoT Systems							
4.	App design for WiFi application to ON/OFF Light							
5.	Use of various network protocols in IoT systems							
6.	Application of 802.15.4 Zigbee in IoT Systems.							
7.	Design a simple IoT System comprising sensor, Wireless Network connection, Data Analytics							
8.	Design and Interface ESP32 with DC motor using L298 motor driver							
9.	Experiment on connectivity of Rasberry Pi with existing system components.							
Text Books:								
1.	Internet of Things: Architecture, Design Principles and Applications, Rajkamal, McGraw Hill Higher Education. 2017							
2.	Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 1 st edition, 2014.							
Reference Books:								
1.	Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley, 1 st edition, 2014.							
2.	Getting Started with the Internet of Things CunoPfister,Oreilly. 2011							
3.	Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD),2014.							
e-Resources:								
1.	Introduction to Internet of Things, https://swayam.gov.in/nd1_noc20_cs66/preview							
2.	An Introduction to Programming the Internet of Things(IoT) specialization, https://www.coursera.org/specializations/iot							

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CD3206	SOC	1	0	2	2	--	50	3 Hrs.
MERN STACK TECHNOLOGIES-MODULE I								
(Skill Oriented Course)								
(For CSD)								
Course Objective:								
1.	The core concepts of frontend and dynamic, responsive development for web applications.							
Course Outcomes: At the end of the course Students will be able to								
S. No	Outcome							Knowledge Level
1.	Develop static web pages using HTML & CSS elements							K4
2.	Develop dynamic web pages and validate them using JavaScript							K4
3.	Develop I/O Intensive Web Pages using NodeJS							K4
List of Experiments:								
1.	<p>HTML 5: Introduction to Web, Overview of Web Technologies, HTML - Introduction, HTML - Need, Platform-independency, DOCTYPE Declaration, Types of Elements, HTML Elements – Attributes, Paragraph Element, Division and Span Elements, List Element, Link Element, Character Entities, HTML5 Global Attributes, Creating Table Elements, Table Elements : Colspan/ Rowspan Attributes, border, cellpadding and cellspacing attributes, Creating Form Elements, Input Elements - Attributes, Color and Date Pickers, Select and Data list Elements, Editing Elements, Media.</p> <p>CSS: Introduction CSS, Applying CSS to HTML, Selectors, Properties and Values, CSS Colors and Backgrounds, CSS Box Model, CSS Margins, Padding, and Borders, CSS Text and Font Properties</p>							
2.	<p>JAVASCRIPT: Why we need JavaScript, What is JavaScript, Environment Setup, Working with Identifiers, Type of Identifiers, Primitive and Non Primitive Data Types, Operators and Types of Operators, Types of Statements, Non - Conditional Statements, Types of Conditional Statements, If and Switch Statements, Types of Loops, Types of Functions, Declaring and Invoking Function, Arrow Function, Function Parameters, Nested Function, Built-in Functions, Variable Scope in Functions, Working With Classes, Creating and Inheriting Classes, In-built Events and Handlers, Working with Objects, Types of Objects, Creating Objects, Combining and cloning Objects using Spread operator, Destructuring Objects, Browser and Document Object Model, Creating Arrays, Array Methods.</p>							
3.	<p>NodeJS: What is NodeJs, Functions, Buffer, Modules & Types, Core Modules, Local Modules, Modules Exports</p>							

	<p>What is NPM?, Installing Packages Locally, Installing package globally, Adding dependency in package Json, Updating packages</p> <p>Creating Web Server, Sending Requests, Handling HTTP requests,</p> <p>File System - Read File, Writing a File, Opening a File, Deleting a File, Writing a file asynchronously, Other I/O Operations</p> <p>Debugging Node JS Application Core Node JS Debugger</p>
4.	<p>ExpressJS:</p> <p>Event Emitter class, Inheriting Events, Returning event emitter</p> <p>Express JS, Configuring Routes, Working with Express</p> <p>Serving Static Resources, Serving Static Files, Working with Middle Ware</p>
5.	<p>TypeScript:</p> <p>TypeScript Overview, Intro to TypeScript, Tooling and Environment, Creating a TypeScript Project</p> <p>TypeScript, Type System, Enums, Functions, Interfaces and Classes, Modules, Generics, Mapped Types, Conditional Types, Decorators, Type Definitions, Configuration</p>
Text Books:	
1.	Programming the World Wide Web, 8th Edition Robert W Sebesta, Pearson, 2015.
2.	WebTechnologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.
3.	Beginning MERN Stack: Build and Deploy a Full Stack MongoDB, Express, React, Node.js App, by Greg Lim, 2021
References:	
1.	https://www.javatpoint.com/mern-stack
2.	https://blog.logrocket.com/mern-stack-tutorial/

Code	Category	L	T	P	C	I.M	E.M	Exam
B20MC3201	MC	3	--	--	--	--	--	3 Hrs.
EMPLOYABILITY SKILLS								
(Common to AIDS, AIML, CSBS, CSD, CSE, ECE & IT)								
Part-A: Verbal Ability								
Course Objectives:								
1.	To introduce concepts required in framing grammatically correct sentences and identifying errors While using Standard English.							
2.	To familiarize the learner with high frequency words as they would be used in their professional career.							
3.	To inculcate logical thinking in order to frame and use data as per the requirement							
4.	To acquaint the learner of making a coherent and cohesive sentences and paragraphs for composing a written discourse.							
5.	To familiarize students with soft skills and how it influences their professional grow.							
Course Outcomes: The students will be able to								
S.No	Outcome							Knowledge Level
1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/company specific tests and frame grammatically Correct sentences while writing.							K3
2	Answer questions on synonyms, antonyms and other vocabulary-based Exercises while attempting CAT, GRE, GATE and other related tests.							K3
3	Use their logical thinking ability and solve questions related to analogy, Syllogisms, and other reasoning-based exercises.							K3
4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.							K3
SYLLABUS								
UNIT-I	Spotting Errors, Sentence Improvement							
UNIT-II	Synonyms, Antonyms, Frequently Confused Words, Foreign Phrases, Idioms and Phrasal Verbs, Collocations.							
UNIT-III	Foreign Phrases, Idioms and Phrasal Verbs, Collocations, Analogies, Odd One Out							
UNIT-IV	Sentence completion, Sentence Equivalence, Close Test							
UNIT-V	Reading Comprehension, Para Jumbles							

Text Books:		
1.	Oxford Learners,, Grammar–Finder by John Eastwood, Oxford Publication.	
2.	RS Agarwal books on objective English and verbal reasoning	
3.	English Vocabulary in Use-Advanced, Cambridge University Press	
4.	Collocations In Use, Cambridge University Press	
5.	Soft Skills & Employability Skills by Samina Pillai and Agna Fernandez, Cambridge University Press India Pvt .Ltd.	
6.	Soft Skills, by Dr.K.Alex, S. Chand & Company Ltd., New Delhi	
Reference Books:		
1.	English Grammar in Use by Raymond Murphy, CUP	
2.	Websites: Indiabix,800score, official CAT, GRE and GMAT sites	
3.	Material from IMS, Career Launcher and Time institutes for competitive exams	
4.	The Art of Public Speaking by Dale Carnegie	
5.	The Leader in You by Dale Carnegie	
6.	Emotional Intelligence by Daniel Golman	
7.	Stay Hungry Stay Foolish by Rashmi Bansal	
8.	I have a Dream by Rashmi Bansal.	
Part-B: Quantitative Aptitude-I		
Course Objectives:		
1.	To familiarize students with basic problems on numbers and ratios problems.	
2.	To enrich the skills of solving problems on time, work, speed, distance and also Measurement of units.	
3.	To enable the students to work efficiently on percentage values related to shares, profit and Loss problems.	
4.	To inculcate logical thinking by exposing the students to reasoning related questions.	
5.	To inculcate logical thinking by exposing the students to reasoning related questions.	
Course Outcomes: The students will be able to		
S.No.	Course Outcome	Knowledge Level
1.	The students will be able to perform well in calculating on number problems and various units of ratio concepts	K3
2.	The students will be able to solve problems on time and distance and units related solutions	K3
3.	The students will become adept in solving problems related to profit and loss, in specific, quantitative ability	K3
4.	The students will present themselves well in the recruitment process using analytical and logical skills which he or she developed during	K3

	the course as they are very important for any person to be placed in the industry	
5.	The students will learn to apply Logical thinking to the problems of Syllogisms and be able to effectively attempt competitive examinations like CAT, GRE, GATE for further studies	K3
SYLLABUS		
UNIT-I	Numbers, LCM and HCF, Chain Rule, Ratio and Proportion Importance of different types of numbers and uses of them: Divisibility tests, finding remainders in various cases, Problems related to numbers, Methods to find LCM, Methods to find HCF, applications of LCM, HCF. Importance of chain rule, Problems on chain rule, Introducing the concept of ratio in three Different methods, Problems related to Ratio and Proportion	
UNIT-II	Time and work, Time and Distance Problems on manpower and time related to work, Problems on alternate days, Problems on hours of working related to clock, Problems on pipes and cistern, Problems on combination of the some or all the above, Introduction of time and distance, Problems on average speed, Problems on Relative speed, Problems on trains, Problems on boats and streams, Problems on circular tracks, Problems on polygonal tracks, Problems on races.	
UNIT-III	Percentages, Profit Loss and Discount, Simple interest, Compound Interest, Partnerships, shares and dividends. Problems on percentages-Understanding of cost price, selling price, marked price, discount, percentage of profit, percentage of loss, percentage of discount, Problems on cost price, selling price, market price, discount. Introduction of simple interest, Introduction of compound interest, Relation between simple interest and compound interest, Introduction of partnership, Sleeping partner concept and problems, Problems on shares and dividends, and stocks.	
UNIT-IV	Introduction, number series, number analogy, classification, Letter series, ranking, directions Problems of how to find the next number in the series, Finding the missing number and related sums, Analogy, Sums related to number analogy, Ranking of alphabet, Sums related to Classification, Sums related to letter series, Relation between number series and letter series, Usage of directions north, south, east, west, Problems related to directions north, south, east, west.	
UNIT-V	Data sufficiency, Syllogisms Easy sums to understand data sufficiency, Frequent mistakes while doing data sufficiency, Syllogisms Problems.	
Text Books:		
1.	Quantitative aptitude by RS Agarwal	
2.	Verbal and nonverbal reasoning by RS Agarwal	

3.	Puzzles to puzzle you by shakunatala devi.
References:	
1.	Barrons by Sharon Welner Green and IraK Wolf (Galgotia Publications pvt. Ltd.)
2.	Websites: m4maths, Indiabix, 800score, official CAT, GRE and GMAT sites
3.	Material from IMS, Career Launcher and Time,, institutes for competitive exams
4.	Books for CAT by Arun sharma.
5.	Elementary and Higher algebra by HS Hall and SR Knight.
Websites:	
1.	www.m4maths.com
2.	www.Indiabix.com
3.	www.800score.com
4.	Official GRE site
5.	Official GMAT site



Code	Category	L	T	P	C	I.M	E.M	Exam
B20HS3204	HS	2	--	--	--	--	--	--
GENDER SENSITIZATION								
(Common to ALL Branches)								
Course Objectives:								
1.	To develop students' sensibility with regard to issues of gender in contemporary India.							
2.	To provide a critical perspective on the socialization of men and women.							
3.	To introduce students to information about some key biological aspects of genders.							
4.	To help students reflect critically on gender violence and workplace security.							
5.	To expose students to more egalitarian interactions between men and women.							
Course Outcomes: At the end of the course, students will be able to								
S.No	Outcome							Knowledge Level
1.	Understand the important issues relating to gender in contemporary India.							K2
2.	Get sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender.							K2
3.	Attain a finer grasp of how gender discrimination works in our society and how to counter it.							K2
4.	Acquire insight into the gendered division of labour and its relation to politics and economics.							K2
5.	Develop a sense of appreciation for both men and women in all walks of life.							K3
SYLLABUS								
UNIT-I	Understanding Gender and Related Concepts - Gender in Everyday Life Introduction: Conceptual Connotation – Sex and Gender – Basic Gender Concepts - Gendered Socialization – Gender Stereotypes –Exploring Attitudes towards Gender – Gender Roles & Relationships - Myths – Gender in Indian society – Early days – Later Vedic Period –Medieval and British Period – Independent India.							
UNIT-II	Introduction to Gender Justice- Notion and Significance Division and Valuation of Work – Housework- The Invisible Work - “My Mother doesn't work,” - Offences against Women –Fact and Fiction - Status of Women in Society – Gender and Human Rights - Gender Equality – Gender Justice – Notion and Significance							
UNIT-III	International and Constitutional Perspectives on Gender Equality The International Bill of Rights, 1979 –Declaration on the Elimination of Violence against women 1993 –The Rights of Women –Beijing Platform for Action 1995 – Constitutional Guarantees – Fundamental Rights – Equality.							

UNIT-IV	Gender and Culture Gender and Film - Gender and Electronic Media – Gender and Advertisement – Gender and Popular Literature – Gender Issues - Gender-Sensitive Behaviour – Gender being Together as Equals.
UNIT-V	Gender Violence- Within and Beyond Violence – Gender Violence – Types of Gender Violence –Gender Violence in Indian Perspective – -Women Specific Legislations for the Elimination of Violence Within and Beyond.
Reference Books:	
1.	“Towards A World Of Equals: A Bilingual Textbook on Gender” by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas, and Susie Tharu, Published by Telugu Akademi (2015).
2.	Ferber, Holcomb & Wentling, Sex, Gender & Sexuality: The New Basics, Oxford Univ. Press 2008.
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