



Estd:1980

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

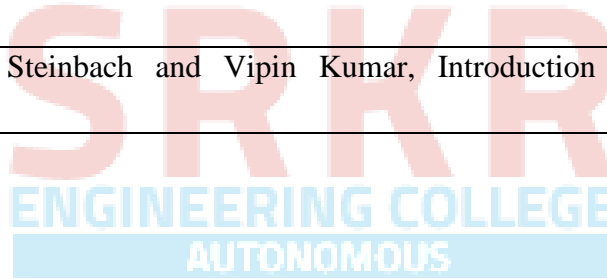
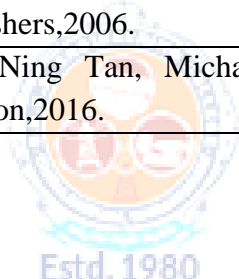
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204

Regulation: R20		III / IV - B.Tech. I - Semester							
COMPUTER SCIENCE & ENGINEERING									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2020-21 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
B20CS3102	Formal Languages and Automata Theory	PC	3	3	0	0	30	70	100
B20CS3103	Computer Networks	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
B20CS3109	Computer Networks Lab	PC	1.5	0	0	3	15	35	50
B20HS3102	Soft Skills (Skill Oriented Course)	SOC	2	1	0	2	--	50	50
B20MC3103	Advanced Coding	MC	0	3	0	0	--	--	--
B20CS3110	Summer Internship	PR	1.5	--	--	--	--	50	50
TOTAL			21.5	19	0	8	180	520	700

	Course Code	Course
#PE-I	B20CS3104	Artificial Intelligence
	B20CS3105	Software Project Management
	B20CS3106	Distributed Systems
	B20CS3107	Advanced Unix Programming
#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								
(For CSE)								
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 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)	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. Getting to Know Your Data: Data Objects and Attribute Types, Statistical Descriptions of Data, Estimating Data Similarity and Dissimilarity.							
UNIT-II (10 Hrs)	Data Preprocessing: Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization. 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.							
UNIT-III (10 Hrs)	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-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.



Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3102	PC	3	--	--	3	30	70	3 Hrs.
FORMAL LANGUAGES AND AUTOMATA THEORY								
(For CSE)								
Course Objectives: Students are expected								
1	How to design Automata's as Acceptors, Verifiers and Translators							
2	Fundamentals of Regular and Context Free Grammars and Languages							
3	Understand the relation between different Languages and Automata							
4	Learn how to design Pushdown Automata and Turing Machine							
Course Outcomes: At the end of the course students will be able to								
S.No	Outcome							Knowledge Level
1.	Construct of Finite Automata with output and without output							K3
2.	Illustrate regular expressions, equivalence of Finite Automata and Regular expressions and properties of Regular languages.							K2
3.	Construct Context Free Grammars, Regular grammars, simplification and Normal forms in Context Free Grammars							K3
4.	Illustrate properties of Context Free Language and Construct Pushdown Automata							K3
5.	Summarize decidable and un-decidable problems and Construct of Turing Machine							K3
SYLLABUS								
UNIT-I (09 Hrs)	Importance of Automata Theory, Central Concepts of Automata Theory, Introduction to DFA and NFA, Acceptance of a String by a DFA, Acceptance of a String by NFA, Design of DFAs, Design of NFAs, Conversion of NFA to DFA, Introduction to NFA with ϵ -Transitions, Conversion of NFA with ϵ -Transitions to NFA without ϵ -Transitions. Minimization of DFA, Introduction to Mealy and Moore Machines, Design of Mealy and Moore Machines, Conversion of Mealy to Moore Machines and Moore to Mealy Machines, Applications and Limitations of Finite Automata.							
UNIT-II (09 Hrs)	Introduction to Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Conversion of Regular Expression to NFA with ϵ -Transitions, Conversion of DFA to Regular Expression. Pumping Lemma of Regular Languages, Applications of pumping lemma, Closure Properties of Regular Languages, Applications of Regular Expressions.							

UNIT-III (09 Hrs)	Chomsky Hierarchy, Regular Grammar, Left-Linear Grammar, Right-Linear Grammar, Conversion of Finite Automata to Regular Grammars and Regular Grammars to Finite Automata, Context Free Grammar, Construction of CFGs for Languages, Determining language of the grammar, Leftmost and Rightmost Derivations, Parse Trees. Ambiguous Grammars, Simplification of Context Free Grammars (Elimination of Useless Symbols, ϵ -Productions and Unit Productions), Normal Forms (Chomsky Normal Form and Greibach Normal Form).
UNIT-IV (09 Hrs)	Pumping Lemma for CFL, Applications of pumping lemma for CFL, Closure Properties of CFL, Applications of Context Free Grammars, Introduction to Pushdown Automata, Model, Graphical Notation, Instantaneous Description, Language Acceptance of Pushdown Automata (Acceptance by empty stack and final state), Design of Pushdown Automata for CFL. Deterministic and Non-Deterministic Pushdown Automata, Conversion of Pushdown Automata to Context Free Grammars, Conversion of Context Free Grammars to Pushdown Automata, Application of Pushdown Automata.
UNIT-V (09 Hrs)	Introduction to Turing Machine, Representation of Turing Machines (Instantaneous Descriptions, Transition Tables and Transition Diagrams), Design of Turing Machines. Types of Turing Machines, Church's Thesis, Universal Turing Machine, Introduction to Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post's Correspondence Problem, Modified Post's Correspondence Problem, Introduction to Classes of P and NP, NP-Hard and NP-Complete Problems.
Textbooks:	
1.	Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rd Edition, Pearson, 2008.
2	An Introduction to Formal Languages and Automata, Peter Linz, 6th Edition, Jones & Bartlett, 2016.
Reference Books:	
1.	Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishra and N. Chandrasekharan, 3rd Edition, PHI, 2007.
2.	Elements of Theory of Computation, Lewis H.P. & Papadimition C.H., 2nd Edition, Pearson /PHI, 1998.
3.	Theory of Automata, Languages and Computation, Rajendra Kumar, 1st Edition, McGraw Hill, 2010

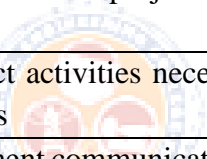
Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3103	PC	3	--	--	3	30	70	3 Hrs.
COMPUTER NETWORKS								
(For CSE)								
Course Objectives: Students are expected								
1	To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.							
2	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							K2
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 (08 Hrs)	Data Link Layer: Error Detection & Correction: types of errors, Error Detection (Parity, CRC, Check Sum), Error Correction (Using hamming code), 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 (08 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 (08 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
B20CS3104	PE	3	--	--	3	30	70	3Hrs.
ARTIFICIAL INTELLIGENCE								
(For CSE)								
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 of WFF to 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. 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. Structured Representations of Knowledge: Semantic Nets, Partitioned Semantic Nets, Frames, Conceptual Dependency and Scripts.
UNIT-V (10 Hrs)	Planning: Components of a Planning System, Goal Stack Planning, Nonlinear planning, hierarchical planning. Natural Language Processing: Steps in the Natural Language Processing, Augmented Transition Nets. 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.
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
B20CS3105	PE	3	--	--	3	30	70	3 Hrs.
SOFTWARE PROJECT MANAGEMENT								
(For CSE)								
Course Objectives: Students are expected to								
1	Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project							
2	Compare and differentiate organization structures and project structures							
3	Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools							
Course Out Comes: At the end of the course students will be able to								
S. No	OUT COME							Knowledge Level
1	Apply the process to be followed in the software development life-cycle models.							K3
2	Apply the concepts of project management & planning.							K3
3	Implement the project plans through managing people, communications and change							K3
4	Conduct activities necessary to successfully complete and close the Software projects							K3
5	Implement communication, modeling, and construction & deployment practices in software development.							K3
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SYLLABUS								
UNIT-I (12 Hrs)	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 (10 Hrs)	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 (10 Hrs)	Model Based Software Architectures: A Management perspective and technical perspective.							

	<p>Work Flows of the Process: Software process workflows, Iteration workflows.</p> <p>Checkpoints of the Process: Major milestones, Minor Milestones, Periodic status assessments.</p>
UNIT-IV (08 Hrs)	<p>Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.</p> <p>Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.</p>
UNIT-V (10 Hrs)	<p>Process Automation: Automation Building blocks, The Project Environment.</p> <p>Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.</p> <p>Project Estimation and Management: COCOMO model, Critical Path Analysis, PERT technique, Monte Carlo approach</p>
TEXTBOOKS:	
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, Pankaj Jalote, Pearson Education, 2005.
3.	Effective Software Project Management, Robert K. Wysocki, Wiley, 2006.

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Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3106	PE	3	--	--	3	30	70	3 Hrs.
DISTRIBUTED SYSTEMS								
(For CSE)								
Course Objectives: Students are expected to								
1	Understand the foundations of distributed systems.							
2	Learn issues related to clock Synchronization and the need for global state in distributed systems							
3	Learn distributed mutual exclusion and deadlock detection algorithms							
4	Understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems							
5	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</p>							

	algorithms: Introduction, 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 (08 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
B20PE3107	PE	3	--	--	3	30	70	3 Hrs.

ADVANCED UNIX PROGRAMMING

(For CSE)

Course Objectives: Students are expected to learn

1	Written technical communication and effective use of concepts and terminology.
2	Facility with UNIX command syntax and semantics.
3	Ability to read and understand specifications, scripts and programs.
4	Individual capability in problem solving using the tools presented within the class. Students will demonstrate a mastery of the course materials and concepts within in class discussions.

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

S.No	Outcome	Knowledge Level
1	Gain good knowledge on Unix commands	K2
2	Know about different system calls for files and directories	K2
3	Ability to know the working of Filters	K3
4	Applying shell programming and shell scripts	K3
5	Application of client server program for IPC.	K3

SYLLABUS

UNIT-I (12 Hrs)	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 (10 Hrs)	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 Chgrp Command Changing the Group of a File.
UNIT-III (10 Hrs)	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. Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.
UNIT-IV (08 Hrs)	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.
UNIT-V (10 Hrs)	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.
Textbooks:	
1.	The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2.	Introduction to Unix Shell Programming by M.G.Venkatesh murthy, Pearson.
Reference Books:	
1.	Unix and shell programming by B.M. Harwani, OXFORD university press.



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								
(For CSE)								
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, Boxplots 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				
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.							
6	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							

	<ul style="list-style-type: none"> 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
B20CS3109	PC	--	--	3	1.5	15	35	3 Hrs.
COMPUTER NETWORKS LAB								
(For CSE)								
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 Out Comes: At the end of the course students will be able to								
S. No	Outcome							Knowledge Level
1	Implement datalink 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
SYLLABUS								
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
B20HS3102	SOC	1	--	2	2	--	50	3Hrs.
SOFT SKILLS								
(Common to AIDS, CSBS, 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: 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
B20MC3103	MC	3	--	--	--	--	--	3 Hrs.

ADVANCED CODING

(For CSE)

Course Objectives: Students are expected to

1	Understand the essentials of coding.
2	Learn about linked lists.
3	Learn the use of Standard Template Library components.
4	Learn various selection based and pattern matching algorithms.
5	Learn different Graph algorithms

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

S.No	Outcome	Knowledge Level
1	Implement different Matrix forms and understand the importance of Efficient Coding solutions.	K3
2	Solve various classical problems on Linked Lists	K3
3	Solve coding Tasks with the help of STL.	K3
4	Apply Selection based algorithms to solve various problems.	K3
5	Apply Graph algorithms to solve network problems.	K3

SYLLABUS

UNIT-I (6 Hrs)	<p>Review of Coding essentials: Introduction to coding Platforms. Coding solution Vs. Efficient Coding solution. Types of solution approaches. Analyzing problem specific data requirement, Various data representations. Essential Data structures for fast coding. Matrix forms and representations, Spiral filling and printing, Clockwise and anticlockwise rotations, Zig-Zag form and Pattern coding.</p>
UNIT-II (8 Hrs)	<p>Linked Lists and Trees: Classical problems on linked lists, finding and removing duplicates in Linked list, Conversion of BST in to Linked list, Multiple links, Construct a doubly linked list from 2D Matrix, List Sorting using bubble Sort, Modular node in Linked List, Rotate doubly linked list by n nodes.</p>
UNIT-III (10 Hrs)	<p>Standard Library templates Introduction to C++ language: C++ Features, Working on STLs, Algorithms-Sortings and searching, Functions, Containers-Sequence, Associative, Unordered associative and Derived, Iterators.</p>

	Basic Techniques: Dynamic Arrays, Set structures, Map structures, Iterators and ranges, Generating Subsets, Generating permutations, Backtracking techniques, Pruning the search. Bit masking.
UNIT-IV (10 Hrs)	Essential Coding Algorithms: Selection based algorithms: sorting, Coin change problem, Fractional selections, Schedules matching, Huffman coding techniques, Minimizing sums, Data compression. Finding method count, Subsequence and related problems, paths in grid.
UNIT-V (10 Hrs)	Graph Algorithms: Graph Traversals, Bellman-Ford Algorithm, Euler path, tour, cycle – Eulerian Graph Bridges and articulation points. Strongly connected components in directed graphs.
Textbooks:	
1.	The C –Programming Language, B.W. Kernighan, Dennis M. Ritchie, Prentice Hall India Pvt.Ltd, Second Edition, 2015.
2.	Object Oriented Programming Using C++:Alok Kumar Jagadev , Amiya Kumar Rath, Satchidananda Dehuri,PHI,2010.
3.	Data Structures and Algorithm Analysis in C++ – Mark Allen Weiss, Third Edition, Pearson Edu Publishers, 2014.
Reference Books:	
1.	Data Structures and Algorithms: Concepts, Techniques and Applications – G.A.V.Pai, first edition, Tata Mc Graw Hill Publishers.2008.
2.	Advanced Data Structures – Peter Brass, first edition, Cambridge University Press, 2008.
3.	Introduction to Algorithms by Thomos H.cormen, 3rd Edition, PHI,2009.
E-Resources:	
1.	https://www.geeksforgeeks.org/ .
2.	https://www.tutorialspoint.com/



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

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

Estd:1980

Regulation: R20		III / IV - B.Tech. II - Semester							
COMPUTER SCIENCE & ENGINEERING									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2020-21 admitted Batch onwards)									
Course Code	Course Name	Category	Cr	L	T	P	Int. Marks	Ext. Marks	Total Marks
B20CS3201	Compiler Design	PC	3	3	0	0	30	70	100
B20CS3202	Machine Learning	PC	3	3	0	0	30	70	100
B20CS3203	Cryptography and Network Security	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
B20CS3208	Compiler Design Lab	PC	1.5	0	0	3	15	35	50
B20CS3209	Machine Learning using Python Lab	PC	1.5	0	0	3	15	35	50
B20CS3210	Cryptography and Network Security Lab	PC	1.5	0	0	3	15	35	50
B20CS3211	MEAN Stack Technologies and Data Structures (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	B20CS3204	Mobile Computing
	B20CS3205	Big Data Analytics
	B20CS3206	Object Oriented Analysis and Design
	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	LM	E.M	Exam
B20CS3201	PC	3	0	0	3	30	70	3Hrs.

COMPILER DESIGN

(For CSE)

Course Objectives:

1.	To study the various phases in the design of a compiler
2.	To understand the design of top-down, bottom-up parsers and syntax directed translation schemes
3.	To introduce LEX and YACC tools
4.	To learn to develop algorithms to generate code for a target machine

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

S No	Outcome	Knowledge Level
1.	Apply the knowledge in different phases of Compiler, specifying different types of tokens in lexical analyzer and use the Compiler tools like LEX.	K3
2.	Construct top-down parser, shift reduce parser for CFG.	K3
3.	Construct LR parsers for CFG and summarize Syntax directed translation schemes.	K3
4.	Summarize intermediate code and illustrate code optimization techniques.	K3
5.	Illustrate code generation and runtime environments.	K3

SYLLABUS

UNIT-I (10Hrs)	<p>Language Processors: Introduction to Language Processing, Structure of a Compiler, The Science of Building a Compiler, Compiler-Construction Tools.</p> <p>Lexical Analysis: The Role of Lexical Analysis, Input Buffering, Specification of Tokens, Recognition of Tokens, The Lexical Analyzer Generator LEX.</p>
UNIT-II (10Hrs)	<p>Syntax Analysis: The Role of a Parser, CFG (Definition of CFG, Derivations and Parse Trees, Ambiguity), Bottom-up Parsing (Shift Reduce Parsing), Elimination of Left Recursion in CFG, Elimination of Left Factoring in CFG, FIRST and FOLLOW in CFG, Top-down Parsing (Recursive-Descent Parsing and Predictive Parsing).</p>
UNIT-III (10Hrs)	<p>Introduction to LR Parser: Simple LR Parsing, More Powerful LR Parser (Canonical LR and LALR Parsing), Error Recovery in LR parser, The Parser Generator YACC.</p> <p>Syntax-Directed Translation: Syntax Directed Definitions (Inherited and Synthesized Attributes, Evaluating an SDD at Nodes of Parse Tree), Evolution Order of SDTS (Dependency Graphs, Ordering the Evaluation of Attributes, S-Attributed Definitions and L-Attributed Definitions), Application of SDTS (Construction of Syntax Trees),</p>

	Syntax Directed Translation Schemes (Postfix Translation Schemes, Parser Stack Implementation of Postfix SDT's).
UNIT-IV (10Hrs)	<p>Intermediate Code Generation: Variants of Syntax Trees (DAG for Expressions, The Value-Number Method for Constructing DAG's), Three-Address Code (Three Address Code, Quadruples, Triples and Indirect Triples), Type Checking (Rules for Type Checking and Type Conversion).</p> <p>Code Optimization: The Principal Sources of Optimization, Introduction to Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Introduction to Data-Flow Analysis.</p>
UNIT-V (10Hrs)	<p>Code Generation: Issues in the Design of a Code Generator, The Target Language, A Simple Code Generator, Code Generation from DAG, Peephole Optimization, Register Allocation and Assignment.</p> <p>Run-time Environments: Storage Organization, Stack Allocation of Space, Heap Management, Symbol Tables (Symbol Table Per Scope, Use of Symbol Tables).</p>
Text Books:	
1.	Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson, Pearson Education India; 2nd edition, 2013
2.	Compiler Construction-Principles and Practice, Kenneth C Loudon, Cengage Learning, 2 nd Edition, 1 January 2011.
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

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3202	PC	3	--	--	3	30	70	3 Hrs.
MACHINE LEARNING								
(For CSE)								
Course Objectives: Students are expected to								
1	Introduce the basic concepts and techniques of Machine Learning							
2	Demonstrate regression, classification and clustering methods.							
3	Introduce 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	Formulate the concepts of ingredients and preliminaries of machine learning							K3
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							K2
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>Linear Models: The least-squares method: Univariate linear regression, Logistic Regression, Support vector machines (Except Logistic regression others Peter Flach)</p> <p>Distance Based Models: Introduction, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.</p>							
UNIT-III (10 Hrs)	<p>Features: Kinds of feature, Feature transformations: Thresholding and discretisation, Normalisation, Incomplete Features, Feature construction and selection.</p>							

	Model ensembles: Bagging, random forests, Boosting: AdaBoost, Gradient Boosting, XGBoost
UNIT-IV (08 Hrs)	Dimensionality Reduction: PCA, 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 perceptrons: Going forwards, Going backwards: Backpropagation of error, Multilayer perceptron in practice, Examples of using MLP. Reinforcement Learning: Overview, Example, Markov Decision Process, Values, Back on Holiday: Using reinforcement learning, Uses of Reinforcement Learning
Textbooks:	
1.	Introduction to Machine Learning, Alpaydin E, MIT Press (2014) 3rdEdition
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	Python Machine Learning Cookbook-Practical Solutions from Preprocessing to Deep Learning, Chris Albon, Oreilly, 2018.
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.	“Principal Component Analysis versus Linear Discriminant Analysis”, https://medium.com/analytics-vidhya/illustrative-example-of-principalcomponent-analysis-pcavs-linear-discriminant-analysis-lda-is-105c431e8907
3.	“A gentle introduction to K-fold cross validation”, https://machinelearningmastery.com/k-foldcross-validation/
4.	Grid search for model tuning”, https://medium.com/analyticsvidhya/illustrative-example-ofprincipal-component-analysis-pca-vs-lineardiscriminant-analysis-lda-is-105c431e8907
5.	“Regularization in Machine Learning”, https://towardsdatascience.com/regularization-inmachine-learning76441ddcf99a

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3203	PC	3	--	--	3	30	70	3 Hrs.

CRYPTOGRAPHY AND NETWORK SECURITY

(For CSE)

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	Identify 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)	<p>Introduction to Cryptography: Security Attacks, Services & Mechanisms, Symmetric Cipher Model, Substitution and Transposition Techniques.</p> <p>Block Ciphers: Traditional Block Cipher Structure, Block Cipher Design Principles.</p>
UNIT-II (12 Hrs)	<p>Symmetric Key Cryptography: Data Encryption Standard (DES), Advanced Encryption Standard (AES), IDEA, Block Cipher Modes of Operations.</p> <p>Public Key Cryptography: Principles, Public Key Cryptography Algorithms, Euler's Theorem, RSA Algorithm, Diffie-Hellman Key Exchange.</p>
UNIT-III (12 Hrs)	<p>Cryptographic Hash Functions: Application of Cryptographic Hash Functions, SHA and MD5 Algorithms, Message Authentication Functions, HMAC & CMAC.</p> <p>Digital Signatures: DSS, DSS with RSA</p>

	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.
Textbooks:	
1.	Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition.
2.	Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition.
3.	Blockchain Fundamentals- Ravindhar vadapalli, https://www.researchgate.net/publication/345045424_
Reference Books:	
1.	Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyaya, McGrawHill, 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

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3204	PE	3	0	0	3	30	70	3 Hrs.
MOBILE COMPUTING								
(For CSE)								
Course Objectives:								
1.	To study the emerging technologies in the context of wireless networks							
2.	To understand the mobile computing environment							
3.	To learn about pervasive computing environment							
Course Outcomes: At the end of the course Students will be able to								
S. No	Outcome							Knowledge Level
1.	Discuss fundamental challenges in mobile communications							K2
2.	Demonstrate different Architectures for Mobile communication							K3
3.	Elaborate various IP, TCP protocols for mobile and ad-hoc networks							K3
4.	Illustrate different data delivery methods and synchronization protocols							K3
5.	Identify Wireless local area networks (WLAN) and their protocols							K2
SYLLABUS								
UNIT-I (10 Hrs)	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, Limitations of mobile devices.							
UNIT-II (10 Hrs)	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-2000/3G wireless communication standards, WCDMA 3G communication standards, CDMA 3G communication standards, Broadband wireless access, 4G networks, 5G Networks.							

UNIT-III (10 Hrs)	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
UNIT-IV (10 Hrs)	Synchronization: Synchronization in mobile computing systems, Usage models for Synchronization in mobile application, Domain-dependant specific rules for data synchronization, , synchronization and conflict resolution strategies, synchronizer; Mobile agent: mobile agent design, aglets; Application Server.
UNIT-V (10 Hrs)	Mobile Wireless Short Range Networks and Mobile Internet: Wireless networking and wireless LAN, Wireless LAN (WLAN) architecture, , Wireless application protocol (WAP)-WAP1.1 architecture, wireless datagram protocol (WDP), Wireless Transport Layer Security (WTLS), 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, Lothar Merk, Martin S. Nocklous, Thomas Stober, Springer.2003
2.	“Mobile Communications” 2 nd Edition JOCHEN SCHILLER
e-Resources:	
1.	A course on Mobile Computing, https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3205	PE	3	--	--	3	30	70	3 Hrs.
BIG DATA ANALYTICS								
(For CSE)								
Course Objectives: Students are expected to								
1	Optimize business decisions and create competitive advantage with Big Data analytics							
2	Analyze the big data using intelligent techniques							
3	Introduce programming tools PIG & HIVE in Hadoop ecosystem							
Course Outcomes: At the end of the course students will be able to								
S. No	Outcome							Knowledge Level
1	Illustrate big data challenges in different domains including social media, transportation, finance and medicine							K3
2	Use various techniques for mining data stream							K3
3	Design and develop Hadoop							K2
4	Identify the characteristics of datasets and compare the trivial data and big data for various applications							K2
5	Explore the various search methods and visualization techniques							K2
SYLLABUS								
UNIT-I (12 Hrs)	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 (10 Hrs)	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 (10 Hrs)	Introduction to Hadoop: Hadoop: History of Hadoop, the Hadoop Distributed File System, Components of Hadoop Analysing 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 (08 Hrs)	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 (10 Hrs)	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
Textbooks:	
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”, McGrawHill 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.

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3206	PE	3	--	--	3	30	70	3 Hrs.
OBJECT ORIENTED ANALYSIS AND DESIGN								
(For CSE)								
Course Objectives: Students are expected to								
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	Outcome							Knowledge Level
1	Illustrate software development process							K3
2	Illustrate Object Oriented Structural Modeling and Design Class & Object Diagrams							K4
3	Design Basic Behavioral Modeling							K4
4	Design Advanced Behavioral Modeling							K4
5	Select suitable pattern while designing a system							K3
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 (08 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
B20CS3207	PE	3	--	--	3	30	70	3 Hrs.
NETWORK PROGRAMMING								
(For CSE)								
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-get sockname and get peername 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
B20CS3208	PC	--	--	3	1.5	15	35	3Hrs.
COMPILER DESIGN LAB								
(For CSE)								
Course Objectives:								
1.	To implement the different Phases of compiler.							
2.	To get exposure to compiler writing tools LEX and YACC							
Course Outcomes: At the end of the course Students will be able to								
S. No	Outcome							Knowledge Level
1.	Construction of DFA and NFA.							K4
2.	Implement the techniques of Lexical Analysis.							K4
3.	Implement the techniques of Syntax Analysis.							K4
4.	Generate intermediate code, Implement Optimization techniques and in turn generate machine level code.							K4
5.	Apply the knowledge of LEX and YACC tools to develop programs.							K4
SYLLABUS								
Exercise-1								
1.	a) Write a program to construct DFA from the given regular expression and test whether the given string is accepted or not b) Write a program to construct NFA from the given regular expression and test whether the given string is accepted or not							
Exercise-2								
2.	a) Write a Program for lexical analyzer to read if, for, while statements and separate them to characters, and then group them to form the tokens. b) Write a Program for lexical analyzer recognize identifiers, constants, operators and key words of the mini language. c) Write a Program for lexical analyzer to read an expression and identify the tokens variables constants and operators in it.							
Exercise-3								
3.	a) Write a parsing program to identify whether the given expression is valid or not. b) Write a program to implement shift reduce parser for the simple CFG. c) Implement recursive descent parser by creating a separate function for each variable from the given CFG. d) Write a program to determine FIRST sets for all variables and terminals from the given CFG. e) Write a program to determine FOLLOW sets for all variables from the given CFG. f) Write a program which takes predictive parsing table as input and to determine whether the input string is accepted or not.							

	Exercise-4
4.	<ul style="list-style-type: none"> a) Write a program to take simple expressions and generate the corresponding three address statements. b) Write a program to perform loop unrolling. c) Write a program to perform constant propagation d) Write a program to implement simple code generator from the given three address statements.
	Exercise-5
5.	<ul style="list-style-type: none"> a) Implement the lexical analyzer using JLex, flex or lex other lexical analyzer generating tools. b) Write a LEX specification program for the tokens of C language c) Write YACC program to implement a calculator and find the value of arithmetic expression.
Reference Books:	
1.	Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson, Pearson Education India; 2nd edition, 2013
2.	Compiler Construction-Principles and Practice, Kenneth C Loudon, Cengage Learning, 2 nd Edition, 1 January 2011.
3.	Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
4.	The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
5.	Writing compilers and interpreters, R. Mak, 3rd edition, Wiley student edition.
e-Resources:	
1.	https://nptel.ac.in/courses/106/104/106104123

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3209	PC	--	--	3	1.5	15	35	3 Hrs.
MACHINE LEARNING USING PYTHON LAB								
(For CSE)								
Course Objectives: Students are expected to								
1	Implement different mechanisms in pre-processing and model evaluation & implementation							
2	Implement different dimensionality reduction techniques							
3	Implement different clustering & classification techniques							
4	Evaluate the model.							
5	Implement simple linear, logistic regressions and Feed-Forward Network							
Course Outcomes: At the end of the course students will be able to								
S. No	Outcome	Knowledge Level						
1	Design Pre-processing model for their own data sets.	K4						
2	Apply dimensional reduction techniques for their own datasets	K3						
3	Develop different clustering & classification techniques	K3						
4	Evaluate the model with Lasso and Ridge Regularization	K5						
5	Design neural network for structured, unstructured data classification and regression	K4						
SYLLABUS								
Experiment 1:	Data pre-processing: Handling missing values, handling categorical data, bringing features to same scale, selecting meaningful features							
Experiment 2:	Model Evaluation and optimization: K-fold cross validation, learning and validation curves, grid search							
Experiment 3:	Compressing data via dimensionality reduction: PCA, LDA							
Experiment 4:	Ensemble Learning, Data Clustering & Classification							
Experiment 5:	Write a program to evaluate clustering model							
Experiment 6:	Vector addition.							
Experiment 7:	Regression model.							
Experiment 8:	Write a program to reduce variance of a linear regression model using Lasso and Ridge Regularization							
Experiment 9:	Write a program to implement logistic regression for binary classification and multiclass classification							
Experiment 10:	Perceptron for digits.							
Experiment 11:	Feed-Forward Network for wheat seeds dataset.							
Experiment 12:	Write a program to implement a neural network for regression.							
Experiment 13:	Write a program to save and load a trained machine learning model							

Additional Programs	
Experiment 1:	Image Classifier using CNN.
Experiment 2:	Transfer Learning for cat vs dog.
Experiment 3:	Autoencoder for MNIST
Experiment 4:	Sentiment analysis with RNN and LSTM.
REFERENCE BOOKS:	
1.	Chris Albon, “Machine Learning with Python Cookbook-practical solutions from preprocessing to Deep learning”, O’REILLY Publisher,2018
2.	Sebastian Raschka & Vahid Mirjalili, “Python Machine Learning”, Packt Publisher, 2017
3.	Ian Good Fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
4.	Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.
5.	Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress , 2017.
6.	Ragav Venkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press, 2018.
7.	Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.
8.	Joshua F. Wiley, “R Deep Learning Essentials”, Packt Publications, 2016
Useful Reference Links:	
1.	https://scikit-learn.org/stable/modules/generated/sklearn.linear_model.Perceptron.html
2.	https://towardsdatascience.com/15-data-exploration-techniques-to-go-from-data-to-insights93f66e6805df
3.	https://medium.com/ml-research-lab/chapter-4-knowledge-from-the-data-and-data-explorationanalysis-99a734792733
4.	https://machinelearningmastery.com/implement-backpropagation-algorithm-scratch-python/
5.	https://www.analyticsvidhya.com/blog/2016/01/guide-data-exploration/
6.	https://towardsdatascience.com/wtf-is-image-classification-8e78a8235acb
7.	https://medium.com/nybles/create-your-first-image-recognition-classifier-using-cnn-keras-andtensorflow-backend-6eaab98d14dd
8.	https://analyticsindiamag.com/learn-image-classification-using-cnn-in-keras-with-code/
9.	https://www.tensorflow.org/tutorials/images/transfer_learning
10.	https://www.pyimagesearch.com/2020/02/17/autoencoders-with-keras-tensorflow-and-deeplearning/
11.	https://d2l.ai/chapter_natural-language-processing-applications/sentiment-analysis-rnn.html
12.	https://towardsdatascience.com/sentiment-analysis-using-lstm-step-by-step-50d074f0994

Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3210	PC	--	--	3	1.5	15	35	3 Hrs.
CRYPTOGRAPHY AND NETWORK SECURITY LAB								
(For CSE)								
Course Objectives: Students are expected to								
1	Learn Traditional cryptographic techniques.							
2	Understand basic concepts of security services with symmetric and asymmetric algorithms.							
3	Understand user and message authentication with MD-5, SHA-1 and Digital Signature algorithms.							
Course Outcomes: At the end of the course students will be able to								
S. No	Outcome							Knowledge Level
1	Develop simple XOR operation for encryption of data							K4
2	Develop Symmetric cryptography.							K4
3	Develop Asymmetric cryptography.							K4
4	Implement Diffie-Hellman Key exchange algorithm.							K3
5	Develop programs on MD-5, SHA-1 algorithms.							K4
6	Implement Digital Signature Standard.							K3
SYLLABUS								
Experiment 1:	Write a 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.							
Experiment 2:	Write a 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.							
Experiment 3:	Write a program to perform encryption and decryption using the following algorithms 1. Ceaser cipher 2. Substitution cipher 3. Hill Cipher							
Experiment 4:	Write a program to implement the DES algorithm logic.							
Experiment 5:	Write a program to implement the AES algorithm logic.							
Experiment 6:	Write a program to implement RSA algorithm.							
Experiment 7:	Implement the Diffie-Hellman Key Exchange mechanism.							
Experiment 8:	Calculate the message digest of a text using the SHA-1 algorithm.							
Experiment 9:	Calculate the message digest of a text using the MD5 algorithm.							
Experiment 10:	Implement the Signature Scheme using Digital Signature Standard							
Note: All Programs can do either in C Language or Java Language								

REFERENCE BOOKS:	
1.	Cryptography and Network Security- William Stallings, Pearson Education, 7 th Edition.
2.	Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition.
3.	Cryptography and Network Security- Behrouz A Forouzan, DebdeepMukhopadhyaya, Mc-GrawHill, 3 rd Edition, 2015.
4.	Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall PTR
5.	Cryptography: Theory and Practice by Douglas R. Stinson, CRC press.



Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS3211	SOC	1	--	2	2		50	3 Hrs.
MEAN STACK TECHNOLOGIES AND DATA STRUCTURES								
(Skill Oriented Course)								
(For CSE)								
Course Objectives: Students are expected to learn								
1	The core concepts of frontend and backend development for web applications.							
Course Outcomes: At the end of the course students will be able to								
S. No	Outcome							Knowledge Level
1	Develop dynamic web pages and validate them using JavaScript							K4
2	Develop web pages using PHP and MySQL							K4
Advanced Trees:								
Balanced Search Trees, AVL tree properties, implementation and its operations, Construction of Red Black Trees, Splay Trees and 2-3 Trees.								
m-ary Search Trees, B-Tree Construction and its Operations.								
Data Structures for Strings: Tries and Compressed Tries, Suffix Trees and Suffix Arrays.								
Pattern Matching and Hashing:								
Pattern Matching Algorithms :								
Naïve string searching, z-algorithm, Rabin-Karp, KMP Algorithm.								
Hashing Techniques:								
Hash Table Structure, Hash Function, Collision handling, Separate Chaining. Open Addressing and Rehashing.								
LIST OF EXPERIMENTS								
JavaScript -	JavaScript Objects Primitives Operations and Expressions Variables and Operators Control Statements Switch Case Looping in JS Arrays Date and Time Functions Pattern Matching using Regular Expressions.							
PHP Programming:								
PHP Creating PHP script, Running PHP script								

Working with variables and constants: Using variables, Using constants, Datatypes, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions.	
MYSQL: Installation Accessing MYSQL using PHP Form Handling, Cookies, Session Tracking, Tables inserting data into Tables Selecting Data from a Table, Updating Table Deleting data from Table.	
TEXTBOOKS:	
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	Java Script & jQuery the missing manual, 2nd Edition, David sawyer mcfarland, O'Reilly, 2011.
REFERENCE BOOKS:	
1.	Ruby on Rails Up and Running, Lightning fast Web development, 1st Edition, Bruce Tate, Curt Hibbs, Oreilly, 2006
2.	Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, 1st Edition, Dream Tech, 2009

Code	Category	L	T	P	C	I.M	E.M	Exam
B20MC3201	MC	3	--	--	--	--	--	3 Hrs.
EMPLOYABILITY SKILLS								
(Common to AIDS, CSBS, 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:		
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 the	K3

	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.
3.	Flavia Agnes, Sudhir Chandra, Monmayee Basu, Women and Law in India, Oxford Univ. Press 2004.
4.	Mamta Rao, Law Relating to Women and Children, Eastern Book Co, Lucknow.
5.	K.I. Vibhute, Criminal Law, Lexis Nexis, 12th Edn.
6.	N. Prabha Unnithan (ed.), Crime & Justice in India, Sage Pub., 2013.
7.	Ritu Gupta, Sexual Harassment at Workplace, Lexis Nexis, 2013.
8.	IGNOU: Gender Sensitization: Society, Culture and Change (2019) BGSE001, New Delhi IGNOU.
Web links:	
1.	https://nptel.ac.in/courses/110105080
2.	https://www.youtube.com/watch?v=2Xfp2eiTte0
3.	https://www.youtube.com/watch?v=-FCEBe5VNcA&t=41s
4.	https://www.youtube.com/watch?v=7n9IOH0NvyY
5.	https://www.youtube.com/watch?v=dpC2jGqu4G0
6.	https://www.youtube.com/watch?v=kcW4ABcY3zI&t=99s
7.	https://www.youtube.com/watch?v=dIXw1PbnWKM
8.	https://www.youtube.com/watch?v=9bayaZ18_po
9.	https://www.youtube.com/watch?v=ZbLq23cGFV4&t=1662s
10.	https://www.youtube.com/watch?v=61aYvb0Vo68
11.	https://www.youtube.com/watch?v=728H4Khf7Gk&t=1793s
12.	https://www.youtube.com/watch?v=y2Yk-rSZ7PI
13.	https://www.youtube.com/watch?v=wSqFvcjDpos
14.	https://www.youtube.com/watch?v=AljDd7nj9wE
15.	https://www.youtube.com/watch?v=MKPM0f2fOjM