



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 & BUSINESS SYSTEMS | | | | | | | | | |
| 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 |
| B20CB3101 | Compiler Design | PC | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| B20CB3102 | Computer Networks | PC | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| B20CB3103 | Fundamentals of Digital Marketing | 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 |
| B20CB3109 | Compiler Design Lab | PC | 1.5 | 0 | 0 | 3 | 15 | 35 | 50 |
| B20CB3110 | Network Programming Lab | PC | 1.5 | 0 | 0 | 3 | 15 | 35 | 50 |
| B20HS3102 | Soft Skills (Skill Oriented Course) | SOC | 2 | 1 | 0 | 2 | -- | 50 | 50 |
| B20MC3102 | Competitive Coding | MC | 0 | 3 | 0 | 0 | -- | -- | -- |
| B20CB3111 | Summer Internship | PR | 1.5 | -- | -- | -- | -- | 50 | 50 |
| TOTAL | | | 21.5 | 19 | 0 | 8 | 180 | 520 | 700 |

| | Course Code | Course |
|-------|---|---|
| #PE-I | B20CB3104 | Marketing Research & Marketing Management |
| | B20CB3105 | Finance & Cost Accounting |
| | B20CB3106 | Software Engineering |
| | B20CB3107 | Artificial Intelligence |
| | B20CB3108 | Computer Graphics |
| #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. | |

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|--------------------|-----------------|----------|-----------|-----------|----------|------------|-------------|---------------|
| Course Code | Category | L | T | P | C | I.M | E.M. | Exam |
| B20CB3101 | PC | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

COMPILER DESIGN

(For CSBS)

Prerequisites: calculus of functions of one and two variables

Course Objectives: Students are expected to learn

| | |
|----|--|
| 1. | To study the various phases in the design of a compiler |
| 2. | To understand the design of top-down and bottom-up parsers |
| 3. | To understand syntax directed translation schemes |
| 4. | To introduce LEX and YACC tools |
| 5. | To learn to develop algorithms to generate code for a target machine |

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

| S.No | Outcome | Knowledge Level |
|------|---|-----------------|
| 1 | Design, develop, and implement a compiler for any language | K4 |
| 2 | Use LEX and YACC tools for developing a scanner and a parser | K3 |
| 3 | Design and implement LL and LR parsers | K4 |
| 4 | Design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity | K4 |
| 5 | Apply algorithms to generate machine code | K3 |

SYLLABUS

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|------------------------------|---|
| UNIT-I (10 Hrs) | Language Processors, the structure of a compiler, the science of building a compiler, programming language basics. Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers. |
| UNIT-II (10 Hrs) | Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Recursive and Non recursive top down parsers, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars, Parser Generators. |
| UNIT-III (12 Hrs) | Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Back patching, Switch-Statements, Intermediate Code for Procedures. |

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| UNIT-IV (12 Hrs) | Run-Time Environments: Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace Based Collection. Machine-Independent Optimizations: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial Redundancy Elimination, Loops in Flow Graphs. |
| UNIT-V (10Hrs) | Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator. Machine-dependent Optimizations: Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation. |
| Text Books: | |
| 1. | Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson. |
| 2. | Compiler Construction-Principles and Practice, Kenneth C Loudon, Cengage Learning. |
| Reference Books: | |
| 1. | Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press. |
| 2. | The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH |
| 3. | Writing compilers and interpreters, R. Mak, 3rd edition, Wiley student edition. |

Estd. 1980

AUTONOMOUS

| Code | Category | L | T | P | C | I.M | E.M | Exam |
|--|---|---|----|----|---|-----|-----|-----------------|
| B20CB3102 | PC | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |
| COMPUTER NETWORKS | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: | | | | | | | | |
| 1. | To provide insight about networks, topologies, and the key concepts. | | | | | | | |
| 2. | To gain comprehensive knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities. | | | | | | | |
| 3. | To understand the principles, key protocols, design issues, and significance of each layers in ISO and TCP/IP. | | | | | | | |
| 4. | To know the basic concepts of network services and various network applications. | | | | | | | |
| Course Outcomes After completion of the course, the student will be able to | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1. | Explain the functions of the different layer of the OSI Protocol. | | | | | | | K3 |
| 2. | Describe and draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs). | | | | | | | K2 |
| 3. | Apply different access control techniques to understand operation of internet. | | | | | | | K3 |
| 4. | Analyze to resolve IP addresses class full, perform routing. | | | | | | | K4 |
| 5. | Apply DNS, EMAIL, and HTTP in real world applications | | | | | | | K3 |
| SYLLABUS | | | | | | | | |
| UNIT-I (10Hrs) | <p>Introduction: Network Types, LAN, MAN, WAN, Network Topologies Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, OSI Vs TCP/IP, Lack of OSI models success, Internet History.</p> <p>Physical Layer –Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and unguided media: Wireless-Radio waves, microwaves, infrared.</p> | | | | | | | |
| UNIT-II (10 Hrs) | <p>Data link layer: Design issues, Framing: fixed size framing, variable size framing, flow control, error control, error detection and correction codes, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer,</p> <p>Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.</p> <p>Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field.</p> | | | | | | | |

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| UNIT-III (10 Hrs) | <p>Media Access Control: Random Access: Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance,</p> <p>Controlled Access: Reservation, Polling, Token Passing,</p> <p>Channelization: frequency division multiple Access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA).</p> <p>Wired LANs: Ethernet, Ethernet Protocol, Fast Ethernet (100 Mbps), Gigabit Ethernet</p> <p>Wireless LANs: 802.11architecture, Bluetooth Layers.</p> |
| UNIT-IV (10 Hrs) | <p>The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical, Congestion Control algorithms General principles of congestion control, Congestion prevention polices.</p> <p>Internet Working: How networks differ- How networks can be connected- Tunnelling, internetwork routing-, Fragmentation, network layer in the internet – IP Version 4 protocol-IPV4 Header Format, IP addresses, Class full Addressing, CIDR, NAT-, Subnets-IP Version 6-The main IPV6 header, Transition from IPV4 to IPV6, Comparison of IPV4 & IPV6-, DHCP</p> |
| UNIT-V (10 Hrs) | <p>The Transport Layer: Transport layer protocols: Introduction-services- port number- User data gram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services TCP features- Segment- A TCP connection- windows in TCP- flow control-Error control, Congestion control in TCP.</p> <p>Application Layer: World Wide Web: HTTP, Electronic mail-Architecture- web based mail- email security- TELENET-local versus remote Logging-Domain Name System: Name Space, DNS in Internet ,- Resolution-Caching- Resource Records- DNS messages- Registrars-security of DNS Name Servers</p> |
| Textbooks: | |
| 1. | Computer Networks — Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI |
| 2. | Data Communications and Networks – Behrouz A. Forouzan, Fifth Edition TMH. |
| 3. | Everyday Cryptography, 1st Edition, Keith M.Martin, Oxford, 2016 |
| Reference Books: | |
| 1. | Data Communications and Networks- Achut S Godbole, AtulKahate |
| 2. | Computer Networks, Mayank Dave, CENGAGE |

| Code | Category | L | T | P | C | I.M | E.M | Exam |
|-----------|----------|---|---|---|---|-----|-----|--------|
| B20CB3103 | PC | 3 | - | - | 3 | 30 | 70 | 3 Hrs. |

FUNDAMENTALS OF DIGITAL MARKETING

(For CSBS)

Course Objectives: Students are expected to learn

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|---|--|
| 1 | Basics of Digital Marketing |
| 2 | Digital Metrics |
| 3 | Search Engine Optimization including Search Engine Advertising |
| 4 | Social Media Marketing on Facebook, LinkedIn |
| 5 | Indian Aspect of Digital Marketing |

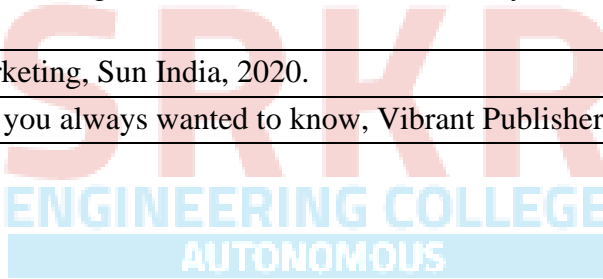
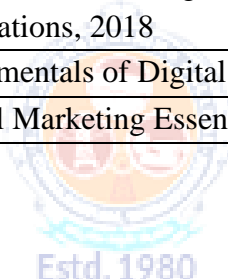
Course Outcomes: After completion of the course, the student will be able to

| S.No | Outcome | Knowledge Level |
|------|---|-----------------|
| 1 | Relate the Basics of Digital Marketing in the Modern Era. | K3 |
| 2 | Apply the Display Advertising Concepts | K3 |
| 3 | Prepare for the Search Engine Optimization/Advertising | K3 |
| 4 | Prepare for the Social Media Marketing Tactics | K3 |
| 5 | Predict the Scope of Digital Marketing in Indian Context | K2 |
| 6 | Solve the Digital Marketing Aspects | K3 |

SYLLABUS

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|----------------------------|--|
| UNIT-I (10 Hrs) | <p>Basics of Digital Marketing Definition of Digital Marketing-Evolution of Digital Marketing: from traditional to modern marketing, the rise of the internet: The Dotcom Era, Post Dotcom: Creation of Internet Business Models-emergence of digital marketing as a new tool-Application of Digital Marketing.</p> |
| UNIT-II (12Hrs) | <p>Display Advertising Concept of Display Advertising: Display Advertising Media, Digital Metrics-Types of Display Ads: Format, Display Ad Size- Buying Models: Cost per Click (CPC), Cost per Milli (CPM), Cost per Lead (CPL), Cost per Acquisition (CPA), Fixed cost/ Sponsorship.</p> |
| UNIT-III (12Hrs) | <p>Search Engine Advertising and Search Engine Optimization Introduction about how search engine works, why pay for Search Advertising: Capture Intent, Ease of Action, Controlled Costs, Analytics, Competition-Understanding Ad Placements: Top, Side, Bottom-Concept of Search Engine Optimization, Important elements to be considered in Search Engine Optimization.</p> |

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| UNIT-IV (12Hrs) | Social Media Marketing Introduction to Social Media Marketing- Building a Successful Strategy: Listen, Goal Setting, Strategy, Implementation, Measure, Improve-Facebook Marketing-LinkedIn Marketing-Twitter Marketing-Instagram and Snapchat. |
| UNIT-V (10Hrs) | Digital Marketing – The Indian View India Digital Spend Overview, Emerging trends of Digital Marketing: Big Data and IoT- Data technologies Impacting Marketing, B2B and SMB – Segments based Digital Marketing, SoLoMo – the Next level of Hyperlocal Marketing. |
| Text Books: | |
| 1. | Fundamentals of Digital Marketing by Puneet Singh Bhatia, Pearson Publishers, 2 nd Edition 2019 |
| 2. | Digital Marketing by Seema Gupta, Mc GrawHill Publishers, 2 nd Edition 2020 |
| Reference Books: | |
| 1. | Digital Marketing by Dave Chaffey and Fiona Ellis- Chadwick by Pearson Publishers, 2019 |
| 2. | Applications of Digital Marketing for success in Business by Abhishek Das, BPB Publications, 2018 |
| 3. | Fundamentals of Digital Marketing, Sun India, 2020. |
| 4. | Digital Marketing Essentials you always wanted to know, Vibrant Publishers, 2020 |



| Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|--|---|----|----|---|-----|-----|-----------------|
| B20CB3104 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |
| MARKETING RESEARCH AND MARKETING MANAGEMENT | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: Students are expected to | | | | | | | | |
| 1 | To familiarize with the concept, Scope and Importance of Marketing Research | | | | | | | |
| 2 | To provide conceptual knowledge on Marketing Information System, Marketing Decision Support System and Marketing Research Management | | | | | | | |
| 3 | To provide the conceptual knowledge of Marketing Management and its Functions | | | | | | | |
| 4 | To learn concept, characteristics and importance of marketing mix | | | | | | | |
| 5 | To overview about the marketing mix elements – product, price , place and promotion | | | | | | | |
| Course Outcomes: After completion of the course, the student will be able to | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1 | Explain the scope and importance of marketing research | | | | | | | K2 |
| 2 | Overview about the marketing research process | | | | | | | K3 |
| 3 | Explain the concepts of marketing | | | | | | | K2 |
| 4 | Evaluate factors influencing marketing environment | | | | | | | K3 |
| 5 | Discuss about the Characteristics of marketing mix | | | | | | | K2 |
| 6 | Overview about the promotional mix elements | | | | | | | K3 |
| SYLLABUS | | | | | | | | |
| UNIT-I (10Hrs) | Introduction to Marketing: | | | | | | | |
| | Marketing: Concept, Nature, Scope and Importance of marketing Concepts of Marketing: Production Concept, Product concept, Sales Concept, Marketing concept, Societal Marketing Concept, Functions of Marketing. Marketing Environment- Factors influencing Marketing Environment. Market Segmentation- Bases of Segmenting the Market Consumer Behaviour- Factors influencing consumer behaviour. | | | | | | | |
| UNIT-II (12Hrs) | Introduction to Marketing Research | | | | | | | |
| | Marketing Research: Concept, Scope and Importance of Marketing Research, Marketing Information System, Marketing Decision Support System, Status of Marketing Research Industry in India. Marketing Research Management: Importance of Research Management, Qualities of a Marketing Research Manager, Organising Marketing Research Function, Evaluation and Control of Marketing Research, Marketing Research and Marketing Management. | | | | | | | |
| UNIT-III (12Hrs) | Marketing Research Process: Formulating the Research problem, Choice of Research Design, Determining Sources of Data, Designing Data collection Forms, Determining | | | | | | | |

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| | Sampling Design and Sampling size, Organising and Conducting the Field Survey, Processing and Analysing the Collected Data, Preparing the Research Report. |
| UNIT-IV (12Hrs) | <p>Marketing Mix: Concept, Characteristics and Importance of Marketing Mix.</p> <p>Product: Concept and classification of products, New product Development Process, Stages of product Life cycle.</p> <p>Pricing: Role and Importance of pricing, Objectives of pricing, Factors affecting price Determination, Methods of pricing: Cost-oriented pricing, Demand-oriented pricing, Competition-oriented pricing; Pricing strategies.</p> |
| UNIT-V (10Hrs) | <p>Channels of Distribution: Concept, Functions of channels of Distribute, Factors influencing the choice of channel.</p> <p>Promotion: Meaning and importance of Promotion, Concept of promotion Mix, Components of promotion Mix, Factors affecting the promotion Mix, Global Marketing, Services Marketing, Rural Marketing , E- Marketing.</p> |
| Text Books: | |
| 1. | Marketing Management (Text and Cases)- Author – Dr. K. Karunakaran, Publisher– Himalaya Publishing House; 4 th Edition |
| 2. | Marketing Research – GC Beri – Tata MC Graw- Hill Publishing company Ltd; 4 th Edition |
| Reference Books: | |
| 1. | Marketing Management – Rajan Saxena – MC Graw hill education (India) Pvt Ltd; 5 th Edition |
| 2. | Marketing Research[Concepts and Cases]-Donald R. Corper & Pamela S. Schindlee; 2 nd Edition |
| 3. | Marketing Management – V S Ramaswamy & S. Namakumari - Mac Millan Publishers India Ltd; 4 th Edition |

| Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|--|---|----|----|---|-----|-----|-----------------|
| B20CB3105 | PE | 3 | -- | -- | 3 | 30 | 70 | 3Hrs |
| FINANCE & COST ACCOUNTING | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: | | | | | | | | |
| 1. | To prepare, analyze, interpret the financial statements for business decision making. | | | | | | | |
| 2. | To understand the components of product cost, their calculation methods | | | | | | | |
| Course Outcomes: By the end of the course, the student should have the ability : | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1. | To understand Principles of Accounting | | | | | | | K2 |
| 2. | To understand Accounting Process | | | | | | | K2 |
| 3. | To understand Inventory Valuation | | | | | | | K2 |
| 4. | To understand Fundamentals of Management accounting and Cost accounting | | | | | | | K2 |
| SYLLABUS | | | | | | | | |
| UNIT-I (10 Hrs) | Introduction to Accounting: Importance, Objectives and Principles, Accounting Concepts and conventions, and The Generally Accepted Accounting Principles (GAAP), their implications on accounting system; Double entry system–recording business transactions–Classification of accounts–Accounting cycle. | | | | | | | |
| UNIT-II (10 Hrs) | The Accounting Process: Overview, Books of Original Record; Journal, ledger, Trial Balance, Classification of capital and revenue expenses, Final Accounts with adjustments. Rectification of Errors, Valuation of Fixed Assets -Tangible vs. Intangible assets. Depreciation, Methods of depreciation–their impact on measurement of business Accounting. | | | | | | | |
| UNIT-III (10 Hrs) | Inventory Valuation: Methods of inventory valuation and valuation of goodwill, methods of valuation of goodwill. Accounting from incomplete records, advantages and disadvantages of single entry and double entry system and the differences between the two, preparation of accounts, and ascertainment of profit from incomplete records, Accounting Treatment as per the statement of affairs method and calculation of missing figures. | | | | | | | |
| UNIT-IV (10 Hrs) | Introduction to Management Accounting, Cost analysis and Control: Management accounting Vs. Cost accounting vs. financial accounting, Role of accounting information in planning and control, Cost concepts and Managerial use of classification of costs. Cost analysis and control: Direct and Indirect expenses, allocation and apportionment of overheads, calculation of machine hour rate. Activity based costing. | | | | | | | |

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| UNIT-V (10 Hrs) | Costing for Specific Industries: Unit costing, Job Costing, Cost Sheet and tender and process costing and their variants, treatment of normal losses and abnormal losses, inter-process profits, costing for by-products and equivalent production. |
| Text Books: | |
| 1. | S. N. Maheswari, S. K. Maheshwari, Sharad K. Maheshwari Accounting for Management, 4e, Vikas Publishing House, 2018. |
| 2. | Dhanesh K. Khatri, Financial Accounting & Analysis, Tata McGraw-Hill Publishing Limited, New Delhi, 2015. |
| 3. | V. Rajasekharan, R. Lalitha, Financial Accounting & Analysis, Pearson Education, New Delhi, 2015 |
| 4. | Hansen Mowen, Cost and Management Accounting & Control, Thompson Publications 2012 |
| 5. | S. P. Jain and K. L. Narang, Cost and Management Accounting, Kalyani Publishers, New Delhi, 2006. |
| 6. | Manash Gupta, Cost Accounting Principles and Practice, Pearson Education, 2006 |
| Reference Books: | |
| 1. | M. Y. Khan, P. K. Jain, Management Accounting: Theory and Problems, TMH, New Delhi, 4/e, 2007. |
| 2. | James Jiambalvo, Managerial Accounting, John Wiley & Sons, Inc. New Delhi, 2007. |
| 3. | Atkinson, Banker, Kaplan and Young, Management Accounting, PHI, 2006 |
| 4. | Paresh Shah, Basic Financial Accounting for Management, Oxford University Press, New Delhi, 2014. |
| 5. | Seema Srivastava, Financial Accounting, Jawaharlal, S. Chand, 2014. |

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| Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|--|---|---|---|---|-----|-----|-----------------|
| B20CB3106 | PE | 3 | 0 | 0 | 3 | 30 | 70 | 3 Hrs. |
| SOFTWARE ENGINEERING | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: Students are expected to Learn | | | | | | | | |
| 1. | Importance of OOSE in Software development. | | | | | | | |
| 2. | Importance of Requirements Engineering. | | | | | | | |
| 3. | Role of UML and Testing in Software Development. | | | | | | | |
| 4. | Entire Software Development Process with aid of case studies. | | | | | | | |
| Course Outcomes: After completion of the course, the student will be able to | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1. | Define a problem and perform Requirements Engineering. | | | | | | | K3 |
| 2. | Compare conventional and agile software methods. | | | | | | | K3 |
| 3. | Develop function oriented and object oriented software design using tools like rational rose. | | | | | | | K4 |
| 4. | Use modern engineering tools necessary for software project management, estimations, time management and software reuse. | | | | | | | K3 |
| 5. | Generate test cases for software testing. | | | | | | | K3 |
| SYLLABUS | | | | | | | | |
| UNIT-I (10Hrs) | The Nature of Software, The Unique Nature of Web-Apps, 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, Personal and Team Process Models, Process Technology. | | | | | | | |
| UNIT-II (10 Hrs) | Agility, Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, A Tool Set for the Agile Process, Software Engineering Knowledge, Core Principles, Principles That Guide Each Framework Activity, Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements. | | | | | | | |
| UNIT-III (10 Hrs) | Requirements Analysis, 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. | | | | | | | |

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| UNIT-IV (10 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 (10 Hrs) | The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Web-App Interface Design, Design Evaluation, 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 of Testing, White-Box Testing, Basis Path Testing. |
| Textbooks: | |
| 1. | Software Engineering a practitioner’s approach, Roger S. Pressman, Seventh Edition, McGraw Hill Higher Education. |
| 2. | Software Engineering, Ian Sommerville, Ninth Edition, Pearson. |
| Reference Books: | |
| 1. | Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010. |
| 2. | Software Engineering, Ugrasen Suman, Cengage. |
| e-Resources | |
| 1. | https://onlinecourses.nptel.ac.in/noc20_cs68/preview |
| 2. | https://www.javatpoint.com/software-engineering-tutorial |

| Code | Category | L | T | P | C | I.M | E.M | Exam |
|-----------|----------|---|---|----|---|-----|-----|--------|
| B20CB3107 | PC | 3 | 1 | -- | 4 | 25 | 70 | 3 Hrs. |

ARTIFICIAL INTELLIGENCE

(For CSBS)

Course Objectives:

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|----|---|
| 1. | To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language |
| 2. | To understand the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution that play an important role in AI programs |
| 3. | To have a basic understanding of some of the more advanced topics of AI |

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

| S.No | Outcome | Knowledge Level |
|------|---|-----------------|
| 1 | Understand the basic applications of AI and problems that can be solved by AI | K3 |
| 2 | Apply the problem-solving strategies to generate best AI solutions using state space search | K3 |
| 3 | Apply AI languages to represent knowledge base | K3 |
| 4 | Apply AI tools to represent knowledge base | K3 |
| 5 | Apply uncertainty techniques to solve AI real time problems | K3 |

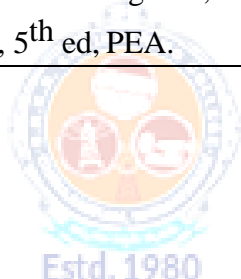
Estd. 1980

AUTONOMOUS

SYLLABUS

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|------------------------------|--|
| UNIT-I (10 Hrs) | Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends. |
| UNIT-II (10 Hrs) | Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games. |
| UNIT-III (10 Hrs) | Logic concepts: Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic. |
| UNIT-IV (8 Hrs) | Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames Advanced knowledge representation techniques: |

| | |
|----------------------------|--|
| | Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web. |
| UNIT-V (12 Hrs) | Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, Dempster-Shafer theory. Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems. |
| Text Books: | |
| 1. | Artificial Intelligence- Saroj Kaushik, CENGAGE Learning. |
| 2. | Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA. |
| Reference Books: | |
| 1. | Artificial Intelligence- Deepak Khemani, TMH, 2013. |
| 2. | Introduction to Artificial Intelligence, Patterson, PHI. |
| 3. | Artificial intelligence, structures and Strategies for Complex problem solving, George F Lugar, 5 th ed, PEA. |



| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|----|----|---|-----|-----|-----------------|
| B20CB3108 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |
| COMPUTER GRAPHICS | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: Students are expected to learn | | | | | | | | |
| 1. | Understand the fundamental concepts and theory of computer graphics | | | | | | | |
| 2. | Understand modelling, and interactive control of 3D computer graphics applications | | | | | | | |
| 3. | The underlying parametric surface concepts be understood | | | | | | | |
| 4. | Learn multimedia authoring tools. | | | | | | | |
| Course Outcomes: After completion of the course, the student will be able to | | | | | | | | |
| S. No | Outcome | | | | | | | Knowledge Level |
| 1 | Apply the various concepts to classify the graphics application and graphics systems. | | | | | | | K3 |
| 2 | Analyze and illustrate the drawing algorithms, transformations for 2D | | | | | | | K3 |
| 3 | Compute various clipping operations. | | | | | | | K4 |
| 4 | Demonstrate 3-D object representation | | | | | | | K3 |
| 5 | Analyze and illustrate transformations for 3D and techniques for animation | | | | | | | K3 |
| SYLLABUS | | | | | | | | |
| UNIT-I (10Hrs) | INTRODUCTION: Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices. | | | | | | | |
| UNIT-II (08Hrs) | OUTPUT PRIMITIVES: Points and lines, line drawing algorithms, mid-point circle algorithm, Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm. 2-D GEOMETRICAL TRANSFORMATIONS: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates | | | | | | | |
| UNIT-III (10Hrs) | 2-D VIEWING : The viewing pipe-line, viewing coordinate reference frame, window to view-port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland Hodge man polygon clipping algorithm. | | | | | | | |

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|-----------------------------|--|
| UNIT-IV (10Hrs) | 3-D OBJECT REPRESENTATION: spline representation, Hermite curve, Bezier curve and B-spline curve, Polygon surfaces, quadric surfaces, , Solid modeling Schalars – wire frame, CSG, B-rep. Bezier and B-spline surfaces, Basic illumination models, shading algorithms |
| UNIT-V (12 Hrs.) | 3-D GEOMETRIC TRANSFORMATIONS: Translation, rotation, scaling, reflection and shear transformation and composite transformations. Visible surface detection methods: Classification, back-face detection, depth buffer, scan-line, depth sorting COMPUTER ANIMATION: Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specification |
| Text Books: | |
| 1. | Computer Graphics C Version, Donald Hearn & M. Pauline Baker, Pearson Education, New Delhi, 2004. |
| 2. | Computer Graphics Principles & practice-second edition in C/ Foley, VanDam, Feiner and Hughes/Pearson Education |
| Reference Books: | |
| 1. | Computer Graphics Second edition/ Zhigand xiang, Roy Plastock, Schaum’s outlines/Tata Mc-Graw hill edition |
| 2. | Procedural Elements for Computer Graphic, David Rogers, Tata McGraw Hill, 2nd Edition |
| 3. | Principles of Interactive Computer Graphics, Neuman and Sproul, TMH |
| 4. | Computer Graphics, Steven Harington, TMH |

Estd. 1980

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| Subject Code | Category | L | T | P | C | I.M | E.M | Exam |
|--------------|----------|----|----|---|-----|-----|-----|--------|
| B20CB3109 | PC | -- | -- | 3 | 1.5 | 15 | 35 | 3 Hrs. |

COMPILER DESIGN LAB

(For CSBS)

Course Objectives: Students are expected to

- | | |
|---|--|
| 1 | Implement the different Phases of compiler. |
| 2 | Implement and test simple optimization techniques. |
| 3 | Give exposure to compiler writing tools. |

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

| S.No | Outcome | Knowledge Level |
|------|---|-----------------|
| 1 | Implement the techniques of Lexical Analysis and Syntax Analysis. | K4 |
| 2 | Apply the knowledge of Lex & Yacc tools to develop programs. | K4 |
| 3 | Generate intermediate code. | K4 |
| 4 | Implement Optimization techniques before machine code generation | K4 |

SYLLABUS

| | |
|----|---|
| 1 | Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines. |
| 2 | Write a C program to identify whether a given line is a comment or not. |
| 3 | Write a C program to recognize strings under 'a*', 'a*b+', 'abb'. |
| 4 | Write a C program to test whether a given identifier is valid or not. |
| 5 | Write a C program to find whether given string is keyword or not. |
| 6 | Write a C program to test whether a given string is constant or not. |
| 7 | Write a c program to count blank space and count the no. of lines. |
| 8 | Write a C program to simulate lexical analyzer for validating operators. |
| 9 | Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools. |
| 10 | Write program to find Simulate First and Follow of any given grammar. |
| 11 | Construction of recursive descent parser for the given grammar. |
| 12 | Write a C program for implementing the functionalities of predictive parser. |
| 13 | Program to implement semantic rules to calculate the expression that takes an expression with digits, + and * and computes the value. |
| 14 | Write a program to perform loop unrolling. |
| 15 | Write a program to perform constant propagation. |
| 16 | Implement Intermediate code generation for simple expressions |

| Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|--|---|----|---|-----|-----|-----|-----------------|
| B20CB3110 | PC | - | -- | 3 | 1.5 | 15 | 35 | 3 Hrs. |
| NETWORK PROGRAMMING LAB | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: Students are expected to | | | | | | | | |
| 1 | Understand and apply different network commands. | | | | | | | |
| 2 | Analyze different networking functions and features for implementing optimal solutions Apply different networking concepts for implementing network solution. | | | | | | | |
| 3 | Implement different network protocols. | | | | | | | |
| Course Outcomes: After completion of the course, the student will be able to | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1 | Apply the basics of Physical layer in real time applications. | | | | | | | K3 |
| 2 | Apply data link layer concepts, design issues, and protocols. | | | | | | | K3 |
| 3 | Apply Network layer routing protocols and IP addressing. | | | | | | | K3 |
| 4 | Implement the functions of Application layer and Presentation layer paradigms and Protocols. | | | | | | | K4 |
| 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 | Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm | | | | | | | |
| 6 | Take an example subnet of hosts. Obtain broadcast tree for it. | | | | | | | |
| 7 | Write a client-server application for chat using UDP | | | | | | | |
| 8 | Implement programs using raw sockets (like packet capturing and filtering) | | | | | | | |
| 9 | Write a C program to perform sliding window protocol. | | | | | | | |
| 10 | Get the MAC or Physical address of the system using Address Resolution Protocol. | | | | | | | |
| 11 | Simulate the Implementing Routing Protocols using Border Gateway Protocol (BGP) | | | | | | | |
| 12 | Simulate the OPEN SHORTEST PATH FIRST routing protocol based on the cost assigned to the path. | | | | | | | |
| Reference Books: | | | | | | | | |
| 1 | Java Network Programming-Orielly | | | | | | | |
| 2 | Advance Unix Programming Richard Stevens, Second Edition Pearson Education | | | | | | | |
| 3 | Advance Unix Programming, N.B. Venkateswarlu, BS Public | | | | | | | |

| 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 |
|-----------|----------|-----|----|---|-----|-----|-----|------|
| B20MC3102 | MC | --- | -- | 3 | --- | --- | --- | --- |

COMPETITIVE CODING

(For IT, AIDS and CSBS)

Course Objectives: Students are expected to

| | |
|---|---|
| 1 | Enhance the Programming and Data Structure and Algorithm skills by solving number of real-world programming problems under crucial constraints including Time and Space Complexities. |
| 2 | Students to come up with an optimized Solution by passing all required test cases. |
| 3 | Compete with various brilliant minds across the globe in enhancing Programming, Data Structure & Algorithm, Analytical Skills, Problem Solving and Time Management Skills. |

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

| S. No | Outcome | Knowledge Level |
|-------|---|-----------------|
| 1 | Solve Recursion and Backtracking Problems | K3 |
| 2 | Solve various algorithms related to Number Theory | K3 |
| 3 | Implement various algorithms related to Linear Data Structures | K4 |
| 4 | Implement various algorithms related to Non - Linear Data Structures | K4 |
| 5 | Implement Divide and Conquer, Greedy Algorithms and Dynamic Programming by solving problems | K4 |

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SYLLABUS

| | |
|---|---|
| 1 | <p>Overview:</p> <ul style="list-style-type: none"> • Introduction to the Course |
| 2 | <p>Introduction to Recursion and Backtracking:</p> <ul style="list-style-type: none"> • Multiplication without using * Operator • Tower's of Hanoi • Ackermann's Problem • Convert given number Decimal to Binary and Binary to Decimal • Convert given Digit to String |

| | |
|----|--|
| 3 | <p>Number Theory:</p> <ul style="list-style-type: none"> • Euclid's Algorithm (Greatest Common Divisor) • Check the given number is Prime or Not • Find Prime Factors of a given Number • Binomial Coefficient • Generate the following Patterns <pre> 1 A * * * * * * * * * * 2 2 A B A * * * * * * * 3 3 3 A B C B A * * * * * * * * * * 4 4 4 4 A B C D C B A 5 5 5 5 5 A B C D E D C B A </pre> |
| 4 | <p>Stacks:</p> <ul style="list-style-type: none"> • Implement two Stacks in single Array • Infix to Postfix Conversion • Infix to prefix Conversion |
| 5 | <p>Queues:</p> <ul style="list-style-type: none"> • Implement Queue Operations using Two Stacks • Generate Binary Numbers between 1 to N using a Queue |
| 6 | <p>Linked List:</p> <ul style="list-style-type: none"> • Implementation of Reverse a Singly Linked List • Swapping of Two nodes in a Singly Linked List without Swapping Data |
| 7 | <p>Circular Linked List:</p> <ul style="list-style-type: none"> • Concatenate two Circular Linked List • Maximum and Minimum Value of Circular Linked List |
| 8 | <p>Trees:</p> <ul style="list-style-type: none"> • Check whether two Binary Trees are Identical or Not • Find the Height of a Binary Tree • Check for Height balancing of a Binary Tree |
| 9 | <p>Graphs:</p> <ul style="list-style-type: none"> • Find the Number of Connected components in a graph • Depth First Search • Breadth First Search • Cycle Detection using Breadth First Search |
| 10 | <p>Greedy Algorithm:</p> <ul style="list-style-type: none"> • Introduction to Greedy Technique • Prim's Minimum Spanning Tree • Kruskal's Minimum Spanning Tree • Dijkstra's Shortest Path Algorithm |

| | |
|--|---|
| 11 | Divide and Conquer: <ul style="list-style-type: none"> • Introduction to Divide and Conquer Technique • Binary Search • Quick Sort • Merge Sort |
| 12 | Dynamic Programming: <ul style="list-style-type: none"> • Introduction to Dynamic Programming • Longest Common Subsequence • Longest Palindrome Subsequence |
| CODING PLATFORMS: <ul style="list-style-type: none"> • CodeChef • CodeForces • LeetCode • HackerRank • HackerEarth | |
| Reference Books: | |
| 1 | Fundamentals of Data Structures in C, 2 nd Edition, Horowitz, Sahini and Anderson-Freed, University Press,2008. |
| 2 | Data Structures using C by Aaron M. Tenenbaum, Y. Langsam and M.J. Augenstein, Pearson Education, 2009 |
| 3 | Data Structures with C by Seymopur Lipschutz, Schaum Outline Series,2010. |
| 4 | Data Structures using C by R.KrishnaMoorthy G.Indirani Kumaravel, TMH, New Delhi,2008 |



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. II - Semester | | | | | | | |
|--|---|----------------------------------|-------------|-----------|----------|-----------|------------|------------|-------------|
| COMPUTER SCIENCE & BUSINESS SYSTEMS | | | | | | | | | |
| 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 |
| B20CB3201 | Operations Research | PC | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| B20CB3202 | Machine Learning | PC | 3 | 3 | 0 | 0 | 30 | 70 | 100 |
| B20CB3203 | Data Science | 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 |
| B20CB3209 | Communication and Leadership Development Workshop | PC | 1.5 | 0 | 0 | 3 | 15 | 35 | 50 |
| B20CB3210 | Machine Learning using Python Lab | PC | 1.5 | 0 | 0 | 3 | 15 | 35 | 50 |
| B20CB3211 | Data Science lab | PC | 1.5 | 0 | 0 | 3 | 15 | 35 | 50 |
| #SOC-IV | Skill Oriented Course - IV | 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 | B20CB3204 | Distributed Operating Systems |
| | B20CB3205 | Modern Web Applications |
| | B20CB3206 | Mobile Computing |
| | B20CB3207 | Robotics and Embedded Systems |
| | B20CB3208 | NPTEL/SWAYAM (Duration: 12 weeks minimum) |
| #SOC-IV | B20CB3212 | Web Application Development using Full Stack- Frontend Development-Module-II |
| | B20CB3213 | Android Application Development |
| #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 |
|--|--|---|----|----|---|-----|-----|-----------------|
| B20CS3201 | PC | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |
| OPERATIONS RESEARCH | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: | | | | | | | | |
| 1. | To acquaint the students with basic Operation Research concepts, Formulation of LPP and its solution using various methods. | | | | | | | |
| 2. | To build capabilities in the students to analyze the various transportation and assignment problems, job sequencing problems, inventory problems, Games theory and Queuing Models. | | | | | | | |
| 3. | To familiarize the students with project management techniques i.e., PERT and CPM. | | | | | | | |
| Course Outcomes: At the end of the course, students will be able to | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1. | Describe the basic Operations Research models, formulate and solve Linear Programming problems for industrial and business applications | | | | | | | K4 |
| 2. | Build and Solve Transportation and Assignment problems using appropriate methods for different situations. | | | | | | | K4 |
| 3. | Determine the optimal solutions for various Job Sequencing and Inventory models for industrial applications. | | | | | | | K4 |
| 4. | Analyse and solve various Games theory and Replacement Models in real situations | | | | | | | K4 |
| 5. | Design and schedule various project management problems by CPM & PERT. | | | | | | | K4 |
| SYLLABUS | | | | | | | | |
| UNIT-I (10Hrs) | Introduction to OR: Definition of OR, Characteristics and phases of OR, Scope of OR, OR models, General methods for solving OR models, Role of computers in OR. Linear Programming: Formulation, Graphical Solution, Simplex Method, Artificial Variable Technique-Big-M method, Duality. | | | | | | | |
| UNIT-II (10 Hrs) | Transportation Model: Balanced and Unbalanced transportation problems-Initial solution by North West Corner Rule, Lowest Cost Method and VAM, Optimality test by MODI method, Degeneracy in TP. Assignment Model: Hungarian algorithm, Balanced and Unbalanced Assignment Problems, Travelling Salesman Problems. | | | | | | | |

| | |
|------------------------------|--|
| UNIT-III (10 Hrs) | <p>Job Sequencing: Introduction, Assumptions, Johnson’s algorithm for N-Jobs 2-Machines Problems, N-Jobs 3-Machines Problems, N-Jobs M-Machines Problems, Graphical solution for 2-Jobs and M-Machines Problems.</p> <p>Inventory Models: Definition of Inventory, Costs associated with Inventory Problems, Classification of Models, EOQ Model with and without Shortages, Inventory Problems with Price Breakups.</p> |
| UNIT-IV (10 Hrs) | <p>Game Theory: Introduction, Basic definitions, Two Person Zero Sum Games, Minimax criterion, Saddle point, Value of game, Solution of games with saddle point, Mixed Strategy Games-Arithmetic method, Dominance principle to reduce size of game, Graphical Method, Algebraic solution to rectangular games.</p> <p>Replacement Problems: Individual and Group Replacement Policy, Reliability & System Failure Problems.</p> |
| UNIT-V (10 Hrs) | <p>Network Analysis: Introduction, Project scheduling by CPM and PERT, Network diagram representations, Rules to construct Network diagrams, Time estimates in network analysis-EST, EFT, LST, LFT, float/slack and critical path, Time estimates and Probability considerations in PERT,</p> |
| Text Books: | |
| 1. | Operations Research by S.D Sharma. |
| 2. | Operations Research by V. K. Kapoor. |
| Reference Books: | |
| 1. | Operations Research - Kanti Swaroop, P.K. Gupta, Man Mohan, Sulthan Chand & Sons Education. |
| 2. | Operations Research - Hamdy A Taha – Pearson Education. |
| 3. | Operations Research - Panneer Selvan Prentice Hall of India. |
| 4. | Introduction to Operations Research, F.S. Hiller, G.J. Liberman, TMH. |
| e-Resources: | |
| 1. | https://nptel.ac.in/courses/112/106/112106134/ |
| 2. | https://nptel.ac.in/courses/110/106/110106062/ |

| Code | Category | L | T | P | C | I.M | E.M | Exam |
|-----------|----------|---|----|----|---|-----|-----|--------|
| B20CB3202 | PC | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

MACHINE LEARNING

(For CSBS)

Course Objectives: Students are expected to

| | |
|----|---|
| 1. | Identify problems that are amenable to solution by ANN methods, and which ML methods may be suited to solving a given problem. |
| 2. | Formalize a given problem in the language/framework of different ANN methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc). |

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

| S.No | Outcome | Knowledge Level |
|------|---|-----------------|
| 1. | Explain the fundamental usage of the concept Machine Learning system | K2 |
| 2. | Demonstrate various regression and classification Techniques on real time applications | K3 |
| 3. | Analyze the Ensemble Learning Methods | K4 |
| 4. | Illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning. | K4 |
| 5. | Discuss the Neural Network Models and Fundamentals concepts of Deep Learning | K3 |

SYLLABUS

| | |
|------------------------------|--|
| UNIT-I (10Hrs) | <p>Introduction- Artificial Intelligence, Machine Learning, Deep learning, Types of Machine Learning Systems, Main Challenges of Machine Learning.</p> <p>Statistical Learning: Introduction, Supervised and Unsupervised Learning, Training and Test Loss, Tradeoffs in Statistical Learning, Estimating Risk Statistics, Sampling distribution of an estimator, Empirical Risk Minimization.</p> |
| UNIT-II (10 Hrs) | <p>Supervised Learning(Regression/Classification):Basic Methods: Distance based Methods, Nearest Neighbours, Decision Trees, Naive Bayes, Linear Models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Binary Classification: Multiclass/Structured outputs, MNIST, Ranking.</p> |
| UNIT-III (10 Hrs) | <p>Ensemble Learning and Random Forests: Introduction, Voting Classifiers, Bagging and Pasting, Random Forests, Boosting, Stacking.</p> <p>Support Vector Machine: Linear SVM Classification, Nonlinear SVM Classification SVM Regression, Naïve Bayes Classifiers.</p> |

| | |
|-----------------------------|--|
| UNIT-IV (10 Hrs) | <p>Unsupervised Learning Techniques: Clustering, K-Means, Limits of K-Means, Using Clustering for Image Segmentation, Using Clustering for Preprocessing, Using Clustering for Semi-Supervised Learning, DBSCAN, Gaussian Mixtures.</p> <p>Dimensionality Reduction: The Curse of Dimensionality, Main Approaches for Dimensionality Reduction, PCA, Using Scikit-Learn, Randomized PCA, Kernel PCA.</p> |
| UNIT-V (10 Hrs) | <p>Neural Networks and Deep Learning: Introduction to Artificial Neural Networks with Keras, Implementing MLPs with Keras, Installing TensorFlow 2, Loading and Preprocessing Data with TensorFlow.</p> |
| Textbooks: | |
| 1. | Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition, O'Reilly Publications, 2019 |
| 2. | Data Science and Machine Learning: Mathematical and Statistical, D.P. Kroese, Z.I. Botev, T. Taimre, R. Vaisman, CRC Press. 2020 |
| Reference Books: | |
| 1. | Machine Learning Probabilistic Approach, Kevin P. Murphy, MIT Press, 2012 |



| Code | Category | L | T | P | C | I.M | E.M | Exam |
|-----------|----------|---|----|----|---|-----|-----|--------|
| B20CB3203 | PC | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

DATA SCIENCE

(For CSBS)

Course Objectives: Students are expected to

| | |
|---|--|
| 1 | Impart knowledge on basics of data science, data manipulation and exploratory data analysis concepts that is vital for data science. |
| 2 | Develop skills for applying tools and techniques to analyze, visualize and interpret data. |

Course Outcomes: By the end of the course, student will be able to

| S.No | Outcome | Knowledge Level |
|------|---|-----------------|
| 1 | Demonstrate knowledge on the concepts of data science to perform mathematical computations using efficient storage and data handling methods in NumPy.. | K3 |
| 2 | Apply Data Preparation and Exploration methods using Pandas to perform data manipulation. | K3 |
| 3 | Apply Data Cleaning and preparation of data. | K3 |
| 4 | Create data visualization using charts, plots and histograms to identify trends, patterns and outliers in data using Matplotlib and Seaborn | K4 |
| 5 | Develop methods to analyze and interpret time series data to extract meaningful statistics. | K4 |

SYLLABUS

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|------------------------------------|---|
| UNIT-I (10 Hrs) | <p>INTRODUCTION TO DATA SCIENCE</p> <p>Basic terminologies of data science, Types of data, Five steps of data science, Arrays and vectorized computation using NumPy - The NumPy ndarray: A multidimensional array object, Universal functions: Fast element-wise Array functions, Array-oriented Programming with arrays, File input and output with arrays, Linear algebra, Pseudo random number generation.</p> |
| UNIT-II (10 Hrs) | <p>DATA EXPLORATION WITH PANDAS</p> <p>Process of exploring data, Pandas data structures – Series, Data frame, Index objects; Essential functionality, Summarizing and computing descriptive statistics – Correlation and covariance, Unique values, Value counts and membership; Data loading, Storage, and file formats - Reading and writing data in text format , Binary data formats.</p> |
| UNIT-III (10 Hrs) | <p>DATA CLEANING, PREPARATION AND DATA WRANGLING</p> <p>Handling missing data, Data transformation, String manipulation - String object methods, Regular expressions, Vectorized string functions in Pandas; Data wrangling:</p> |

| | |
|---------------------------------------|--|
| | join, Combine and reshape - Hierarchical indexing, Combining and merging datasets, Reshaping and pivoting. |
| UNIT-IV (10 Hrs) | DATA VISUALIZATION WITH MATPLOTLIB Plotting and visualization- A brief matplotlib API primer, Plotting with Pandas and Seaborn, Other python visualization tools; Data aggregation and Group operations Group By mechanics, Data aggregation, Apply: General split-apply-combine, Pivot tables and Cross-tabulation. |
| UNIT-V (8 Hrs) | TIME SERIES ANALYSIS Date and time data types and tools, Time series basics, Date ranges, Frequencies, and shifting. Time zone handling, Periods and period arithmetic, Resampling and frequency Conversion – Downsampling, upsampling and interpolation, Resampling with periods; Moving window functions. |
| Text Books: | |
| 1. | Wes McKinney, Python for Data Analysis, O'Reilly, 2nd Edition, 2017 |
| Reference Books: | |
| 1. | Sinan Ozdemir, Principles of Data Science, Packt Publishers, 2nd Edition, 2018. |
| 2. | Rachel Schutt, Cathy O'Neil, Doing Data Science: Straight Talk from the Frontline, O'Reilly, 2014. |
| ADDITIONAL LEARNING RESOURCES: | |
| 1 | https://swayam.gov.in/nd1_noc19_cs60/preview |
| 2 | https://towardsdatascience.com/ |
| 3 | https://www.w3schools.com/datascience/ |
| 4 | https://github.com/jakevdp/PythonDataScienceHandbook |
| 5 | https://www.kaggle.com |

| Subject Code | Category | L | T | P | C | I.M | E.M | Exam |
|--------------|----------|---|----|----|---|-----|-----|--------|
| B20CB3204 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

DISTRIBUTED OPERATING SYSTEMS

(For CSBS)

Course Objectives: The objective of this course is to make the student learn about

1. Fundamentals of distributed systems and communication aspects in distributed environment.
2. Synchronization of system clocks and synchronization of processes based on system clocks.
3. File system implementation in distributed systems and shared memory models.

Course Outcomes: By the end of the course, the student will be able to

| S.No | Outcome | Knowledge Level |
|------|--|-----------------|
| 1. | Understand the ways of communication in distributed environment. | K2 |
| 2. | Understand how synchronization of clocks and sharing of resources among processes happen in distributed systems. | K2 |
| 3. | Understand issues related to communication among processes. | K2 |
| 4. | Understand file system design and implementation for distributed systems. | K2 |
| 5. | Understand working of various shared memory systems. | K2 |

SYLLABUS

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| UNIT-I (8 Hrs) | Introduction to Distributed Systems: Introduction, Goals, Hardware concepts, Software Concepts, Design Issues. Communication in Distributed System: Client-Server Model, Remote Procedure Call. |
| UNIT-II (8 Hrs) | Synchronization in Distributed Systems: Clock Synchronization- Logical clocks, Physical Clocks, Clock Synchronization Algorithms and Use of Synchronized Clocks. Mutual Exclusion- Centralized Algorithm, Distributed Algorithm Token Ring Algorithm, Their Comparison. Election Algorithms- Bully and Ring Algorithm, Deadlocks in Distributed Systems- Detection and Prevention. |
| UNIT-III (12 Hrs) | Processes and Processors in Distributed Systems: Concept of Threads- Introduction, Usage, Design Issues for Threads Package and Implementing a Threads Package. System Models- Work Station Model, Processor Pool model and Hybrid model. Processor Allocation- Allocation Models, Design Issues, Implementation Issues and Examples. |
| UNIT-IV (8 Hrs) | Distributed File Systems: Distributed File System Design- The File Service Interface, The Directory Service Interface, Semantics of File Sharing. Distributed File System Implementation- File usage, System Structure, Caching, Replication. Trends in |

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| | Distributed file system. |
| UNIT-V (12 Hrs) | Distributed Shared Memory: Introduction, Bus-Based, Ring-Based, Switched and NUMA Multiprocessors, Consistency Models, Page-Based DSM, Shared-Variable DSM, Object-Based DSM. |
| Text Books: | |
| 1. | Distributed Operating Systems by Andrew S Tenenbaum, Pearson Education. |
| 2. | Distributed Operating Systems Concepts and Design by Pradeep K Sinha PHI Learning |
| Reference Books: | |
| 1. | M Van Steen and A S Tenenbaum, Distributed Systems, 3 rd Edn, Distributed-Systems.net |



| Code | Category | L | T | P | C | I.M | E.M | Exam |
|---|---|---|----|----|---|-----|-----|-----------------|
| B20CB3205 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |
| MODERN WEB APPLICATIONS | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: | | | | | | | | |
| 1. | To enable students to develop modern web application by leveraging latest technologies | | | | | | | |
| 2. | To build strong foundation in students making them job ready as per industry requirements | | | | | | | |
| 3. | To enable them to learn new technologies by applying foundation paradigms | | | | | | | |
| 4. | To building strong expertise to develop end to end application - web frontend and backend development | | | | | | | |
| Course Outcomes: By the end of the course, the student will be able to | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1. | Build static and dynamic web pages with HTML, XML, JSON | | | | | | | K4 |
| 2. | Create Dynamic web pages using CSS and Java Script | | | | | | | K4 |
| 3. | Understand the concepts, analyse and build interactive web applications | | | | | | | K4 |
| 4. | Apply various frameworks of web technologies to optimize the applications | | | | | | | K3 |
| SYLLABUS | | | | | | | | |
| UNIT-I (10Hrs) | Introduction: Concept of website, its need and purpose, Types of websites: Static and dynamic website, Introduction to HTML, XML, JSON, Web Browsers, – Web Servers, Uniform Resource Locator, Tools and Web Programming Languages. Web Standards, Tiered Architecture: Client Server Model, Three Tier Model, Service Oriented Architectures, REST services | | | | | | | |
| UNIT-II (10 Hrs) | Hypertext Mark Up Language: Languages used for website development, HTML5: basic tags, formatting tags, Adding images, Lists, Embedding multimedia in Web pages, Inserting tables, Internal and External Linking, Frames, Forms | | | | | | | |
| UNIT-III (10 Hrs) | Cascading Style Sheets (CSS3): Basics of Cascading Style sheets, Advantages of CSS, External Style sheet, Internal style sheet, Inline style sheet, CSS Syntax, color, background, Font, images | | | | | | | |
| UNIT-IV (10 Hrs) | Java Script: Features of JavaScript, extension of JavaScript, Syntax of JavaScript: data types, operators, variables, tag, Document Object Model (DOM) with JavaScript, Selection Statement using if and Switch, Iterative statement: for, for/in, while, do while, break and continue | | | | | | | |

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| UNIT-V (10 Hrs) | Front End Framework: Introduction to jQuery - Syntax, Selectors, Events, Traversing, AJAX; Introduction to Bootstrap – Basics, Grids, Themes; Angular JS – Expressions, Modules, Data Binding, Scopes, Directives & Events, Controllers, Filters, Services, Validation |
| Textbooks: | |
| 1. | Internet and World Wide Web: How to Program, Deitel P. J., Deitel H. M. and Deitel A. 5th Edition, Pearson Prentice Hall, 2012 |
| 2. | HTML & CSS: Design and Build Websites, Jon Duckett, John Wiley & Sons |
| Reference Books: | |
| 1. | Programming the World Wide Web, Sebesta R. W, 8th edition, Pearson, 2014 |
| 2. | Web Engineering: a practitioner's approach, Pressman R. and Lowe D, 1st Edition, Mc GrawHill, 2008 |
| 3. | Web Engineering: The Discipline of systematic Development of Web Applications, Kappel G., et al, 1st Edition, John Wiley & Sons, 2006 |
| 4. | Web Engineering: Principles and Techniques, Suh W, Idea Group Inc, 2005 |
| 5. | PHP for the Web: Visual Quick Start Guide, Ullman L, 5th Edition, Peachpit Press, 2016 |



| Code | Category | L | T | P | C | I.M | E.M | Exam |
|--|--|---|----|----|---|-----|-----|-----------------|
| B20CB3206 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |
| MOBILE COMPUTING | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: | | | | | | | | |
| 1. | To understand the fundamentals of mobile communication. | | | | | | | |
| 2. | To understand the architecture of various Wireless Communication Networks. | | | | | | | |
| 3. | To understand the significance of different layers in mobile system Course Contents. | | | | | | | |
| Course Outcomes By the end of the course, the student will be able to | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1. | Develop a strong grounding in the fundamentals of mobile Networks | | | | | | | K4 |
| 2. | Apply knowledge in MAC, Network, and Transport Layer protocols of Wireless Network | | | | | | | K3 |
| 3. | Comprehend, design, and develop a lightweight network stack. | | | | | | | K4 |
| 4. | Analyze the Mobile Network Layer system working | | | | | | | K4 |
| 5. | Explain about the WAP Model | | | | | | | K2 |
| SYLLABUS | | | | | | | | |
| UNIT-I (10Hrs) | Introduction to Wireless Networks: Applications, History, Simplified Reference Model, Wireless transmission, Frequencies, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular Systems: Frequency Management and Channel Assignment, types of hand-off and their characteristics. | | | | | | | |
| UNIT-II (10 Hrs) | MAC – Motivation, SDMA, FDMA, TDMA, CDMA, Telecommunication Systems, GSM: Architecture Location tracking and call setup, Mobility management, Handover, Security, GSM, SMS, International roaming for GSM, call recording functions, subscriber and service data management, DECT, TETRA, UMTS, IMT-2000. | | | | | | | |
| UNIT-III (10 Hrs) | Wireless LAN: Infrared vs. Radio transmission, Infrastructure, Adhoc Network, IEEE 802.11WLAN Standards, Architecture, Services, HIPERLAN, Bluetooth Architecture & protocols. | | | | | | | |
| UNIT-IV (10 Hrs) | Mobile Network Layer: Mobile IP, Dynamic Host Configuration Protocol, Mobile Transport Layer, Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/Fast recovery, Transmission/Time-out freezing, Selective retransmission, Transaction Oriented TCP. | | | | | | | |

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| UNIT-V (10 Hrs) | Support for Mobility: Wireless Application Protocol: Architecture, Wireless Datagram Protocol, Wireless Transport Layer Security, Wireless Transaction Protocol, Wireless Session Protocol, Wireless Application Environment, Wireless Markup Language, WML Scripts, Wireless Telephone Application. . |
| Textbooks: | |
| 1. | Jochen Schiller, “Mobile Communication”, Second Edition, Pearson Education, 2008. |
| 2. | Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier. |
| Reference Books: | |
| 1. | William Stallings, “Wireless Communications and Networks”, Second Edition, Pearson Education, 2004. |
| 2. | C. Siva Ram Murthy, B. S. Manoj, “Adhoc Wireless Networks: Architectures and Protocols”, Second Edition, Pearson Education, 2008. |
| e-Resources | |
| 1. | https://nptel.ac.in/courses/106/106/106106147/# |
| 2. | https://www.tutorialspoint.com/android/index.htm |



| Code | Category | L | T | P | C | I.M | E.M | Exam |
|-----------|----------|---|----|----|---|-----|-----|--------|
| B20CB3207 | PE | 3 | -- | -- | 3 | 30 | 70 | 3 Hrs. |

ROBOTICS AND EMBEDDED SYSTEMS

(For CSBS)

Course Objectives:

1. To understand the fundamentals of embedded systems.
2. To understand the architecture and features of microcontrollers.
3. To understand the significance of elements of robots.

Course Outcomes: By the end of the course, the student will be able to

| S.No | Outcome | Knowledge Level |
|------|---|-----------------|
| 1. | Understand microcontrollers embedded processors and their applications. | K2 |
| 2. | Understand the internal architecture and interfacing of different peripheral devices with Microcontrollers. | K2 |
| 3. | Understand the role of embedded systems in industry. | K2 |
| 4. | Understand the design concept of embedded systems. | K2 |
| 5. | Design and engineer autonomous robots using various sensors. | K4 |

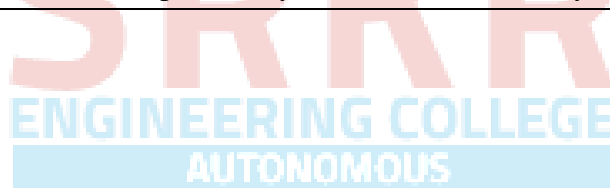
SYLLABUS

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|------------------------------|--|
| UNIT-I (10Hrs) | Introduction to Embedded System: Embedded system Vs General computing systems, History of Embedded systems, Purpose of Embedded systems, Microprocessor and Microcontroller, Hardware architecture of the real time systems. |
| UNIT-II (10 Hrs) | Devices and Communication Buses: I/O types, serial and parallel communication devices, wireless communication devices, timer and counting devices, watchdog timer, real time clock, serial bus communication protocols, parallel communication network using ISA, PCI, PCT-X, Internet embedded system network protocols, USB, Bluetooth. |
| UNIT-III (10 Hrs) | Program Modeling Concepts: Fundamental issues in Hardware software co-design, Unified Modeling Language (UML), Hardware Software trade-offs DFG model, state machine programming model, model for multiprocessor system. |
| UNIT-IV (10 Hrs) | Real Time Operating Systems: Operating system basics, Tasks, Process and Threads, Multiprocessing and multitasking, task communication, task synchronization, qualities of good RTOS. . |
| UNIT-V (10 Hrs) | Examples of Embedded System: Mobile phones, RFID, WISENET, Robotics, Biomedical Applications, Brain machine interface etc. Popular microcontrollers used in |

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| | <p>embedded systems, sensors, actuators.</p> <p>Robotics: Introduction, Elements of robots -- joints, links, actuators, and sensors</p> <p>Kinematics: Kinematics of serial robots, Kinematics of parallel robots, Motion planning and control</p> <p>Advanced Topics on Robotics: Sensing distance and direction, Line Following Algorithms, Feedback Systems, Other topics on advance robotic techniques.</p> |
| Textbooks: | |
| 1. | Jochen Schiller, "Mobile Communication", Second Edition, Pearson Education, 2008. |
| 2. | Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier. |
| Reference Books: | |
| 1. | Introduction to Embedded Systems: Shibu K. V. (TMH) |
| 2. | Embedded System Design – A unified hardware and software introduction: F. Vahid (John Wiley) |
| 3. | Embedded Systems: Raj Kamal (TMH) |
| 4. | Embedded Systems: L. B. Das (Pearson) |
| 5. | The 8051 Microcontroller and embedded systems by Muhammad Ali Mazidi, PHI. |
| 6. | Robotics: Fundamental Concepts and Analysis, Oxford University Press |
| 7. | Introduction to Embedded Systems: Shibu K. V. (TMH) |
| 8. | Embedded System Design – A unified hardware and software introduction: F. Vahid (John Wiley) |
| e-Resources | |
| 1. | Embedded System design: S. Heath (Elsevier) |
| 2. | Embedded microcontroller and processor design: G. Osborn (Pearson) |
| 3. | Embedded systems design by Steve Heath, Newness. |

| Code | Category | L | T | P | C | I.M | E.M. | Exam |
|---|--|----|----|---|-----|-----|------|-----------------|
| B20CB3209 | PC | -- | -- | 3 | 1.5 | 15 | 35 | 3 Hrs. |
| COMMUNICATION AND LEADERSHIP DEVELOPMENT WORKSHOP | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: Students are expected to learn | | | | | | | | |
| 1. | Introduce the basics of communication and decision making in business | | | | | | | |
| 2. | Writing for the Web | | | | | | | |
| 3. | All about Leaders and Leadership | | | | | | | |
| 4. | How Innovative Leaders Manage in the Digital age | | | | | | | |
| Course Outcomes: After completion of the course, the student will be able to | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1. | Understand the Role of Communication and Decision making in business | | | | | | | K2 |
| 2. | Write for the Web | | | | | | | K3 |
| 3. | Know the role of leaders and leadership | | | | | | | K2 |
| 4. | Understand how Innovative Leaders Manage in the Digital age | | | | | | | K2 |
| SYLLABUS | | | | | | | | |
| UNIT-I (10 Hrs) | Business Correspondence: Basics of Communication and Types of communication: Process of communication, components of communication, factors of communication, types of communication, barriers to communication | | | | | | | |
| UNIT-II (10 Hrs) | Formats of letter writing, Basics of Business Writing – 3 x 3: Writing Process: Pre-writing, Writing and Revising; Pre-writing: Analyze –Anticipate –Adapt, Organizing and Writing Business Messages – Researching Data and Gathering Ideas, Organizing Data, Composing the First Draft, Revising, proofreading; Evaluating Business Message Routine Letters and Goodwill Messages: Direct and Indirect Pattern, Types of Routine Letters Request Letters, Reply Letters, Recommendation Letter, Claims and Adjustment Letters, Complaint letters, sales letters, Kinds of Memos – Procedure and Information Memos, Request and Reply Memos, Confirmation Memos. Employment Communication – Preparing Resumes; Types of Resumes – Chronological, Functional and Combination; Application Letters – AIDA Approach; Reference Request Letter; Job Inquiry Letter; Resume Follow up Letter; Interview Follow Up Letter; Rejection Letter; Interviewing for Employment. | | | | | | | |
| UNIT-III | Managing the internationalization Process: and Leading through transformation. | | | | | | | |

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| (12 Hrs) | Social networking sites – Blogs - Business forums; Technology- enabled communication: Tools for Constructing, presenting, transmitting and collaborating messages. |
| UNIT-IV (12 Hrs) | Defining a Leader, Types of Leadership and styles, Leader vs. Manager, Introduction to Meta Theory of Leadership. |
| UNIT-V (10Hrs) | The internet as an environment for Business Eco systems: Michael Dell, Dell Computers, Keeping close to consumers, Tran cultural competence through 21 reconciliations |
| Text Books: | |
| 1. | The 5 Levels of Leadership: Proven Steps to Maximize Your Potential, by John C. Maxwell, 2011 |
| 2. | Business Communication Today – Bovee Thill Schatzman – Seventh Edition. |
| 3. | Business Communication – Connecting in a Digital World, Lesikar, Flatley, Rentz, Lentz, Pande, 13th Edition, Mc Graw Hill. |
| Reference Books: | |
| 1. | Leading Minds: An Anatomy of Leadership, by Howard E. Gardner and Emma Laskin, 2011 |
| 2. | Start with Why: How Great Leaders Inspire Everyone to Take Action, by Simon Sinek, 2011 |



| Code | Category | L | T | P | C | I.M | E.M | Exam |
|--|--|---|----|---|-----|-----|-----|-----------------|
| B20CB3210 | PC | - | -- | 3 | 1.5 | 15 | 35 | 3 Hrs. |
| MACHINE LEARNING USING PYTHON LAB | | | | | | | | |
| (For CSBS) | | | | | | | | |
| Course Objectives: This course will enable students to | | | | | | | | |
| 1 | Learn and understand different Data sets in implementing the machine learning algorithms. | | | | | | | |
| Course Outcomes: After completion of the course, the student will be able to | | | | | | | | |
| S.No | Outcome | | | | | | | Knowledge Level |
| 1 | Implement procedures for the machine learning algorithms | | | | | | | K3 |
| 2 | Design and Develop Python programs for various Learning algorithms | | | | | | | K4 |
| 3 | Apply appropriate data sets to the Machine Learning algorithms | | | | | | | K3 |
| 4 | Develop Machine Learning algorithms to solve real world problems | | | | | | | K4 |
| SYLLABUS | | | | | | | | |
| Requirements: Develop the following program using Anaconda/ Jupiter/ Spider and evaluate ML models. | | | | | | | | |
| 1 | Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file. | | | | | | | |
| 2 | For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples. | | | | | | | |
| 3 | Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample. | | | | | | | |
| 4 | Exercises to solve the real-world problems using the following machine learning methods: a) Linear Regression b) Logistic Regression c) Binary Classifier | | | | | | | |
| 5 | Develop a program for Bias, Variance, Remove duplicates , Cross Validation | | | | | | | |
| 6 | Write a program to implement Categorical Encoding, One-hot Encoding | | | | | | | |
| 7 | Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets. | | | | | | | |
| 8 | Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. | | | | | | | |
| 9 | Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs. | | | | | | | |
| 10 | Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set. | | | | | | | |

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| 11 | Apply EM algorithm to cluster a Heart Disease Data Set. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program. |
| 12 | Exploratory Data Analysis for Classification using Pandas or Matplotlib. |
| 13 | Write a Python program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set |
| 14 | Write a program to Implement Support Vector Machines and Principle Component Analysis |
| 15 | Write a program to Implement Principle Component Analysis |

Reference Books:

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|---|---|
| 1 | Machine Learning Probabilistic Approach, Kevin P. Murphy, MIT Press, 2012 |
|---|---|



| Code | Category | L | T | P | C | I.M | E.M | Exam |
|-----------|----------|----|----|---|-----|-----|-----|--------|
| B20CB3211 | PC | -- | -- | 3 | 1.5 | 15 | 35 | 3 Hrs. |

DATA SCIENCE LAB

(For CSBS)

Course Objective:

To impart knowledge on data manipulation and exploratory data analysis concepts that is vital for data science.

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

| S.No | Outcome | Knowledge Level |
|------|---|-----------------|
| 1 | Demonstrate efficient storage and data handling methods in NumPy to perform mathematical computations vital for data science. | K4 |
| 2 | Apply Data Preparation and Exploration methods using Pandas to gain insights about raw data and transform quality data to perform analysis. | K4 |
| 3 | Create data visualization using charts, plots and histograms to identify trends, patterns and outliers in data importing Matplotlib and Seaborn | K4 |
| 4 | Develop methods to analyze and interpret time series data to extract meaningful statistics. | K4 |
| 5 | Work independently or in teams to solve problems with effective communication. | K4 |

LIST OF EXPERIMENTS

| | |
|---|--|
| 1 | <p>Array Computations using NumPy</p> <ol style="list-style-type: none"> a. Perform arithmetic operations using array. b. Perform slicing and indexing on multi-dimensional arrays. c. Perform computations on multi-dimensional array using universal functions(ufunc). d. Compute arithmetic mean, standard deviation, variance, percentile, minimum and maximum, cumulative sum and product using statistical functions in NumPy. e. Perform set theory operations such as union, intersection, symmetric difference and fetching unique values. |
| 2 | <p>Linear Algebra and Random Number generation using linalg and random module in NumPy</p> <ol style="list-style-type: none"> a. Compute dot product, vector product and inner product of two arrays. b. Perform matrix operations such as multiplication, determinant, sum of diagonal elements and inverse. c. Compute eigenvalues, eigenvectors and singular value decomposition for a square matrix. d. Generate random samples from uniform, normal, binomial, chi-square and Gaussian distributions using numpy. random functions. e. Implement a single random walk with 1000 steps using random module and extract the |

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| | statistics like minimum and maximum value along the walk's trajectory. |
| 3 | <p>Data Manipulation using pandas</p> <ol style="list-style-type: none"> Create DataFrame from List, Dict, List of Dicts, Dicts of Series and perform operations such as column selection, addition, deletion and row selection, addition and deletion. Create a Data Frame and perform descriptive statistics functions such as sum, mean, median, mode, standard deviation, skewness, kurtosis, cumulative sum, cumulative product and percent changes. Implement the computation of correlation and covariance by considering the Data Frames of stock prices and volumes obtained from Yahoo Finance! Using pandas-data reader package. |
| 4 | <p>Working with different data formats using pandas</p> <ol style="list-style-type: none"> Perform reading and writing data in text format using read_csv and read_table considering any online dataset in delimited format (CSV). Perform reading and writing of Microsoft Excel Files (xlsx) using read_excel. |
| 5 | <p>Interacting with Web APIs and Databases</p> <ol style="list-style-type: none"> Predict the last 30 GitHub issues for pandas using request and response object's json method. Move the extracted data to DataFrame and extract fields of interest. (Use url:'https://api.github.com/repos/pandas-dev/pandas/issues') Connect to any relational database using corresponding SQL drivers and perform operations such as table creation, populating the table, selecting data from table, moving data from table to DataFrame, updating records and deleting records in a table. |
| 6 | <p>Data Cleaning and Preparation</p> <ol style="list-style-type: none"> Perform data cleaning by creating a DataFrame and identifying missing data using NA(Not Available) handling methods, filter out missing data using dropna function, fill the missing data using fillna function and remove duplicates using duplicated and drop_duplicates functions. Perform data transformation by modifying set of values using map and replace method and create transformed version of original dataset without modification using rename method. Create a DataFrame with normally distributed data using random sampling and detect possible outliers. Perform text manipulation with regular expression by applying relevant regular expression methods to split a string with a variable number of whitespace characters (tabs, spaces, and newlines) and get a list of all patterns matching. |
| 7 | <p>Data Wrangling</p> <ol style="list-style-type: none"> Perform hierarchical indexing by creating a series with a list of lists (or arrays) as the index, select subsets of data at outer and inner levels using partial indexing. Rearrange the tabular data with hierarchical indexing using unstack and stack method. Create two different DataFrames and merge them using index as merge key and combine data with overlap using combine_first method. |
| 8 | <p>Perform Data Visualization with Matplotlib and SeaBorn considering online dataset for processing.</p> <ol style="list-style-type: none"> Create a Line Plot by setting the title, axis labels, ticks, ticklabels , annotations on |

| | |
|---------------------------------------|---|
| | <p>subplots and save to a file.</p> <p>b. Create Bar Plots using Series and DataFrame index.</p> <p>i. Create bar plots with a DataFrame to group the values in each row together in a group in bars side by side for each value.</p> <p>ii. Create stacked bar plots from a DataFrame.</p> <p>c. Create Histogram to display the value frequency and Density Plot to generate continuous probability distribution function for observed data.</p> <p>d. Create Scatter Plot and examine the relationship between two one-dimensional data series.</p> <p>e. Create Box plots to visualize data with many categorical variables</p> |
| 9 | <p>Time Series Analysis</p> <p>a. Create time series using datetime object in pandas indexed by timestamps.</p> <p>b. Use pandas.date_range to generate a DatetimeIndex with an indicated length.</p> <p>c. Generate data ranges by setting time zone, localize time zone and convert to particular time 10zone using tz_convert and combine two different time zones.</p> <p>d. Perform period arithmetic such as adding and subtracting integers from periods and construct range of periods using period_range function.</p> <p>e. Convert Periods and PeriodIndex objects to another frequency with asfreq method.</p> <p>f. Convert Series and DataFrame objects indexed by timestamps to periods with the to_period method.</p> <p>g. Perform resampling, downsampling and upsampling for the time series.</p> |
| 10 | <p>Data Aggregation</p> <p>a. Create a tabular dataset as a DataFrame and split data into groups using group by method including single key and multiple key values. Select group by considering single and multiple columns.</p> <p>b. Compute summary statistics such as sum, mean and standard deviation for the grouped data using aggregate method.</p> <p>c. Use group by function to split data into groups based on one column, multiple columns, compute summary statistics and perform exploratory data analysis. Consider any online dataset for processing.</p> |
| SOFTWARE/Tools used: | |
| 1. | Python 3.8 |
| 2. | Python Libraries – NumPy, Pandas, Matplotlib, Seaborn, Beautiful Soup, Vader |
| 3. | Anaconda Framework |
| ADDITIONAL LEARNING RESOURCES: | |
| 1. | https://swayam.gov.in/nd1_noc19_cs60/preview |
| 2. | https://towardsdatascience.com/ |
| 3. | https://www.w3schools.com/datascience/ |
| 4. | https://github.com/jakevdp/PythonDataScienceHandbook |
| 5. | https://www.kaggle.com |

| Subject Code | Category | L | T | P | C | I.M | E.M | Exam |
|--------------|----------|---|----|---|---|-----|-----|-------|
| B20CB3212 | SOC | 1 | -- | 2 | 2 | | 50 | 3 Hrs |

Web Application Development Using Full Stack -Frontend Development –Module -II

Course Objectives: Students are expected to learn

| | |
|---|--|
| 1 | The objective of this lab is to build strong foundation of JavaScript which will help developer to apply JavaScript concepts for responsive web frontend development |
|---|--|

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

| | |
|---|--|
| 1 | develop of the major Web application tier- Client side development |
| 2 | participate in the active development of cross-browser applications through JavaScript |
| 3 | Develop JavaScript applications that transition between states |

SYLLABUS

Perform experiments related to the following concepts:

| | |
|---|--|
| A | <ol style="list-style-type: none"> 1) Introduction to JavaScript 2) Applying JavaScript (internal and external) 3) Understanding JS Syntax 4) Introduction to Document and Window Object 5) Variables and Operators 6) Data Types and Num Type Conversion 7) Math and String Manipulation 8) Objects and Arrays 9) Date and Time 10) Conditional Statements 11) Switch Case 12) Looping in JS 13) Functions |
|---|--|

| Course Code | Category | L | T | P | C | I.M | E.M | Exam |
|-------------|----------|---|----|---|---|-----|-----|-------|
| B20CB3213 | SOC | 1 | -- | 2 | 2 | | 50 | 3 Hrs |

ANDROID APPLICATION DEVELOPMENT

(For CSBS)

Course Objectives: On completing this course student will be able to

- | | |
|---|--|
| 1 | To learn how to develop Applications in android environment. |
| 2 | To learn how to develop user interface applications. |
| 3 | To learn how to develop URL related applications. |

SYLLABUS

| | |
|---|--|
| 1 | Create an Android application that shows Hello + name of the user and run it on an emulator. |
| 2 | Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button. |
| 3 | Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use <ul style="list-style-type: none"> a. Linear Layout , b. Relative Layout and c. Grid Layout or Table Layout. |
| 4 | Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a “Back” button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener. |
| 5 | Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents. |
| 6 | Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification. |
| 7 | Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message |
| 8 | Create a user registration application that stores the user details in a database table. |
| 9 | Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user. |

Note: Android Application Development with MIT App Inventor: For the first one week, the student is advised to go through the App Inventor from MIT which gives insight into the various properties of each component.

The student should pay attention to the properties of each components, which are used later in Android programming.

Following are useful links: 1. <http://ai2.appinventor.mit.edu>
2. https://drive.google.com/file/d/0B8rTtW_91YcITWF4czdBMEpZcWs/view

| 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 course as they are very important for any person to be placed in the industry | K3 |
| 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 |
| Estd. 1980 AUTONOMOUS | | | | | | | | |
| 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. | | | | | | | |

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|-------------------------|---|
| 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 |